



# North Raccoon Farm to River Partnership Project



*The North Raccoon Farm to River Partnership: an Iowa Water Quality Initiative to implement in-field and edge-of-field practices that keep nitrogen and phosphorus out of Iowa waters.*

## A new approach to watershed improvement

The North Raccoon Farm to River Partnership is putting a twist on the traditional approach to a watershed project. It is recruiting extra manpower to help spur adoption of farming conservation practices that reduce nitrogen and phosphorus entering waterbodies. The three-year project, launched last summer, covers five watersheds in Sac, Calhoun, Carroll and Greene counties.

Agriculture's Clean Water Alliance (ACWA) members and partners are expanding outreach for watershed improvement. By equipping the retail agronomists with knowledge about conservation practices, up implementation can scale up faster.

With more conservation practices on the ground, achieving the goals of the Iowa Nutrient Reduction Strategy could be reached sooner. The strategy, in place since 2012, offers a suite of practices farmers can adopt to help reduce nitrogen and phosphorus by 45 percent in waters entering the Mississippi River.

In December, ACWA hosted a workshop on conservation drainage in Lake City for more than 25 farmers and agronomists. Chris Hay, Iowa Soybean Association (ISA) senior environmental scientist, explained how bioreactors, saturated buffers and wetlands remove nitrogen from tile-drained water as it leaves row-crop fields. Attendees also learned about the approximate costs for these structures and ways to get them installed at little or no cost to the landowner through the project.

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### Spring 2019

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### GOALS:

**15**  
**BIOREACTORS**

**15**  
**SATURATED  
BUFFERS**

**2**  
**WETLAND  
DESIGN AND  
CONSTRUCTION**

**11,500**  
**COVER CROP  
ACRES**

# Bioreactors 101: Q and A with Chris Hay

A bioreactor is one of the edge-of-field practices listed for nitrate removal in the Iowa Nutrient Reduction Strategy. Iowa Soybean Association (ISA) Senior Environmental Scientist Chris Hay specializes in agriculture drainage and is one of the leading researchers on bioreactors. He answers some common questions on this nitrogen removal practice.

## WHAT IS A BIOREACTOR?

A bioreactor, or more formally— a denitrification bioreactor, is an edge-of-field structure designed to reduce nitrates in subsurface drainage before the water enters a river or stream. It consists of a shallow pit, approximately 4- to 6-feet deep, filled with woodchips and usually covered with soil. Control structures are used to route drainage water into the woodchips, control water flow through the bioreactor, and direct it back to the outlet. The design includes a bypass so that drainage in the field isn't impacted when drain flows exceed the bioreactor capacity.

## HOW DOES A BIOREACTOR WORK?

Microorganisms use the carbon in the woodchips as their food source and the nitrates in the water for respiration. This process converts the nitrates into nitrogen gas, reducing the amount of nitrate remaining in the water. The nitrogen gas escapes naturally into the atmosphere. Nitrate-nitrogen reduction from drainage water by bioreactors typically ranges from 30 to 60 percent.

How much does it cost to install one?

Costs for installing a bioreactor vary from about \$10,000 to \$25,000, depending on the size. Total costs include siting and design, contractor and equipment, and materials including the wood chips and their delivery, pipe and control structures.

Cost share is available through the Farm to River Partnership program, and farmers and landowners could incur minimal to zero costs to have a bioreactor installed. For more information, contact Roger Wolf at Iowa Soybean Association, [rwolf@iasoybeans.com](mailto:rwolf@iasoybeans.com).

## HOW LONG DOES A BIOREACTOR LAST?

Researchers are still exploring the answer to this question. Bioreactors are a new technology and the oldest ones in Iowa are now reaching the 10- to 12-year mark. We anticipate bioreactors to last 10-15 years, depending on the quality of the woodchips used. Researchers are analyzing types and sizes of woodchips and bioreactor management for the longest possible scenarios.

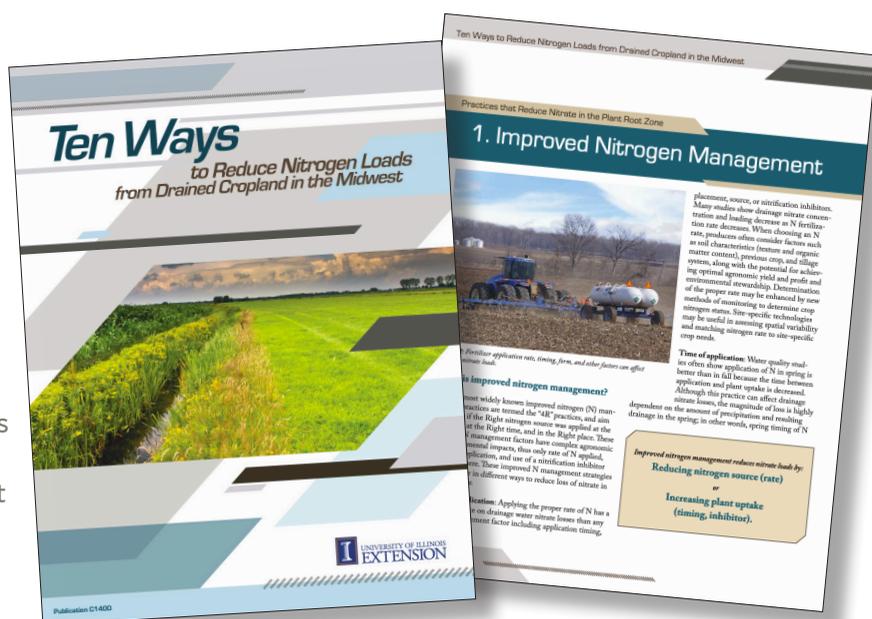
When carbon in the woodchips is no longer easily available, woodchip replacement will be necessary. There is some cost here to replace the woodchips but not nearly as much as the initial installation.

## HOW DO I KNOW IF IT IS WORKING?

Monitoring of tile water going into the bioreactor and coming out of the control structure is the only way we can accurately assess its performance. Occasional testing for nitrates will give some confidence that the bioreactor is still working. A drop in bioreactor performance is an indication that a change in management may be needed or, if the woodchips are old enough, that the woodchips may need to be replaced.

For more information, download the informative booklet: Ten Ways to Reduce Nitrogen Loads from Drained Cropland in the Midwest, which has detailed information on bioreactors at [http://draindrop.cropsci.illinois.edu/wp-content/uploads/2016/09/Ten-Ways-to-Reduce-Nitrate-Loads\\_IL-Extension-\\_2016.pdf](http://draindrop.cropsci.illinois.edu/wp-content/uploads/2016/09/Ten-Ways-to-Reduce-Nitrate-Loads_IL-Extension-_2016.pdf)

To see a time-lapse of a bioreactor installation, visit [iasoybeans.com](http://iasoybeans.com)



# Project progress

The North Raccoon Farm to River Partnership, launched in June 2018, offers funding for practices to improve water quality on rural lands in five sub-watersheds within the North Raccoon River basin.

Farm to River Partnership coordinator Diane Ercse is no longer with the project. If you are interested in any of these practices or opportunities, contact your local ag retailer or Roger Wolf at the Iowa Soybean Association: [rwolf@iasoybeans.com](mailto:rwolf@iasoybeans.com). Watch for news on a new project coordinator to come.

## BIOREACTORS

Funding = 100% paid  
Project goal = 15 installed

Work is progressing to install 15 bioreactors within the three-year project timeframe. Four bioreactors have been installed, several are in the design phase and more are being planned. If you are considering a bioreactor, contact your ag retailer now to begin the process.

## COVER CROPS

Funding = \$20/acre  
Project goal = 11,500 acres

The project goal to increase cover crop usage in the project area is making some headway. In just a few months, more than 1,700 acres were committed to cover crops, planted last fall for the first time.

## OTHER GOALS

Saturated buffers = 15, 100% paid

Targeted wetlands = 2,  
construction 100% paid, plus  
CRP payments 10-15 years

## PROJECT OPPORTUNITIES

Replicated strip trials to evaluate potential practices through the Iowa Soybean Association On-Farm Network®

Tile water monitoring at no expense to farmers

Whole farm conservation assessments, which can identify resources for other practices not covered by the grant

*Continued from page 1: Farm to River Partnership practices new approach*

“The conservation drainage session showed me the opportunities and options available for different landscapes,” said Jeff Frank, an ISA director who farms near Auburn in Sac County. “This session gave me ideas of what’s possible for my farm. I’m considering a bioreactor for this area as it won’t interfere with the farmed land.”

By training ag retail agronomists, more people can now advocate for water quality improvement. “Workshops such as this one, are a great way for our staff to learn about conservation practices,” said Gregg Schmitz with Nutrien Ag Solutions. “Our agronomists now have more knowledge to answer farmer questions. They can offer suggestions to clients on nutrient management and practices for better soil health, which will improve farmer productivity in the long run.”



1255 SW Prairie Trail Parkway  
Ankeny, Iowa 50023

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**ACWA MEMBERS IN THE FARM TO RIVER  
PARTNERSHIP AREA**

For more information on installing the conservation practices as part of the Farm to River Partnership, contact one of these ACWA retailers or Roger Wolf at the Iowa Soybean Association: [rwolf@iasoybeans.com](mailto:rwolf@iasoybeans.com).

**Landus Cooperative**  
Marc Schumacher, Lake City  
712-464-3141  
[www.landuscooperative.com](http://www.landuscooperative.com)

**Nutrien Ag Solutions**  
Gregg Schmitz, Wall Lake  
712-664-2444  
[www.nutrienagsolutions.com](http://www.nutrienagsolutions.com)

**NEW Cooperative, Inc.**  
Jeremy Swanson, Precision Ag Manager  
515-571-9714  
[www.newcoop.com](http://www.newcoop.com)



ACWA is a non-profit organization of 11 ag retailers in the Des Moines and Raccoon River watersheds, that agree water quality is vital to the future of farming. By helping their farmer clients with management options, adopt conservation practices, ACWA members are making strides toward the alliance's goals of farmer profitability combined with improving water quality.

[www.acwa-rrws.org](http://www.acwa-rrws.org)

