

Growing Wetlands for Clean Water 2016 Update

Farmers now putting wetlands in the ground

Nutrient pollution is one of the biggest issues for the Mississippi River system, and Illinois contributes more nutrients to the Gulf of Mexico’s “dead zone” than any other state. But nutrient pollution is not just a “down the Mississippi” problem: Excessive nitrogen and phosphorus loadings are degrading water quality in local and regional water bodies throughout the Midwest, as recent events in Toledo and Des Moines have made clear. Various state and federal agencies are working on new rules and strategies to address nutrient pollution, but at the Wetlands Initiative (TWI) we believe on-the-ground steps don’t have to wait.

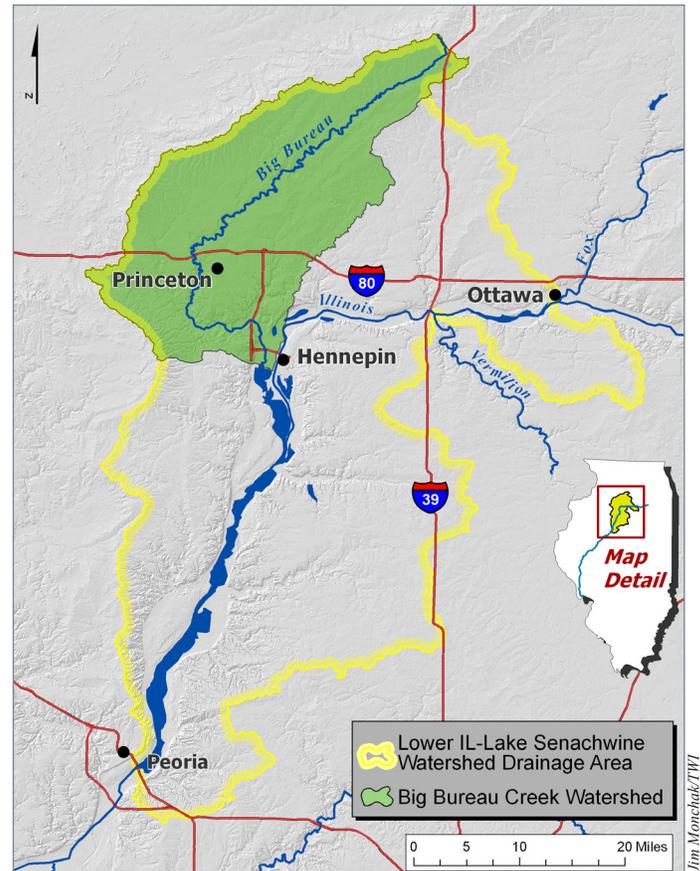
The largest source of Midwestern nutrient pollution is agricultural runoff containing excessive nitrogen and phosphorus. Common farm-based stewardship efforts have had some success in reducing sediment erosion and phosphorus runoff from the surface of fields, but a different approach is needed to reduce nitrogen runoff, since nitrogen primarily moves underground through drain tiles—buried pipes that carry water off farmland.

TWI is promoting adoption of small, precisely sited wetlands located in or adjacent to ditches or small tributaries on farms. This type of constructed wetland is designed to naturally remove nitrogen from tile-drainage flows before they enter a major stream, without taking large amounts of farmland out of production. Not only do these “in-line” wetlands remove nitrogen more efficiently and cost-effectively than almost any other method, they do it within the typical Midwest farm landscape full of drain tiles.

Of course, no single conservation practice will be able to achieve overall nutrient-reduction goals. Illinois’ recently released Nutrient Loss Reduction Strategy highlights a suite of practices that are needed, ranging from fertilizer management to cover crops to wetlands. In agricultural watersheds in Illinois, TWI has set out to advance the use of constructed wetlands as a feasible, effective conservation practice for Midwestern farmers to add to others they are implementing.

The Small Poster Child for a Big Problem

The Big Bureau Creek (BBC) Watershed in north-central Illinois totals 500 square miles, and three-fourths of it is in row crops. It is a subwatershed of the Lower Illinois–Lake Senachwine Watershed, which ranks 23rd out of 818



The Big Bureau Creek Watershed contributes a disproportionately high share of nitrogen to the Gulf of Mexico. It accounts for approximately 25% of the Lower Illinois–Lake Senachwine drainage area, which the U.S. Geological Survey ranked 23rd out of 818 watersheds for total nitrogen delivery.

watersheds in its size class across the entire Mississippi River Basin for total nitrogen output.

Part of the problem is that more than 90% of Illinois’ original wetlands have been lost through development and drainage, a pattern common among Midwestern states with high agricultural use. In the Big Bureau Creek Watershed, more than 40% of the land was once wetlands.

Also like other heavily agricultural areas in Illinois, use of nitrogen-removing conservation practices has been very low in the BBC Watershed. There is a great opportunity for increased stewardship in the watershed—and throughout the state—to improve water quality through a range of practices, and by using wetlands in particular.

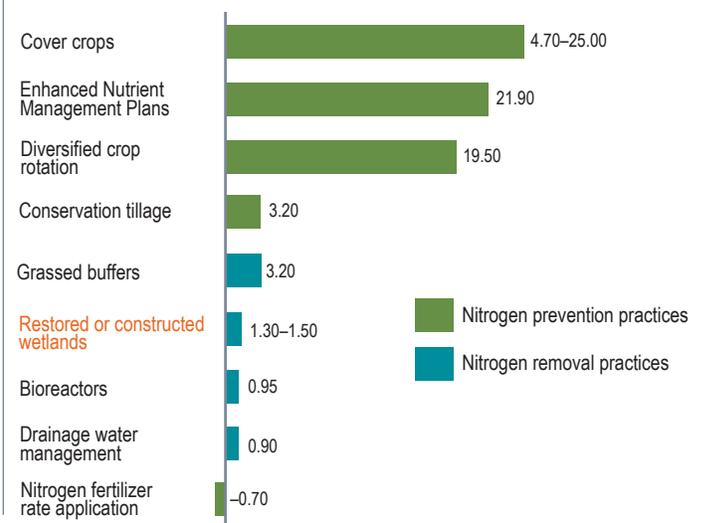


TWI's first constructed wetland was installed in Bureau County in August 2015. These small wetlands are sited along streams or drainage ways and are designed to naturally reduce excess nutrients leaving farm fields through tile lines.

World Resources Institute, 2/2010; Christianson et al., 2013

Comparison of nitrogen removal cost-effectiveness for select agricultural practices

(estimated average annual cost in \$/pound nitrogen removed)



Restored or constructed wetlands are one of the most cost-effective practices to reduce nitrogen runoff from farmland. Wetlands also provide benefits such as phosphorus and sediment removal and wildlife habitat.

A Practical (and Natural) Solution

Research has shown that wetlands are a highly effective nutrient-removal practice when carefully designed and sited within the agricultural landscape. The natural physical, biological, and chemical processes in a wetland capture and retain nutrients and, in the case of nitrogen, transform it into a harmless gas. The key is to position the wetlands in locations where they can most effectively reduce nitrogen loads.

In Iowa, the state's Department of Agriculture and Land Stewardship has installed dozens of in-line wetlands through its Conservation Reserve Enhancement Program and documented that they remove nitrogen and herbicides. The Iowa design is in the 10- to 40-acre range, of which more than half is buffer. The wetland portion is mostly within and along a ditch or stream, so the productive land a farmer loses is minimal; meanwhile, these scattered small wetlands also provide wildlife habitat, some flood storage, and some sediment retention.

As part of a modeling project, TWI applied the design criteria from the Iowa program to the Lime Creek Sub-watershed, a 50-square-mile portion of the BBC Watershed. The federal target for reducing nitrogen loads in the Mississippi River system so as to reverse the Gulf of Mexico's dead zone is 45%. Our watershed model found that placing in-line wetlands on just 7.7% of Lime Creek's farmed land area could reduce its nitrogen runoff by close to half!

Making These New Wetlands Happen

To achieve the overall target for nutrient reduction we'll need quite a number of in-line wetlands, even when combined with other conservation practices. A strength of our design is that the shallow wetlands are relatively easy to build and

their maintenance is simple, making wider use possible. Constructed wetlands are also a "long-life" practice; they can remain effective at cleaning water for 30 years or more.

TWI's early Big Bureau Creek outreach revealed that farmers' unfamiliarity with the wetland practice presented a barrier to implementation; they wanted to see these constructed wetlands installed locally so they could "kick the tires" in their own watershed. Over the past year, TWI provided technical assistance to farmers to install two in-line wetlands in the BBC Watershed and organized public expos to allow other farmers to learn about the practice hands-on.

Interest among Bureau County landowners in hosting these wetlands has now picked up sharply, and TWI staff are preparing wetland designs for several other farmers who have appropriate sites. TWI is also collaborating with the University of Illinois at Chicago to monitor and analyze nutrient removal at the first two wetland sites, which will document the water quality improvement and enable us to further optimize the design.

Meanwhile, we've initiated a partnership with the influential Illinois Corn Growers Association for farmer outreach, and we're in discussions with other farm-sector groups that can help spread this practice widely. In 2017–18, TWI will focus on expanding the project beyond the Big Bureau Creek Watershed into other agricultural watersheds across Illinois.

Funding for this project in 2015–16 has been provided by Clif Bar Family Foundation, Drive Current, Inc., Illinois Corn Growers Association, Illinois Nutrient Research & Education Council, The McKnight Foundation, New Belgium Brewing Company, Patagonia Chicago Magnificent Mile, The Siragusa Foundation, Walton Family Foundation, Winnetka Garden Club, Zea Mays Foundation, and individual donors to TWI.