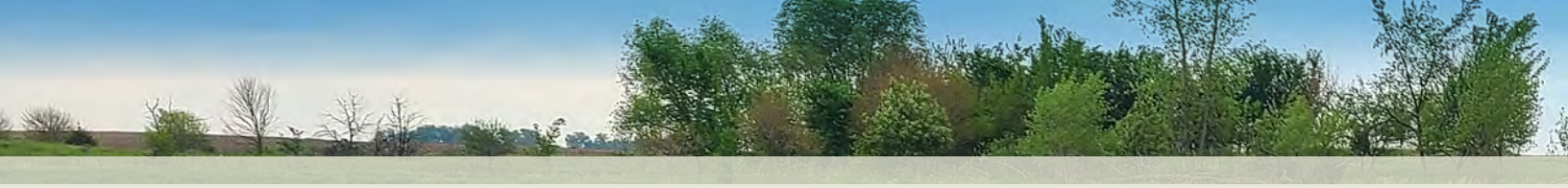
IOWA NUTRIENT RESEARCH CENTER

2024 ANNUAL REVIEW



MESSAGE FROM THE DIRECTORS

Researchers, from undergraduate students to long-tenured faculty, make up the heart of the Iowa Nutrient Research Center (INRC). It is their expertise, enthusiasm, passion and tireless effort that moves the science of nutrient reduction forward. Since the INRC was established in 2013, we have funded more than 145 projects, awarding approximately $17.6 million dollars to support the research of hundreds of scientists. Their critically important work has led to discoveries that have improved nutrient reduction practices and resulted in the development of new technologies.

INRC staff strive to broadcast researchers' findings to a variety of audiences through an array of communications and in-house and partner events. The INRC was particularly proud to highlight the work of current and former INRC-funded graduate students in our spring seminar series "Focus on the Future – Students & Their Contributions to Water Quality Research." These early career researchers provided insights on a wide range of topics including factors influencing the economic optimum N rate, water quality impacts of perennial ground cover in corn production systems, using blind inlets to reduce phosphorus loss in farmed potholes, improving the understanding of corn yield drag after cereal rye cover crops, spatiotemporal variability of soil, responses of wildlife to working lands and water conservation projects, and microbial communities as a pathway to improved bioreactor performance. We encourage you to watch or rewatch the recorded seminars on the INRC's website to learn more about these projects.

While the main purpose of the INRC is to advance the science of nutrient reduction, INRC funding has helped launch the scientific careers of numerous students. We look forward to watching their important contributions to this field for decades to come.

Matt Helmers, *Director* | **Kay Stefanik,** *Assistant Director*

INRC FUNDS NEW WATER QUALITY PROJECTS IN 2024

The Iowa Nutrient Research Center pursues science-based approaches to evaluating the performance of current and emerging nutrient management practices, providing recommendations on implementing the practices and developing new practices. Each year, a group of independent reviewers assist INRC in the selection of the most promising projects in research areas stakeholders have identified as important and timely. In 2024, INRC funded nine new projects in the following categories.

EDGE OF FIELD

- How Long Will Corncobs Improve Nitrogen Removal in Bioreactors?
- Two-stage Agricultural Channels in Iowa's Drained Landscape to Improve Water Quality and Long-term Resilience

MULTI-OBJECTIVE

- Incentivizing Conservation: Understanding Opportunities and Barriers That Influence Iowa Farmers' Decisions to Adopt Nutrient Management Conservation Practices Over Time
- Rural Iowa Communities' Water Quality Awareness, Engagement and Policy Preferences
- Watershed Scaling Effects Measured Via Nested High Frequency Sensors

NUTRIENT MANAGEMENT

- Evaluating Manure Application and Cover Crop Planting Timing to Maximize Water Quality Benefits in Corn
- Investigating Long-term Nutrient Trends and Short-term Orthophosphate Dynamics in a HUC12 Basin with Extensive Land Use Change
- Investigating the Fate of Nitrogen Fertilizer in Perennial Groundcover Corn Cropping Systems Using 15N Stable Isotope Labeling
- Quantifying Nutrient Load Reduction Practices at Multiple Field Sites

Visit **inrc.cals.iastate.edu/projects** for more details and updates about INRC-funded projects.

2024 INRC PROJECTS BY THE NUMBERS

9 PROJECTS AWARDED

>$1.31 MILLION FOR RESEARCH

>$27.4 MILLION LEVERAGED FUNDS

22 PEER-REVIEWED PUBLICATIONS

42 PRESENTATIONS

13 GRADUATE RESEARCHERS

20 UNDERGRADUATE RESEARCHERS

36 WORKSHOPS & FIELD DAYS

2024 ACTIVITIES

1 INRC held a spring roundtable event where researchers, farmers and other partners discussed priorities for Iowa nutrient reduction research.

2 INRC hosted a discussion and field tour for a small group of Chinese academics representing water resource and forestry disciplines who visited Iowa State University and the University of Iowa in May.

3 INRC staff led two workshops on the Iowa Nutrient Reduction Strategy (INRS) in June, in partnership with Iowa State University Extension and Outreach. The workshops aimed to enhance understanding of the INRS and familiarize participants with digital tools to estimate nutrient loss from fields.

4 INRC co-hosted a one-day multi-state Drainage Research Forum in September that brought together scientists, local officials, crop consultants, academics, contractors, farmers and government staff, to discuss agricultural drainage and related issues. Co-hosts were the University of Minnesota and South Dakota State University.

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OUTREACH & EDUCATION COLLABORATIVE EVENTS

INRC staff have participated in a wide variety of outreach and education events including:

- 3 Conservation on Tap events with Iowa Learning Farms to promote discussion of conservation practices for improving water quality and soil health with farmers, landowners and urban residents.
- 4 Crop Advantage and CropsTV talks on balancing tile drainage needs and nitrate losses.
- Nitrate testing water quality workshop with an environmental science class from Pleasant Hill High School.
- Presentation on water quality, soil health and the Iowa Nutrient Reduction Strategy, as well as an outdoor activity testing nitrate concentrations in surface water as part of the Water Rocks! teacher summit.
- Wetland and Beaver Dam Water Quality Workshop with Iowa Learning Farms in Mahaska County.
- Presentation to educators at the Iowa Conservation Education Coalition Winter Workshop, “Bringing the Iowa Nutrient Reduction Strategy into the Classroom with Conservation Case Studies.”
- Presentation to Iowa State Fair’goers at the DNR Courtyard, “Is That a Pond or a Wetland? How to Tell Ponds and Wetlands Apart and Why the Correct Name Matters.”
- Blog post contributions to Iowa Learning Farms, Conservation Learning Group, and Farm and Feedlot on nutrient reduction practices and water quality.

NEWS ABOUT RESEARCH

INRC news releases and features in 2024 included stories of collaboration for greater research impacts and findings from projects studying saturated grass waterways, farmers use of social media, drainage water recycling and corn cob bioreactors. Find the latest links to articles, events, related news and more on INRC's website at **inrc.cals.iastate.edu**.

INRC SEMINAR SERIES

The INRC continued its water quality research seminar series in 2024 with monthly hybrid presentations during the academic year. In the spring, INRC focused on the future as current and recent graduate students discussed their work on INRC-funded research projects.

A fall 2024 set of seminars highlighting trends in nutrients and water quality in large watersheds across the country was the center's most popular series to date. The four seminars, presented by leading water quality researchers, reviewed time-span data for watersheds recognized as important locally and nationally, including the Mississippi River and the Chesapeake Bay. Seminar recordings can be found at **inrc.cals.iastate.edu/video**.

PHOTOS

Cover
- Iowa State University graduate student, Daniel Edwards, samples macroinvertebrate communities from a restored wetland in central Iowa to learn about their ecological health and functioning. Photo by Charlie Loewen, lead researcher, INRC project, Co-benefits and Possible Unintended Consequences of Restoring Wetlands for Nutrient Reduction.
- Saturated grass waterway research (also on page 2). Photo by Clark Porter.
- Sunset at bioreactor research site. Photo by Michelle Soupir.
- Chinese delegation visit to study nutrient reduction practices (also on page 3). INRC photo.

Page 3
Photos associated with activities. INRC photos.

Page 4
- Conservation Reserve Enhancement Program wetland. Photo by Adam Janke.
- Conservation on Tap event at Lua Brewing in Des Moines. INRC photo.
- INRC water quality research seminar with graduate student Andrew Rupiper. INRC photo.

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- Iowa Department of Natural Resources
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- Nutrient researcher, State Association of Private Colleges
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- Vice President, Iowa State University Extension and Outreach
- Dean, College of Agriculture and Life Sciences, Iowa State University

STAFF

- Director, Matt Helmers
- Assistant Director, Kay Stefanik
- Program Specialist, Malcolm Robertson
- Accountant, Wendy Borja-Diaz
- Communications Specialist, Ann Y. Robinson

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CONTACT INFORMATION

inrc.cals.iastate.edu
inrc_wq@iastate.edu
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