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IOWA NUTRIENT RESEARCH CENTER

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Iowa Nutrient Research Center



Matt Helmers, Director

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Iowa Nutrient Reduction Strategy (NRS)

The science assessment identified N & P reduction practices in three categories — management practices, land use, and edge-of-field.

Nutrient Management practices involve nutrient application rate, timing, and method, plus use of cover crops and reduced tillage.

Land management practices include perennial energy crops, extended rotations, grazed pastures, and land retirement.

Edge-of-field practices involve drainage water management, wetlands, bioreactors, buffers, terraces, and sediment control.



The Iowa Nutrient Reduction Strategy was developed by:



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- The *Iowa Nutrient Research Center* was established by the Iowa Board of Regents in response to legislation passed by the Iowa Legislature in 2013.
- The center pursues science-based approaches to evaluating the performance of current and emerging nutrient management practices, and providing recommendations on implementing the practices and developing new NRS.



IOWA NUTRIENT RESEARCH CENTER – Who We Are



Matthew Helmers: Director, Iowa Nutrient Research Center, Dean's Professor in the College of Ag and Life Sciences, Professor, Department of Ag and Biosystems Engineering



Kay C Stefanik: Assistant Director



Malcolm Robertson: Program Coordinator



Ann Robinson: Communications Specialist

Wendy Borja-Diaz: Accountant

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Advisory Council

The original legislation identified members of the Center's advisory council.

- ✓ **Iowa Secretary of Agriculture**
- ✓ **IDALS Division of Soil Conservation and Water Quality**
- ✓ **Iowa Department of Natural Resources**
- ✓ **Nutrient researcher, University of Northern Iowa**
- ✓ **Nutrient researcher, State Association of Private Colleges**
- ✓ **Hydroscience and Engineering (IIHR), University of Iowa**
- ✓ **Vice President, Iowa State University Extension and Outreach**
- ✓ **Dean, College of Agriculture and Life Sciences, Iowa State University**



RFP Process

- Gather input on research needs from stakeholders
- Develop request for proposals
- Solicit proposals
- Review proposals to make funding decisions – Peer review of proposals

Iowa Nutrient Reduction Strategy (NRS)

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Nutrient Management

Awards

FY14	-	2
FY15	-	2
FY16	-	6
FY17	-	2
FY18	-	4
FY19	-	5
FY20	-	4
TOTAL	-	25

Land Management

Awards

FY14	-	1
FY15	-	3
FY16	-	3
FY17	-	1
FY18	-	3
FY19	-	2
FY20	-	5
TOTAL	-	18

Edge-of-Field Practices

Awards

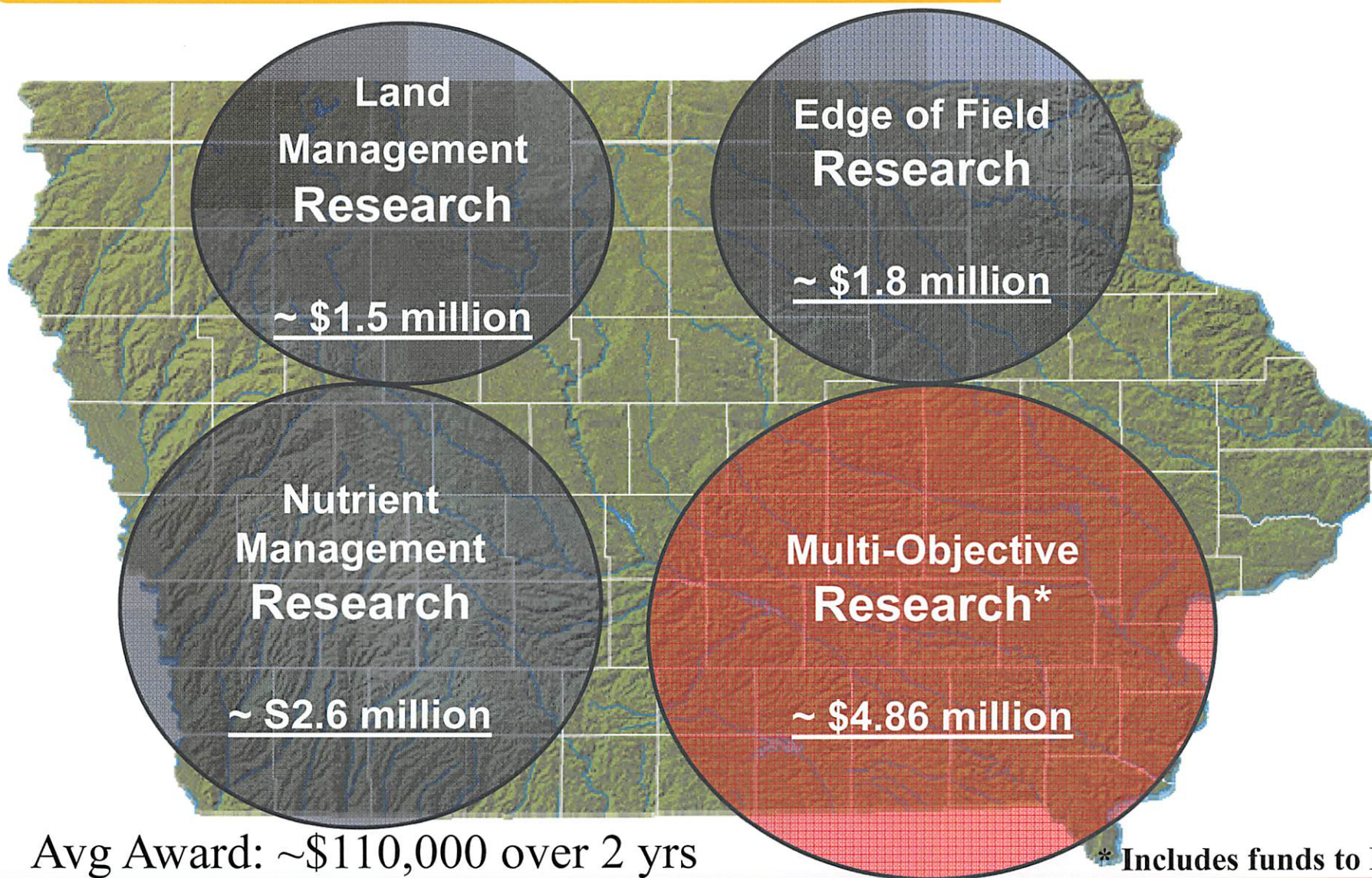
FY14	-	3
FY15	-	2
FY16	-	2
FY17	-	5
FY18	-	2
FY19	-	3
FY20	-	2
TOTAL	-	19

Multi-Objective Research

Awards

FY14	-	4
FY15	-	4
FY16	-	3
FY17	-	4
FY18	-	4
FY19	-	6
FY20	-	5
TOTAL	-	30

Research Category Dollar Awards



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Research Dollar Amount Overview

AFFILIATION AWARDS		2014	2015	2016	2017	2018	2019	2020	2021	TOTALS
Allocation	FY	1,500,000	1,325,000	1,325,000	1,325,000	999,327	3,025,767	542,942		10,043,036
Iowa	2014	\$528,332	\$0							\$528,332
UNI		\$50,000	\$35,000							\$85,000
ISU		\$897,438	\$450,540							\$1,347,978
Iowa	2015		\$620,000	\$0						\$620,000
UNI			\$65,633	\$55,789						\$121,422
ISU			\$195,451	\$94,614						\$290,065
Iowa	2016			\$587,000	\$0					\$587,000
UNI				\$53,968	\$62,975					\$116,943
ISU				\$475,684	\$330,011					\$805,695
Iowa	2017				\$517,000	\$0				\$517,000
UNI					\$55,150	\$56,850				\$112,000
ISU					\$405,244	\$257,956				\$663,200
Iowa	2018					\$507,000	\$70,000			\$577,000
UNI						\$0	\$0			\$0
ISU						\$401,864	\$239,234			\$641,098
Iowa	2019						\$407,000			\$407,000
UNI							\$44,999			\$44,999
ISU							\$632,947	\$624,978		\$1,257,925
Iowa	2020							\$538,000	\$60,000	\$598,000
UNI								\$55,832	\$58,108	\$113,940
ISU								\$702,761	\$615,701	\$1,318,462
										\$10,753,059
Iowa					Iowa	36%				\$3,834,332
UNI					UNI	6%				\$594,304
ISU					ISU	59%				\$6,324,423
TOTALS		\$1,475,770	\$1,366,624	\$1,267,055	\$1,370,380	\$1,223,670	\$1,394,180	\$1,921,571	\$733,809	\$10,753,059

Accomplishments and Impacts, 2013 - 2020

Saturated buffer research

- Researched and developed a national practice standard
- Changed Federal policy to allow saturated buffers with cost share on CRP
- An accepted Nutrient Reduction Strategy practice as of 2016

Oxbow research

- INRC-supported research shows that multi-objective oxbows can reduce nitrate in tile drainage
- This research led to the Iowa Nutrient Research Science team listing this as a nutrient reduction practice

Cover crop research – identifying barriers

- The center continues to fund projects aimed at making cover crops more practical and profitable as a way to improve water quality, including by helping farmers successfully integrate cover crops into livestock systems

Better understand nutrient movement in landscape

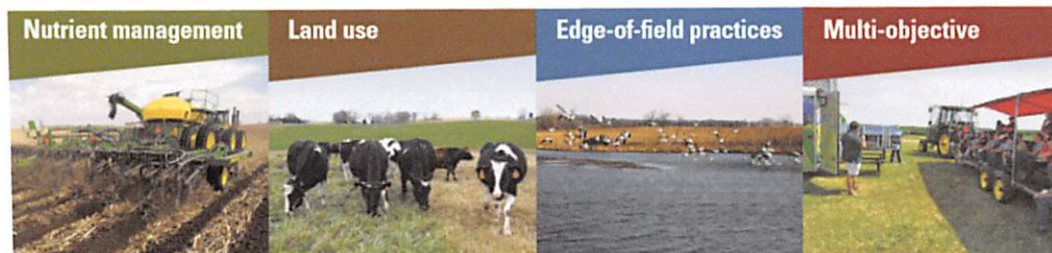
- Impact of stacked practices across paired watersheds
- Identify nutrient movement at delivery scale in sub-watersheds

Exploring new research technologies

- The next generation of nitrate-cleansing bioreactors may be filled with corn cobs.
- Water quality evaluation of prairie strips – CRP eligible practice



Seminar Series



Iowa Nutrient Research Center

INRC Seminar Spring 2020: Water Research Past, Present & Future 3:10-4:00 p.m., 1306 Elings Hall

January 22 - Looking in the Rearview Mirror: Some Thoughts on the Future of Nutrient Management in Iowa

Pete Nowak, Professor, Nelson Institute for Environmental Studies, University of Wisconsin

February 26 - History of Water Quality Research with the National Laboratory for Agriculture and the Environment

Dan Jaynes, Soil scientist, USDA Agricultural Research Service, recently retired

March 25 - History of Buffer Research at Iowa State University

Tom Isenhardt, Professor, Natural Resource Ecology and Management Department, Iowa State University

April 22 - Lessons from the Chesapeake to the Mississippi

Jason Hubbard, Director of Institute of Water Security and Science, West Virginia University

May 20 (3:10-5:00 p.m.) - Field Tour of Wetlands near Ames

William Crompton, University Professor, Ecology, Evolution & Organismal Biology Department, Iowa State University

(Transportation provided - please RSVP to malcolmr@iastate.edu)

This seminar series is sponsored by the Iowa Nutrient Research Center at Iowa State University. Sessions are free and open to the public. They can be accessed live and will be recorded and posted on the INRC website with permission of presenters. Details at www.cals.iastate.edu/inrc/. For questions, contact INRC Program Coordinator Malcolm Robertson, at malcolmr@iastate.edu.

[Elings Hall](#), 605 Bissell Road, Ames, is located on the west side of campus. Off-campus attendees are encouraged to park in the Memorial Union ramp, due to limited public parking near Elings Hall.

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Water Quality Project Map



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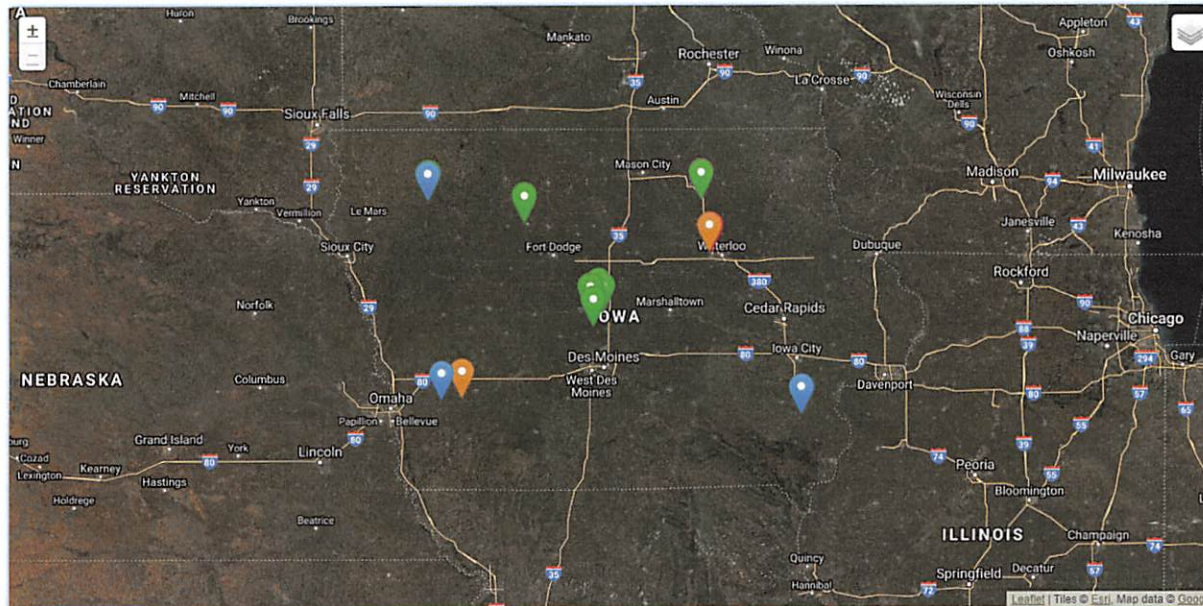
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Map

Map - All Locations

-  All Locations
-  Edge-of-Field
-  Land Management
-  Multi-Objective
-  Nutrient Management



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Iowa Nutrient Research Center

Other Information

- Willing to help connect stakeholders with researchers for future projects
- Welcome input on future research needs as we develop future RFPs
- <https://www.cals.iastate.edu/inrc/>



Recently Funded Projects

Nutrient Management

- Assessing the Effectiveness of Individual Versus Multiple Nutrient Reduction Practices on Water Quality and Economic Viability.
- Investigating the Double-impact of Soil Health Promoting Practices on Water Quality.
- Mitigating Reduced Corn Yields Following a Winter Rye Cover Crop: What Role Does Allelopathy Play?
- The Root of the Matter: Are Changes in Corn Root Morphology Responsible for Improved Yield and Higher Nitrogen Use Efficiency in Diversified Cropping Systems?

Recently Funded Projects

Edge-of-Field

- Evaluating the Water Quality Benefits of Reconstructed Multi-purpose Oxbows.
- Watershed-scale Phosphorus Inputs from Streambanks.

Land Management

- Evaluating the Potential for Drainageways to Serve as Test Sites for Innovative Grass Waterway Designs.
- Impacts of Cover Crops on Phosphorus and Nitrogen Loss with Surface Runoff.
- Improving Outcome Predictability, Multifunctionality and Cost-effectiveness of Nutrient Reducing Prairie Strips.
- Interseeding Grass and Legume Cover Crops into Early Vegetative Stage Corn.
- Perennial Turfgrass Cover Crops in Maize Production Systems.

Recently Funded Projects

Multi-Objective

- Evaluating Rotations of Cover Crops and Summer Annual Forages for Yield, Nutritional Value, Effect on Soil Nutrient Profile and Economic Sustainability as Forage Resources for Beef Cattle.
- IIHR Hydrosience and Engineering Workplan (2019-2020).
- Increasing Farmer Engagement with Conservation Practices Through More Effective Communication Strategies.
- Integrating Social and Biophysical Indicators of Nutrient Reduction Progress in Iowa Watershed Projects.
- Linking Agricultural Practices to Water Quality Improvement: The Importance of Scale in Accurately Characterizing Nonpoint Source Nutrient Loads in Iowa Streams.

Research Needs (Original Nutrient Reduction Strategy) – N

Past or Current INRC Work

- In-field N management – 4Rs
- Oxbow restoration and stream meanders
- Directing tile drainage water through riparian buffers
- Impact of denitrification practices on greenhouse gas emissions
- Large scale monitoring of nitrate transport as impacted by single and combination of nitrate reduction practices
- Developing cover crop systems that do not reduce yields for the following corn crop

Potential Future Work

- Two-stage ditch designs
- Monetizing economic benefits that might be derived from improved water quality or other ecosystems services. These could be compared to the cost of nutrient reduction practice implementation.
- New practice development

Research Needs (Original Nutrient Reduction Strategy) – P

Past or Current INRC Work

- Current status of conservation practices, such as cover crops, terraces, contour farming, water and sediment control basins, ponds
- Water quality data comparing extended rotations, pastures, and land conservation to a corn-soybean rotation
- Sediment delivery ratio as influenced by the distance factor and role of road ditches and other channelized flow
- Development and evaluation of management practices to reduce stream bank erosion and sediment delivery

Potential Future Work

- In-field P management – 4Rs
- Field research based on large plots or catchments to study the impacts on P loss of alternative P management practices and delivery of P to surface water
- Validation of the Iowa P index as an edge-of-field and watershed scale assessment tool