

# Growing Wetlands for Clean Water 2015 Update

## Farmers now putting wetlands in the ground

Nutrient pollution is one of the biggest issues for the Mississippi River system, and the Illinois River Watershed is a huge contributor to it. 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 bodies of water 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 we believe on-the-ground steps don’t have to wait.

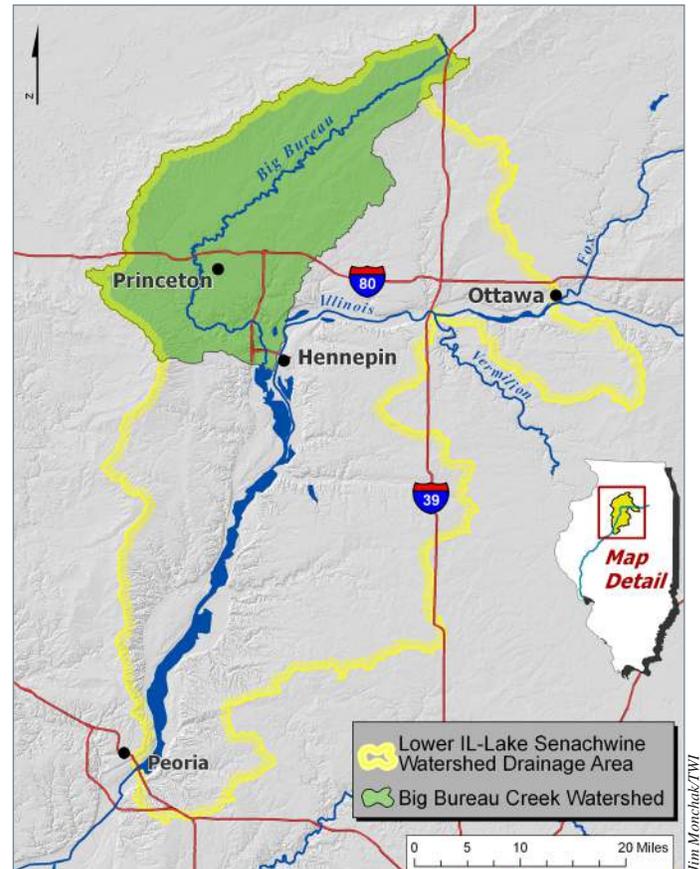
The largest source of Midwestern nutrient pollution is agricultural runoff containing excessive nitrogen and phosphorus. Common farm-based stewardship efforts have had some success in reducing sediment erosion and phosphorus runoff from the surface of fields, but a different approach is needed to reduce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

TWI is promoting adoption of precisely positioned, small wetlands located in or adjacent to ditches or small tributaries on farms. This particular type of constructed wetland removes nitrogen from tile-drainage flows before they enter a major stream, without taking large amounts of prime 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 field tiles.

Of course, no single conservation practice will be able to achieve overall nutrient-reduction goals; a suite of practices is needed. Some address the source of nutrients (fertilizer management, crop rotation, perennial crops); others reduce nutrient transport (cover crops, drainage water management); and still others like wetlands actually remove nutrients. In the Big Bureau Creek Watershed in north-central Illinois, TWI has set out to demonstrate that in-line wetlands are a very feasible and effective conservation practice for Midwestern farmers to add to their suite.

### The Small Poster Child for a Big Problem

The Big Bureau Creek Watershed totals 500 square miles, and three-fourths of it is in row crops. It is located within



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.

the Lower Illinois–Lake Senachwine Watershed; out of 818 watersheds in the same size class across the entire Mississippi River basin, the Lower Illinois–Lake Senachwine Watershed ranks 23rd for total nitrogen yield.

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 two-fifths of the land was once wetlands.

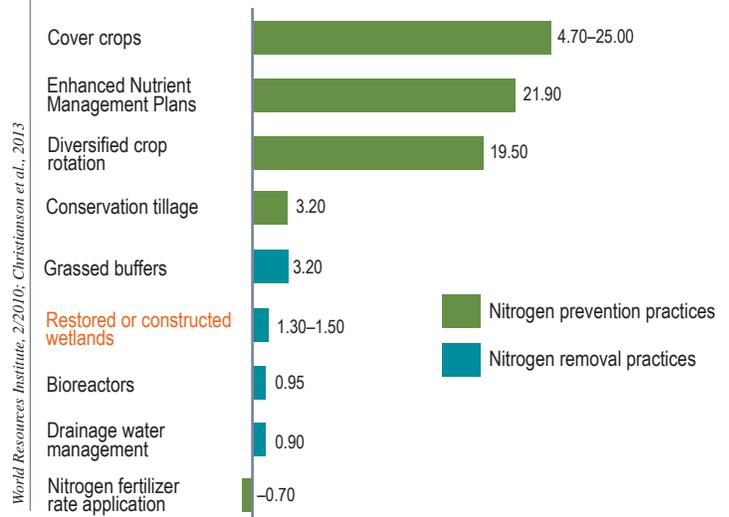
Also typical of other heavily agricultural areas in Illinois, landowner use of nitrogen-removing conservation practices has been very low in the Big Bureau Creek Watershed. There is a great opportunity for increased stewardship



The first in-line 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 nutrient loads leaving farm fields through tile lines.

### Comparison of nitrogen removal cost-effectiveness for select agricultural practices

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



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

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

in the watershed—and throughout the state—to improve water quality through a range of practices, and wetlands in particular.

### A Practical (and Natural) Solution

Research has shown that wetlands are a highly effective nutrient-removal practice when carefully designed and positioned 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 site the wetlands in locations where they can most effectively reduce nitrogen loads.

In northwestern Iowa, the state’s Department of Agriculture and Land Stewardship installed in-line wetlands through its Conservation Reserve Enhancement Program and documented that they remove nitrogen and herbicides. The state’s design is in the 10- to 40-acre range, of which more than half is buffer. The wetlands portion is mostly the bottom and banks of a ditch or stream, so the amount of 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 Subwatershed, a 50-square-mile part of the Big Bureau Creek 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%. The Lime Creek Subwatershed has about 13,000 acres of farmland, and our watershed model shows that just 1,000 acres of precisely placed in-line wetlands would reduce Lime Creek’s nitrogen load by 43%. In short,

just 7.7% of this land area could be used to reduce nitrogen pollution 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 the design we’ve adopted is that the shallow wetlands are relatively easy to build and their maintenance is simple—no pump or other machinery is needed—making wider use possible.

TWI’s Big Bureau Creek outreach has revealed that farmers’ unfamiliarity with the wetland practice presents a barrier to implementation. They want to see these constructed wetlands installed locally so they can “kick the tires” in their own watershed. Over the past year, interest among Bureau County landowners in hosting these wetlands picked up sharply, and TWI staff are now preparing wetland designs for several farmers who have appropriate sites.

The first TWI-designed in-line wetland was installed in the Big Bureau Creek Watershed in August 2015, with more to follow. Meanwhile, TWI is collaborating with the University of Illinois at Chicago to monitor and analyze nutrient removal at the first wetland sites, and we’re initiating partnerships with Illinois ag-sector groups on farmer outreach to help spread this practice widely.

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