# DISCOVERY FARMS MINNESOTA

### DISCOVERY FARMS MINNESOTA UPDATE

### UPDATED, JANUARY 2013

DISCOVERY FARMS\_MINNESOTA: A New Approach To Monitoring Nutrient Movement In Agricultural Landscapes

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# to kill zone in Gulf of Mexico

• Minnesota, Wisconsin farmers big part of problem.

By JOSEPHINE MARCOTTY marcotty@startribune.com

Minnesota and Wisconsin are contributing an increasing share of the Mississippi River pollution that is killing a wide swath of the Gulf of Mexico.

According to a new federal study, nitrogen flowing into the river from the two states has increased 75 percent over the past two decades and is a major reason why nitrogen levels at the mouth of the river in Louisiana have increased 10 percent over the same period.

The gulf's dead zone is one of the largest such polluted areas in the world, according to researchers from the U.S. Geological Survey (USGS) who published the study this week.

More importantly, they said, it proves that despite decades of efforts to slow agricultural runoff and clean up wastewater, pollution in the river has not gotten better.

"It's disappointing," said Deborah Swackhamer, head of the Water Resources Center at the University of Minnesota, who was not involved with the research. "But this is hardcore science that backs up what a lot of people have thought."

Overall, the USGS found that between 1980 and 2008, the levels of nitrates – nitrogen dissolved in water – held steady at six of the eight spots

River continues on A7 ►

« WE DON'T HAVE ANY REGULATORY HAMMER FOR DEALING WITH NITRATE DISCHARGES FROM AGRICULTURE. »

Deborah Swackhamer, head of the Water Resources Center at the University of Minnesota Courtesy Texas A&M University

#### Minnesota NewsWatch

### Discover Farms data network provides feedback on nutrient loss

#### By JONATHAN EISENTHAL

**B**RIAN Herbst, a farmer with a swine finishing and crop operation in Kasson, is the latest ag producer to join the Minnesota Discovery Farms network, which now has a dozen monitoring sites across Minnesota.

Herbst believes that real-world nutrient and sediment data could provide important feedback for his agronomic decisions. That's why he agreed to have monitoring equipment installed to sample both tile drainage and surface runoff from a 15-acre bowl-shaped parcel that drains to the east on his farm.

"Discovery Farms Minnesota is a farmer-led water quality research and educational program that collects field-scale water quality data under real-world conditions on a variety of farming systems and landscapes throughout Minnesota," says Tim Radatz, the program's main research specialist. "Our main goal is to provide water quality and agronomic information to Minnesota farmers."

A steering committee comprised of 10 representatives from agricultural groups and five representatives from conservation groups meets twice a year to provide general direction on research needs, and to help identify and select projects and cooperators. Minnesota Agricultural Water Resources Center provides logistical support. Some of the monitoring equipment is paid for through Legacy Amendment dollars, a special state sales tax that funds environmental programs. Minnesota Department of Agriculture provides one full-time and one half-time hydrologist to help with installing monitoring stations and ensuring they are running well.

Discovery Farms Minnesota includes one site in Norman County that covers an entire section and is planted in wheat, edible beans and sugarbeets, in addition to corn and soybeans. Another Discovery Farms site in Wilkin County is a quartersection devoted to corn and beans. Farm sites vary in size with the smallest site currently at 6 acres.

#### How much N?

Herbst, who has farmed since 1979, raises hogs with his wife, Cynthia, in a custom feeding operation. He produces grain and

#### **Key Points**

- Discovery Farms Minnesota continues to add farmer cooperators.
- Monitoring equipment collects water quality data and records nutrient loss.
- Farm sizes range from 6 acres to an entire section.

herdsman Brock Gile and mechanic Rick Jorgenson work closely with him to ensure that they can collect and apply the manure from the hog operation onto the crop acres according to plan.

Herbst wonders if the University of Minnesota recommendation of 180 pounds of N per acre (about 2,200 gallons of manure) will, over time, mine his soil, which consistently produces 220-plus bushels of com per acre when it receives enough rain. If he only fertilizes enough to support 180 bushels, it could have a huge economic impact on his business. Yet he also wants to only use as much fertilizer as it takes to reach maximum yield potential.

"As good as university recommendations might be, I feel like they lump me into a generalization," Herbst says. "Nutrient numbers should be specific to each farm. If I can prove I am able to fertilize as much as these acres need without increasing runoff, I will have the information I need. Discovery Farms will be an interesting part of that."

#### A snapshot of his system

He realizes that sampling offers a snapshot of his system. He plans to continue farming the monitored site the same as he always has.

"I want to see what my nitrate concentration is at 5 feet," he says. "We need to sort out whether the source of nitrates is manure or my commercial fertilizer application. Keeping track of nutrients is an important part of stewardship, and land stewardship is very high on our list. We want to leave this land even better than what we started with. It's a challenge because of changing economics. I am a firm believer that I do not own any land. I hold the mortgage. God owns the land."

Herbst knows that there is one element beyond any farmer's control — rain. In spite of the best nutrient planning money



RESEARCHER: Tim Radatz Discovery Farms Minnesota and assess nutrient and sed

Discovery Farms. He says the tion began in 2010 and is alreed





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#### Agriculture or water quality? Let's have both

Article by: DAVID J. FREDERICKSON, PAUL AASEN and DON BALOUN | Updated: April 22, 2012 - 5:11 PM

With Earth Day just behind us, we're reminded that, too often, we are told we need to choose between a healthy environment and a healthy economy.



http://www.startribune.com/opinion/commentaries/148330255.html 4/23

### A Cooperative Project

- the cooperating farmer
- Minnesota Department of Agriculture
- Soil and Water Conservation Districts

## The Scrutiny of Midwest Agriculture

- --nitrates and the relationship to hypoxia in the Gulf of Mexico
- --phosphorus and algal blooms in surface waters
- --many would like to regulate
- --basic question: Should regulations be based on predicted (modeled) movement or actual measurements?
- --farmers want to know also

### **Discovery Farms-Concept**

 --A producer led effort to gather field-scale information on water quality moving over and through the landscape in the diversity of farm enterprises in Minnesota

### What Is A Discovery Farm?

- --an operating farm used for systematic collection of accurate information on water leaving the farm via surface/tile flow
- farms selected are intended to be representative of the diversity of farm enterprises in Minnesota

## Why Discovery Farms Minnesota?

- Achieve economic and environmental goals
- Increase knowledge of regulations to farm community & help create a science base for rules
- Proactive approach to environmental protection
- Understand impacts of management practices on natural resources
- Opportunity for producers to find solutions that work in their farming system --

One size doesn't fit all!



# Monitoring 365 Days a Year







### Instrumentation











### Information Collected

### Farm Management Data

- o Crop type, variety, planting and harvest date, and yield
- Fertilization type, application rate, and date
- Tillage type, residue remaining, and date
- Pest management methods and date
- Soil and manure testing value and date





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### Surface Water Monitoring









### Water Samples Are Analyzed For

- --sediment
- --total nitrogen
- --nitrate-nitrogen
- --ammonium-nitrogen
- --total phosphorus
- --soluble phosphorus

### Locations

- Special Projects
  - Kandiyohi County
- Core Farms
  - Goodhue County
  - Stearns County
  - Chisago County
  - Blue Earth County (2)
- Additional locations Fall/Winter 2011 and Summer 2012



## Chisago County

### • Core Farm

- Farming Operation
  - Corn/soybean rotation
  - o No-till
  - Commercial fertilizer application
  - Well drained loam soils

### Monitoring Setup

Surface water runoff
~ 5 ac watershed
Operational March 2011









Nutrient Movement-Peterson Farm 2011			
	Nitrogen, lb./acre	Phosphorus, lb./acre	
Frozen Soil	.58	.31	
Non-Frozen Soil	.73	.11	
Total	1.31	.42	

#### Sediment and P Movement, Discovery Farm, Goodhue County

	Water Year		
	2010	2011	
	Lb./acre		
sediment	47	21	
total P	0.6	0.5	
inorganic P	0.2	0.3	

#### Sediment and P Movement, Discovery Farms, Chisago County

	Water Year		
	2010	2011	
	Lb./acre		
sediment	82	128	
total P	1.3	0.9	
inorganic P	0.7	0.5	
No-till production and a corn/soybean rotation			

#### **Phosphorus In Runoff**

Location	Year	Total	Dissolved	Particulate
		lb./acre		
Goodhue	2011	0.6	0.2	0.4
Goodhue	2011	0.6	0.3	0.2
Chisago	2012	1.2	0.7	0.5
Chisago	2012	0.9	0.5	0.4

#### Nitrogen In Runoff

Location	Year	Total	Nitrate	Organic
			lb./acre	
Goodhue	2011	8.7	0.5	8.2
Goodhue	2011	2.1	0.3	1.8
Chisago	2012	3.9	0.5	3.4
Chisago	2012	2.9	0.7	2.2

### Goodhue County

### • Core Farm

### • Farming Operation

- Swine and cow-calf operation
- Corn-silage/alfalfa rotation
- Injected manure application Well drained silt loam soils

### Monitoring Setup

- Surface water runoff
- ~6 acre watershed
- Operational September 2010





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# Sediment and Nutrient Movement – Goodhue County

Measurement	Frozen Soil	Non-Frozen Soil
total suspended sediment, lb./acre	40.3	8.7
total phosphorus, lb./acre	1.62	.20
total inorganic phosphorus, lb./acre	.17	.03
total nitrogen, lb./acre	8.49	•47
nitrate-nitrogen, lb./acre	.49	.04
ammonia nitrogen, lb./acre	3.64	.18

### Measurements—Goodhue County

- watershed size.....6 acres
- runoff......16%

### **Stearns County**

### • Core Farm

### • Farming Operation

- Small/midsize dairy
- o Corn-silage/alfalfa rotation
- Chisel-plow tillage
- Manure application
- Poorly drained loam soils

### Monitoring Setup

- Surface water runoff and subsurface drainage
- o 28 acre watershed
- o Operational March 2011







# **Blue Earth County**



- Core Farm
- Farming Operation
  - o Corn/soybean rotation
  - Swine manure
  - Poorly drained silty clay loam

### Monitoring Setup

- Surface water runoff and subsurface drainage
- 3.7 acre overland watershed
- o 26 acre tile-shed
- o Installed spring 2011



### **Expectations for Farmers**

- --allow access for 5 to 7 years
- --participate in evaluation of data
- --participate in tours and aassociated activities
- --make changes in farm enterprise if change is justified

# Regional

- Wisconsin
- Minnesota
- North Dakota
- Arkansas
- No limitations

### The Future In Minnesota

- --Expand total number of farms; not yet determined
- --Educate both urban and rural clientele; a tremendous challenge

### **Comments From A Cooperator**

• "As a 6<sup>th</sup> generation farmer, environmental stewardship is something that has been taught to us by the generations that came before. If we are going to have the opportunity to watch our kids manage this land, we have an obligation to continue that legacy."

## **The Application Process**

- --if there is interest, don't hesitate to complete an application form
- initial farm visit
- steering committee decision

### DISCOVERY FARMS MINNESOTA



### Questions?

