

# Confluence

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**Technology-based Tools are Helping with Nutrient Management and Reduction Efforts**

By definition, addressing nonpoint source pollution is inherently more challenging than addressing pollution from point sources. Point source pollution originates in effluent that is discharged regularly (such as daily) from fixed industrial and municipal wastewater treatment plants through permanent conduits such as pipes or ditches. Point sources are regulated under the National Pollution Discharge Elimination System (NPDES) program.



On the other hand, nonpoint source pollution originates from diffuse sources scattered across the landscape. It is delivered to water-bodies during runoff-producing precipitation events. The amount (volume) of runoff as well as chemical and biological pollutants in runoff can vary greatly among storm events. The polluting potential of runoff is affected by field and watershed-specific conditions such as soil type, slope, land cover, and upstream land use. This makes it harder to determine the impact of nonpoint sources on water quality and thus harder to control.

When applied to agriculture, it gets even more complicated, given all the different and varying management actions that can be made to a unit management parcel such as a field. These different management parcels fit together like puzzle pieces that collectively influence a watershed. In turn, collection of smaller watersheds make up larger watersheds until it's all integrated over the basin such as the Mississippi River basin.

While it's complicated and hard to manage, new technology-based tools are emerging that can help all of us better manage and reduce nutrient losses, such as the Agricultural Conservation Planning Framework Toolbox for Watershed Planning developed by Mark Tomer, S.A. Porter and D.E. James at the USDA-ARS National Laboratory for Agriculture and the Environment ([featured in the previous Confluence Newsletter, 3-1](#))

Another recently released tool is Iowa State's "The N Factor" (This Issue), an interactive web-based, educational tool for managing nitrogen in Iowa. This tool helps agricultural producers and those that serve them to better manage nitrogen and thus minimize nitrogen losses on individual fields by providing the user guidance on conservation practices that work for the site-specific uniqueness of individual management units.

These exciting new tools can be adapted to other States and can be valuable tools for farmers and conservational professionals alike, to help address the inherent complexities in addressing agricultural nonpoint source pollution. Tools such as these will continue to emerge to help us reduce our nutrient losses to the Gulf of Mexico.

Sincerely, your Co-Editors:

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## **New Research Tool Provides Water Quality Education**

John Lawrence, Matt Helmers, Jamie Benning

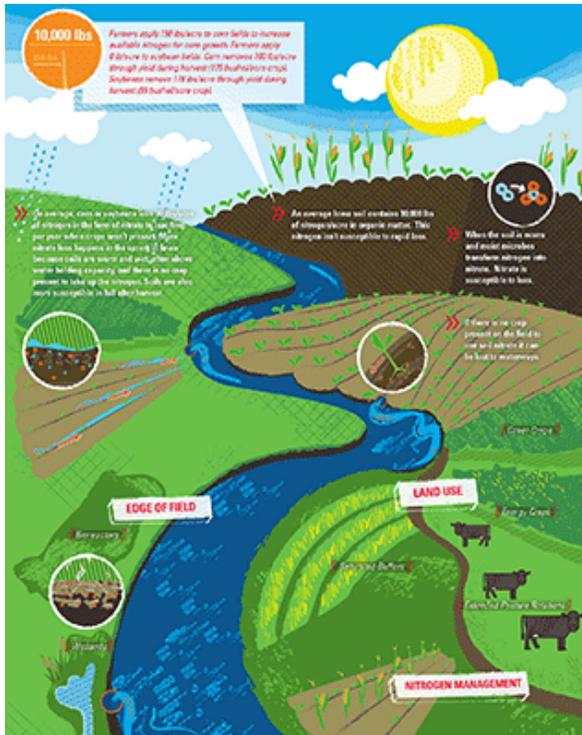
Iowa State University Extension and Outreach

*Editor's note: This tool was developed for soil and climate conditions in Iowa but could serve as a blueprint for other states to follow to develop a similar tool for their respective state*

Iowa State University Extension and Outreach wants Iowans to be informed about water quality and the management of nitrates. That's why "Managing the N Factor," a web-based tool that highlights practices to improve the quality of water throughout the state, was launched last week.

"Managing the N Factor" made its debut in conjunction with ISU Day at the Capitol on Feb. 9. ISU Extension and Outreach specialists and researchers introduced lawmakers to the new resource while walking them through facts about nitrates and the use of nitrogen in crop production.

"This new online tool provides access to the science-based research that is being conducted both on



campus and in the field, helping to educate all Iowans on what can be done to protect our natural resources,” said John Lawrence, associate dean for extension and outreach in the College of Agriculture and Life Sciences and director of Agriculture and Natural Resources. “The quality of our water is extremely important and Iowa State University will continue researching ways to improve that valuable natural resource.”

Virtually tour the application of research "Managing the N Factor" at [www.extension.iastate.edu/waterquality/](http://www.extension.iastate.edu/waterquality/). It takes visitors on a journey that begins with information on nitrogen and its natural place in Iowa’s soil. On average, soil in the state contains about 10,000 pounds of nitrogen per acre in organic matter.

Contrary to popular belief, nitrogen fertilizer is not the primary reason for nitrate loss. Most loss happens during the spring because the soil is wet and warm, often above its ability to retain water, and there are no crops present to take up the nitrogen. Because of a mismatch in timing between nitrate production from soil organic matter and nitrate demand from rapidly growing crops, some nitrate is lost.

Cover crops are being used more frequently to bridge that gap and take up excess nitrogen. Extended crop and pasture rotations, as well as the use of energy crops - crops used to make biofuels such as switchgrass and Miscanthus - are two other techniques being used to maximize nitrate reduction. On the edge of fields, farmers are building wetlands, installing saturated buffers and constructing bioreactors to improve the quality of the water leaving their farms.

"Managing the N Factor" also highlights new research being done by university scientists, discusses nutrient management, and provides videos and publications to further inform stakeholders about practices that minimize nitrate loss. The web-based tool demonstrates research findings associated with the science assessment used to develop the Iowa Nutrient Reduction Strategy.

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## Experts talk soil health - Newsletter articles

USDA NRCS

This series of short, but informative newsletter articles featuring experts from across the country will help your readers better understand the basics and benefits of improving the health of their soil. Feel free to download the files, share them on your web site or in your newsletters – and help “Unlock the Secrets in the Soil.”



[#1: Discover the cover: Farmers realize benefits, challenges of soil-improving cover crops](#)

[#2: When it comes to water, cover crops give more than they take, expert says](#)

[#3: No-till, cover crops go hand-in-hand to build healthy soils, expert says](#)

[#4: For maximum benefit, mix it up, cover crop expert recommends](#)

[#5: Many considerations 'in the mix' when choosing cover crops, expert says](#)

[#6: Different cover crops yield different benefits, expert says](#)

[#7: Expert: Cover crops key in preventing yield losses when converting to no-till](#)

[#8: Fence rows provide insights into restoring healthy soils, expert says](#)

[#9: 'Home-grown innovation' needed for wide-spread cover crop use, expert says](#)

[#10: Radishes offer advantages in cover crop mix, expert says](#)

[#11: Expert urges farmers to ask—and answer—five questions before cover cropping](#)

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## **Soil Health Partnership expands to 65 farm test sites for 2016**

### Soil Health Partnership

Twenty-five more farms have joined a groundbreaking research effort that could change the way farmers take care of their land. The Soil Health Partnership announced the addition of the new test sites at the 2016 Commodity Classic, March 3 – 5 in New Orleans.

This spring, the organization begins in its third year identifying, testing and measuring farm management practices that improve soil health. These include growing cover crops, practicing conservation tillage like no-till or strip-till, and using sophisticated nutrient management techniques.

The program's goal is to quantify the benefits of these practices from an economic standpoint, showing farmers how healthy soil benefits their bottom line. They also have positive environmental benefits, like protecting water from nutrient runoff.

The new farm sites are located in eight Midwestern states.

“It’s exciting that so many farmers want to test and share the impact soil health can have on the environment and farm economics with their peers,” said Nick Goeser, SHP director. “As a data-driven program, the success of our research depends upon these test sites, and we are indebted to them for their participation and enthusiasm.”

A farmer-led initiative of the National Corn Growers Association, the partnership receives funding from Monsanto and the Walton Family Foundation, as well as technical support from The Nature Conservancy and Environmental Defense Fund. Once enrolled, field managers from the partnership work with farmers to determine what practices might work best on their farms. They help the farmer gather soil, planting and tillage data from test plots.

Starting in the 2014 growing season with 20 farms, the partnership plans to gradually increase the number of demonstration farms in the program to 100. Once a grower enrolls, the test site is included in research for five years.

[See videos of Soil Health Partnership farmers](#)

### About the Soil Health Partnership

The Soil Health Partnership brings together diverse partner organizations including commodity groups, federal agencies, universities and environmental groups to work toward the common goal of improving soil health. Over a five-year period, the SHP will identify, test and measure farm management practices that improve soil health and benefit farmers. We believe the results of this farmer-led project will

provide a platform for sharing peer-to-peer information, and lend resources to benefit agricultural sustainability and profitability. An initiative of the National Corn Growers Association, we provide the spark for greater understanding and implementation of agricultural best practices to protect resources for future generations. For more, visit [soilhealthpartnership.org](http://soilhealthpartnership.org).

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## **Indiana NRCS and Farmers Working Together to Improve Water Quality in the Western Lake Erie Basin**

USDA NRCS

Although Indiana may seem far from the western shore of Lake Erie, the everyday activities of the people who live and work in six northeast counties can have an impact on the lake's water quality. That's because those Indiana counties are part of the seven million acre watershed that drains into Lake Erie.

The Western Lake Erie basin takes in northwest Ohio, as well as portions of northeast Indiana and southeast Michigan. In Indiana, the area includes parts of Steuben, DeKalb, Allen, Noble, Adams and Wells Counties.

Lake Erie provides drinking water for 11 million people, and has been designated a priority conservation area for the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) because of increased algal blooms due to higher levels of phosphorus in the surface water. These algal blooms diminish water quality and are harmful to fish and other aquatic wildlife.

Around 75 percent of the land in the watershed is in agricultural production while developed areas cover about 12 percent. Farms can be one of the contributing factors to the problem when excess phosphorus flows off fields and into nearby waterways during or after rain events.

Since 2008, the Indiana NRCS has invested more than \$9 million to help farmers install conservation practices on approximately 82,000 acres of farmland in this targeted area. And after one of the wettest summers on record, Indiana NRCS received an additional \$1.5 million last August to help farmers plant cover crops and install other conservation practices to control erosion, and improve infiltration using a systems approach to keep the soil in place and build soil health. NRCS also provides technical assistance to farmers and other landowners by helping them develop plans that will address natural resource concerns and improve sustainability on their land.

Working alongside NRCS are the other eight federal, state and local agencies that make up the Indiana Conservation Partnership (ICP). Together with private landowners we combine our services, tools and other types of support to minimize the impact of agriculture on Lake Erie and track the effectiveness of our efforts.

Many farmers in the six-county area have been using conservation practices for decades. Farmers like Kevin Bowman, who along with his father Bob, owns and operates Bowman and Bowman Farms, Inc. in DeKalb County were using no-till on their farm long before much was known about algal blooms or the benefits of soil health.

The Bowmans raise corn, soybeans and wheat on nearly 3,000 acres and have no-tilled since the early 1990's. Because of the heavy clay soils on their farm the Bowmans had to be innovative in order to make their operation pay off. They were early adopters of variable rate technology fertilizer application and for the past 10 years, they have used gypsum to help the water infiltrate the ground at a faster rate. To increase organic matter in the soil and manage runoff, they have incorporated cover crops and filter strips and they continually tweak their nutrient and pest management strategies on each and every acre they farm.

A few years ago, the Bowmans replaced tile risers with blind inlets. A blind inlet, also known as a French drain, is one of the new innovative practices being promoted by NRCS in the northeast part of Indiana. The structure is placed in the lowest point of farmed depressions or pot-holes to reduce the amount of sediment, and potentially other contaminants that would be transported to nearby ditches or streams and eventually find their way into Lake Erie. According to Kevin, the blind inlets are a win-win because they improve water quality and he no longer has to farm around the tile riser.

Finally, the Bowmans want to know if what they are doing is making a difference, so they have been working with a team of scientists from the USDA Agricultural Research Service (ARS) since 2002 to evaluate the effectiveness of different conservation practices on their land as part of the Conservation Effects Assessment Project (CEAP). CEAP is a multi-agency effort to quantify the environmental effects of conservation practices and programs and develop the science base for managing the agricultural landscape for environmental quality.

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/>

The Bowmans are just one example of the hundreds of farmers in the western Lake Erie watershed area who have voluntarily taken the initiative to put conservation practices on the ground to improve our water quality and soil health and their efforts are paying off. For example, according to the ICP's 2014 analysis of conservation practices installed, Indiana farmers kept almost 89,000 pounds of phosphorus from entering Lake Erie, enough to fill an Olympic sized swimming pool.

NRCS provides assistance through Farm Bill programs such as the Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP). These programs help farmers who want to voluntarily install conservation practices that help prevent nutrients, with an emphasis on phosphorus, and sediment from agricultural land from entering Lake Erie.

If you would like more information about the conservation practices and other services available in the six-county area, please contact your local NRCS District Conservationist or visit [www.in.nrcs.usda.gov](http://www.in.nrcs.usda.gov)

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## **Supreme Court Declines to hear Challenge to Chesapeake Bay Cleanup Plan**

Lee Riley University of Arkansas Division of Agriculture, Little Rock AR

The United States Supreme Court recently decided not to take up a case challenging the pollution control plan for the Chesapeake Bay watershed. The challenge claimed that the cleanup plan to implement Total Maximum Daily Loads (TMDL) to reduce nitrogen, phosphorus, and sediment exceeded the EPA's authority. Since the Supreme Court declined, the lower court's original interpretation of the Clean Water Act and its ruling in favor of the EPA now stands.

The EPA has compiled and documented Key Developments in the Chesapeake Bay Watershed TMDL implementation and cleanup plan.

[Judge Upholds Bay TMDL](#) (September 13, 2013)

[EPA Credits States for Making Progress in Bay Cleanup; Says More Effort Needed to Get Back on Track for a Restored Bay](#) (June 26, 2014)

[Experts Consider Chesapeake Bay an Ecosystem in Recovery](#) (February 3, 2015)

[Draft Management Strategies Available for Public Review](#) (March 16, 2015)

[EPA Issues Reports on Animal Agriculture Programs](#) (March 16, 2015)

[EPA Provides Interim Evaluations on Progress](#) (June 10, 2015)

[Unanimous Federal Court Decision Upholds Chesapeake Bay TMDL](#) (July 6, 2015)

[EPA Issues Reports on Maryland, Delaware and West Virginia Animal Agriculture Programs](#) (August 31, 2015)

[2016-2017 Milestones and 2014-2015 Milestone Progress Updates Submitted for Review](#) (January 15, 2016)

[Supreme Court Declines to Hear Bay TMDL Challenge](#) (February 29, 2016)

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## **USDA Launches \$41 Million Initiative to Improve Water Quality for Western Lake Erie Basin**

USDA NRCS

Agriculture Secretary Tom Vilsack announced that USDA's Natural Resources Conservation Service (NRCS) will invest \$41 million in a three-year initiative to support the work of farmers in Ohio, Michigan and Indiana to improve water quality in the Western Lake Erie Basin (WLEB). The initiative helps farmers and ranchers implement science-based conservation measures to reduce runoff from farms entering the region's waterways.

NRCS Chief Jason Weller unveiled the initiative today at an event with partners and stakeholders from the region at Maumee Bay State Park in Toledo, Ohio. This initiative will expand conservation and financial assistance opportunities available to WLEB farmers and ranchers who want to take additional steps to improve the quality of the water feeding the Lake. This funding is in addition to the \$36 million the Agency has already planned to make available in the basin through the 2014 Farm Bill, for a combined three-year investment of \$77 million to improve water quality and support sustainable production in the Basin.

"The challenges that face Lake Erie require science-based solutions and a commitment from all partners to address the factors that impact water quality. The area's farmers and ranchers have already made great strides in helping to reduce runoff, and with this new investment they will be able to do even more," said Vilsack. "Farmers and landowners will be able to add conservation measures to about 870,000 acres in this critical watershed, effectively doubling the acres of conservation treatment that can be accomplished in the three years."

Since 2009, NRCS has invested about \$73 million in technical and financial assistance to farmers in the Western Lake Erie Basin through Farm Bill Programs. The conservation improvements they have made through more than 2,000 conservation contracts now cover more than 580,000 acres. Farmers and landowners in the region have stepped up, and with their help the conservation practices these funds supported reduced annual nutrient and sediment losses by an estimated 7 million pounds of nitrogen, 1.2 million pounds of phosphorous, and 488,000 tons of sediment between 2009 and 2014. These savings have resulted in cleaner water leaving farmlands in the Basin.

NRCS also today released a new report through its [Conservation Effects Assessment Project](#) (CEAP) that evaluates the impacts of voluntary conservation in the WLEB and conservation treatment needs. The report, based on farmer survey data in the WLEB, shows voluntary conservation is making significant headway in reducing nutrient and sediment loss from farms, but there is opportunity to improve conservation management across the basin and no single conservation solution will meet the needs of each field and farm.

According to the report, this initiative will help landowners reduce phosphorus runoff from farms by more than 640,000 pounds each year and reduce sediment loss by over 260,000 tons over the course of the three-year investment.

"Throughout the basin, comprehensive field-scale conservation planning and conservation systems are needed to accommodate different treatment needs while maintaining productivity," said Chief Weller. "While voluntary conservation is making a difference in the basin, the CEAP evaluation tells us that there are still gains that can be made through an emphasis on practices like precision agriculture."

The WLEB Initiative is one of the key results of a series of partner workshops NRCS held in fall 2015 to develop recommendations for accelerating conservation in the Basin. The initiative further sharpens the focus of NRCS investments and helps increase the impact of ongoing work by conservation groups and state and local governments. This partnership will work with data from the CEAP Report and other sources along with the recommendations of farmers and other conservation partners to match the right

conservation solution to the unique qualities of each field to maximize the impact of each dollar invested.

Since 2009, USDA has invested more than \$29 billion to help producers make conservation improvements, working with as many as 500,000 farmers, ranchers and landowners to protect over 400 million acres nationwide, boosting soil and air quality, cleaning and conserving water and enhancing wildlife habitat. For an interactive look at USDA's work in conservation and forestry over the course of this Administration, visit <https://medium.com/usda-results>.

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