

# Proceedings of the 3<sup>rd</sup> Annual Nitrogen: Minnesota's' Grand Challenge & Compelling Opportunity Conference



*Thank you to all  
of our Supporters!*



Do not reproduce or redistribute without the written consent of author(s)

# Nitrate, Well Testing and Rules

Where is all this heading?

February 16, 2017



Pesticide and Fertilizer Management Division  
Minnesota Department of Agriculture



# Outline

- Nitrogen Fertilizer Management Plan
- What are private wells telling us?
- Proposed rule
- Prevention activities

# Minnesota corn growers are on a mission

From news reports

SHAKOPEE, Minn. — The Minnesota Corn Growers Association intends to implement an ambitious set of initiatives with the goal of making Minnesota corn farmers the most sustainable and environmentally responsible in the United States.

"This is a grassroots, farmer-driven effort that addresses values shared by both farmers and non-farmers," said Harold Wolle, MCGA president. "It's a lofty goal. But we believe the approximately 25,000 corn farmers MCGA represents are already making great strides in achieving it. We want to be a model for the rest of the country in how we take care of the land while also managing profitable and highly productive farm operations."

The plan calls on Minnesota corn farmers to engage in sustainability programs and implement on-farm best management practices that fit their specific farm. It also expands

a new MCGA grant program focused on conservation, calls for greater investment in developing new uses for corn and seeks to grow partnerships with outside organizations.

Examples of action steps include encouraging corn farmers to engage in existing sustainability programs like the Minnesota Agricultural Water Quality Certification Program and adopt best management practices such as following the University of Minnesota's nitrogen fertilizer use guidelines.

MCGA also recently launched an Innovation Grant program to help farmers implement new BMPs. The organization has also invested in new market opportunities in the areas of sustainable polymers, biofuels and green chemistry.

"We don't need to choose between profitability and environmental sustainability. We can achieve both," said Chad Willis, a farmer near Willmar and chairman of the Minnesota Corn Research & Promotion

Council. "Part of being sustainable is remaining profitable so you can invest in new conservation efforts and ensure that the land you currently farm is left in good shape for the next generation."

Nearly 100 percent of farmer and non-farmer respondents to a recent survey conducted by MCGA said water quality of lakes, rivers and streams is an important. Nearly 90 percent of non-farmer respondents said the same survey said that water quality is an important rule, Minnesota farmers try to do what's best for the land and the environment.

"Farmers live where they farm and where they farm who farms near them. It's the last thing we want to do is have a negative impact on the community's natural resources. I think most non-farmers understand that and they do the right thing. Farmers are also held to a high standard, and

so. We have to continuously improve so we can become even better stewards of the land and contribute to healthier and more vibrant rural communities."

Building new partnerships and strengthening existing collaborations are also a key

## Root River Field to Stream Partnership



*"If I'm losing nutrients from my field, I want to be the first to know"*



CROPS > SOYBEAN

## State's farmer-funded fertilizer research available online



# Nitrate & Drinking Water

- 8 communities\* treating for nitrate costs public water suppliers millions
- 5-6% of private wells exceed health risk limit statewide
- Greater in some areas

## Number of wells at or over Health Risk Limit of 10 mg/L

- 1,912 private wells out of 20,042 wells
- 93 community and non-community wells out of 537 wells\*

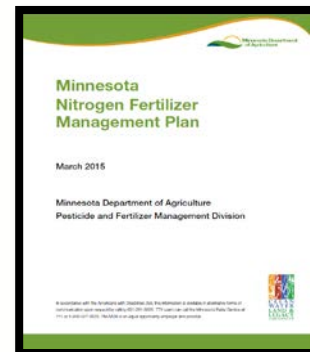
\*MDH 2014-2015

# MDA is Lead Agency for Nitrogen Fertilizer Use

- Develop voluntary Best Management Practices (BMPs) to “prevent or minimize the source of pollution to the extent practicable”;
- Promote BMPs via education and demonstration projects;
- Evaluate BMP adoption and effectiveness;
- Consider regulation if BMPs are proven ineffective

# Nitrogen Fertilizer Management Plan (NFMP)

- Developed over several years with input from ag community
- State's blueprint for minimizing groundwater impacts from the use of nitrogen fertilizer
- Proposes voluntary and regulatory components
- Revised in March 2015





# The Revised NFMP

1. An emphasis on prevention;
2. Extensive testing of private wells by township;
3. A new phased approach to assessing and prioritizing areas with nitrate contamination;
4. An emphasis on involving local producers and communities in problem solving through local advisory groups; and,
5. Promoting alternative management tools (AMTs) – changing land management in targeted areas.

# Phased Approach

- A four phase (level) approach based on percent of wells from the Township Testing program exceeding the nitrate drinking water standard and municipal well sampling
- Two levels are voluntary, two are regulatory
- Starts with one of the voluntary levels
- Becomes regulatory only if BMPs are not voluntarily adopted

# Primary Goal of the Revised NFMP

**“...is to involve the agricultural community in problem solving at the local level. We all need to work together to respond to and address localized concerns about unsafe levels of nitrate in groundwater.”**

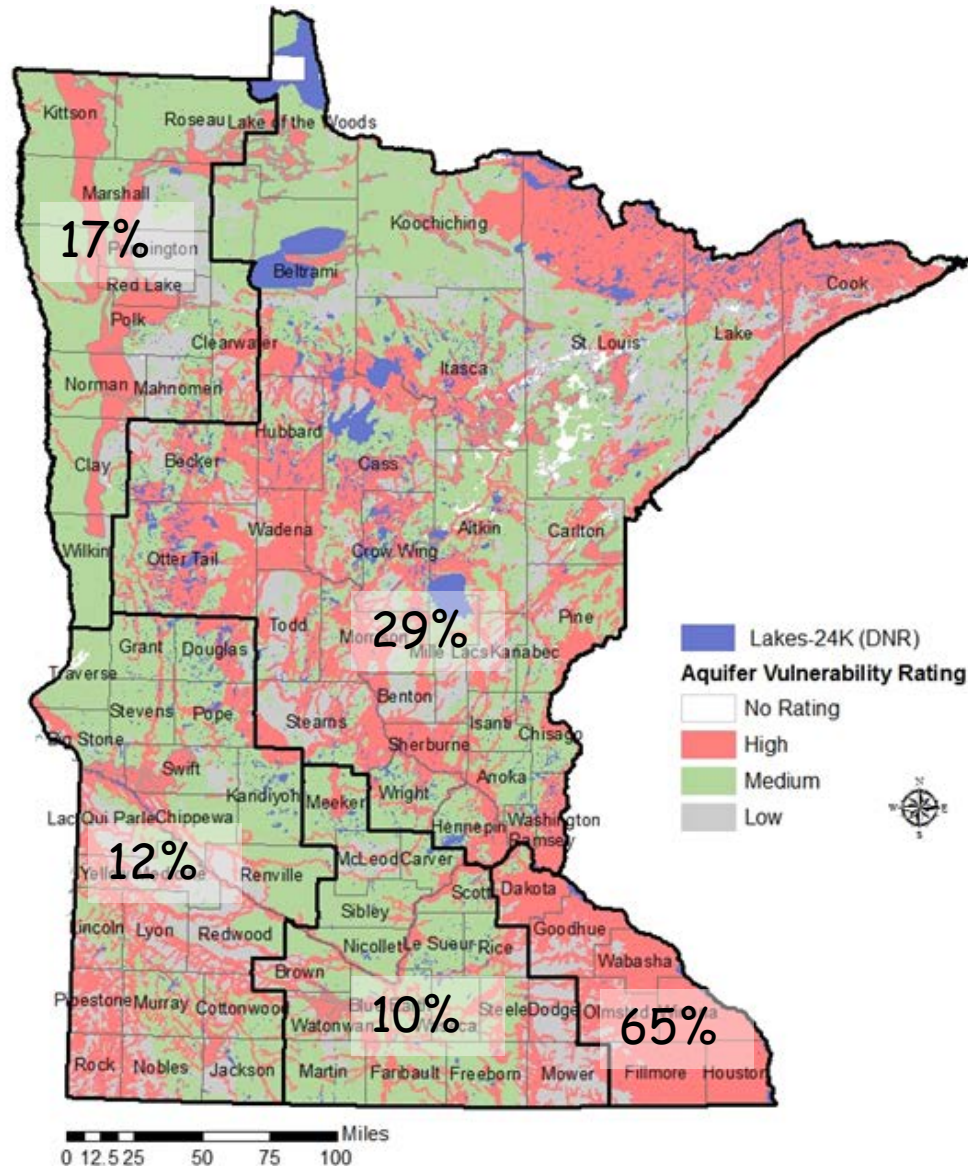
Commissioner of Agriculture, Dave Frederickson

# Nitrate Leaching from Fertilizer

- A very challenging problem
- Under row crop production in vulnerable soils, nitrate leaching will occur
- Losses may vary significantly between years due to weather
- May be long lag times (*years*) between changes in practices and changes in groundwater quality
- Enormous variability *between* and *within* aquifers

**There is no simple solution**

# Challenge



On average, 19% of Minnesota's cropland overlies vulnerable groundwater resources statewide (1 out of 5 acres)



# Nitrogen Fertilizer Management Plan: *Protect Groundwater*



Prevent



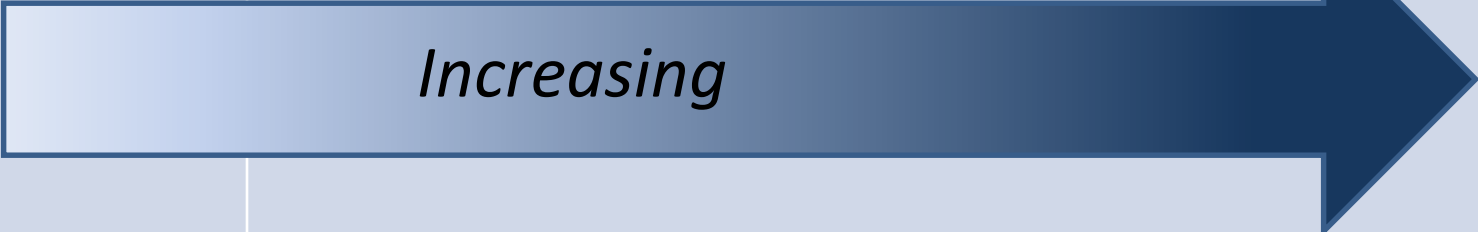

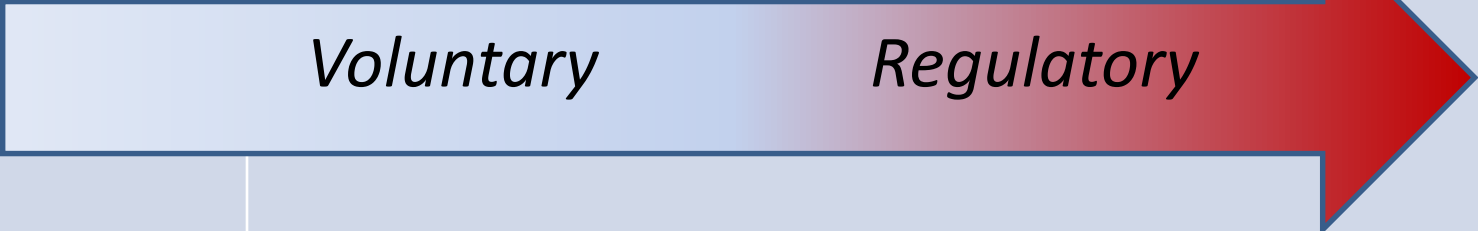
Assess



Respond



# Summary of NFMP

	Prevention	Mitigation Level One	Mitigation Level Two	Mitigation Level Three	Mitigation Level Four
Nitrate Levels	 <i>Increasing</i>				
BMP Adoption	 <i>Acceptable or Undetermined</i> <i>Not Acceptable</i>				
Regulatory Status	 <i>Voluntary</i> <i>Regulatory</i>				

# Nitrate Reduction Strategies

- Adoption of the nitrogen fertilizer Best Management Practices (BMPs)
- Increased low nitrogen vegetative cover (perennial crops, forages and cover crops) or taking land out of production in targeted high risk areas



# Alternative Management Tools (AMTs)

Changing the cropping system:

- Crop rotation
- Cover crops
- Use of perennials (alfalfa)
- Land swapping
- CRP/hunting preserve
- Lower N use varieties
- Taking land out of production



What are 20,000 wells  
telling us so far?

# Township Well Testing Program

- In townships with vulnerable groundwater and significant row crops
- Partnership effort with local government
- Includes all private wells
- Voluntary
- No cost to owner – funded by the Clean Water Fund
- If nitrate is detected follow-up sampling is conducted for pesticides

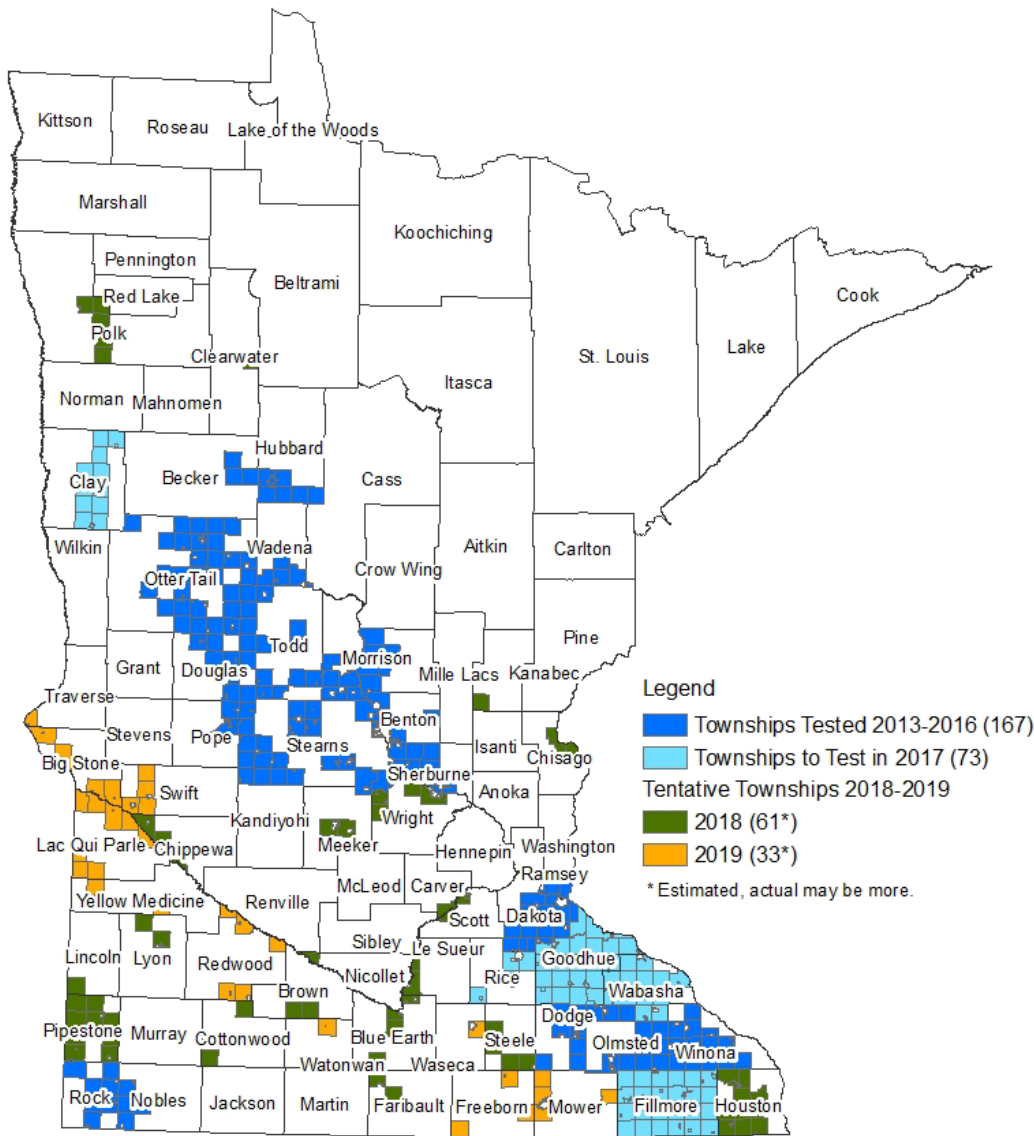


- 
- 2013 to 2016  
Township Testing Results\*  
% of Wells  $\geq 10\text{mg/L}$  Nitrate-N
- <5%
  - 5-9.9%
  - $\geq 10\%$
- \*This data is subject to change based on follow-up sampling and nitrogen source assessment of the townships.



# Township Testing

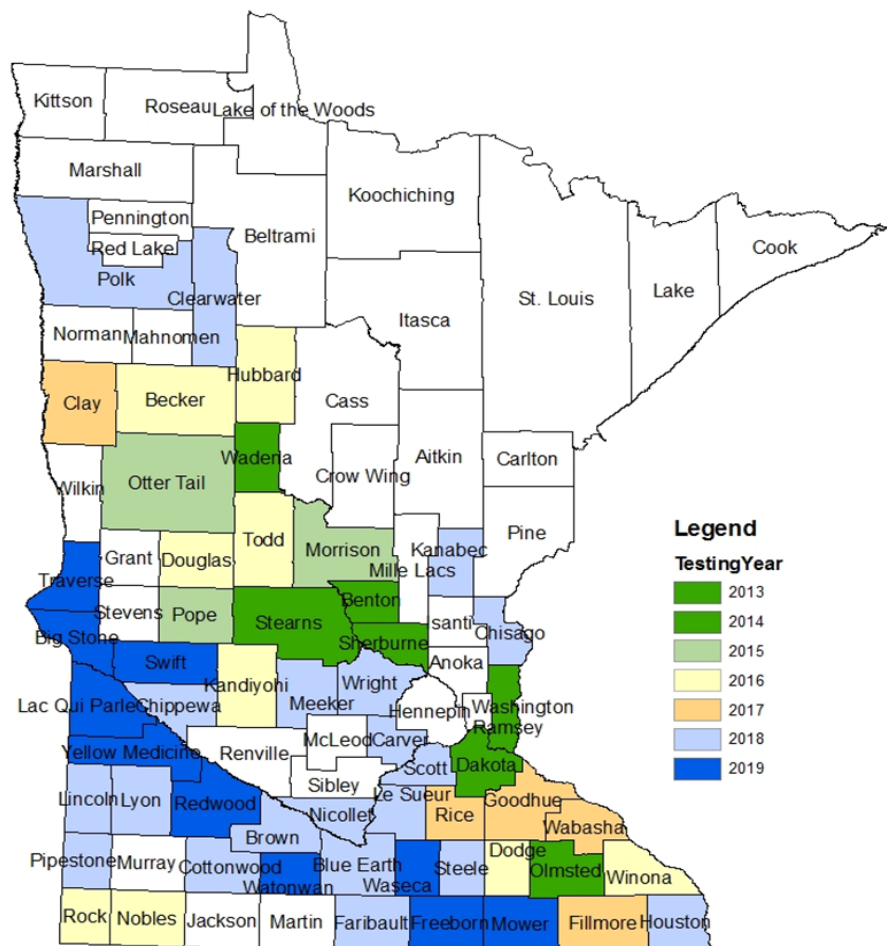
Over 300 townships with row crop agriculture and vulnerable groundwater, or history of high nitrate will be tested



# Testing Schedule

- Sampling will occur over several years
- The first round of sampling should be completed by 2019

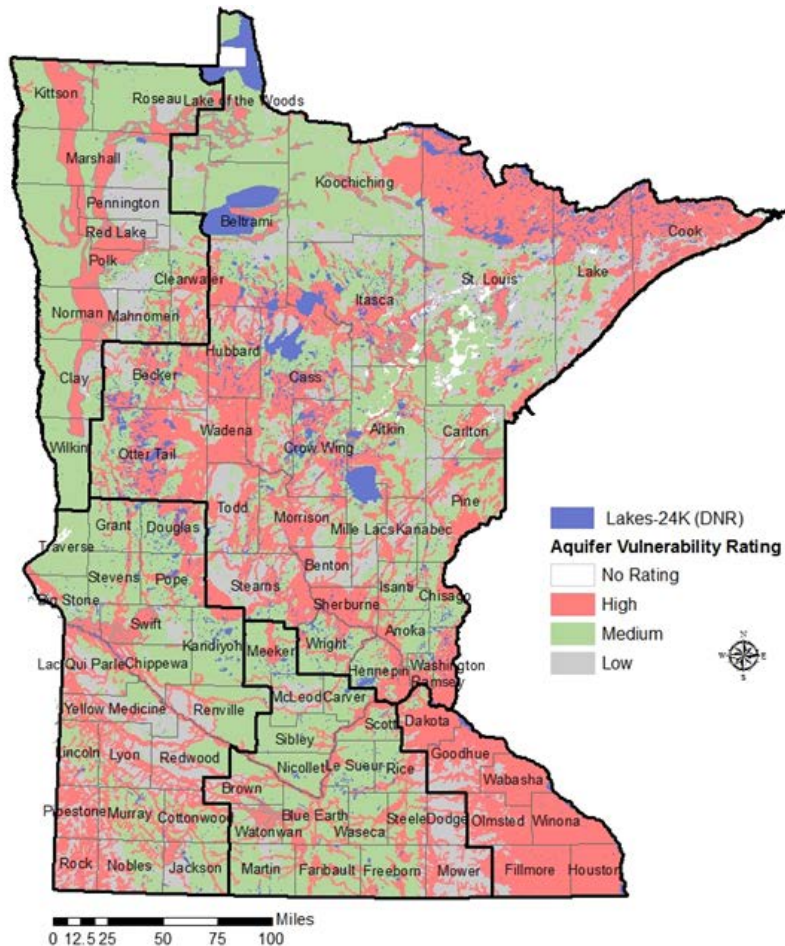
Tentative Township Testing Schedule  
(subject to change)



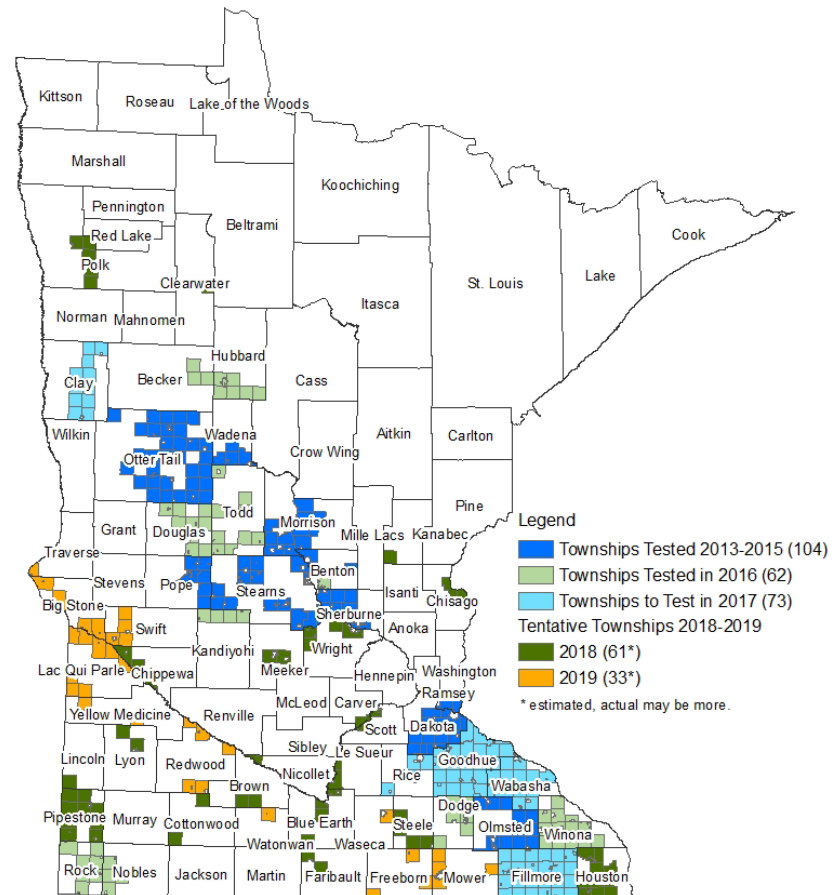
# Draft Nitrogen Fertilizer Rule

# Am I likely to be subject to the rule?

## Soils and Geology



## Nitrate Level and BMPs



# Nitrogen Fertilizer Rule

- **Part One**— Restrict application of nitrogen fertilizer in the fall and to frozen soils in areas vulnerable to groundwater contamination
- **Part Two**—Areas with high nitrate need to follow the nitrogen fertilizer BMPs. Two levels are voluntary and two are regulatory.

The rule should be final around August 2018.

# Nitrogen Fertilizer Rule

## Part One

Based on land features

Applies to areas with vulnerable groundwater

These may include:

- Coarse textured soils
- Shallow fractured bedrock
- Karst



# Nitrogen Fertilizer Rule

## Part One

Exceptions - when applying nitrogen to

- Cover crops
- Small grains
- Perennials and legumes
- Fall pasture
- MAP, DAP, micronutrients with N rate < 20 lbs per acre (does not apply to fields with soil analysis with very low phosphorus levels)

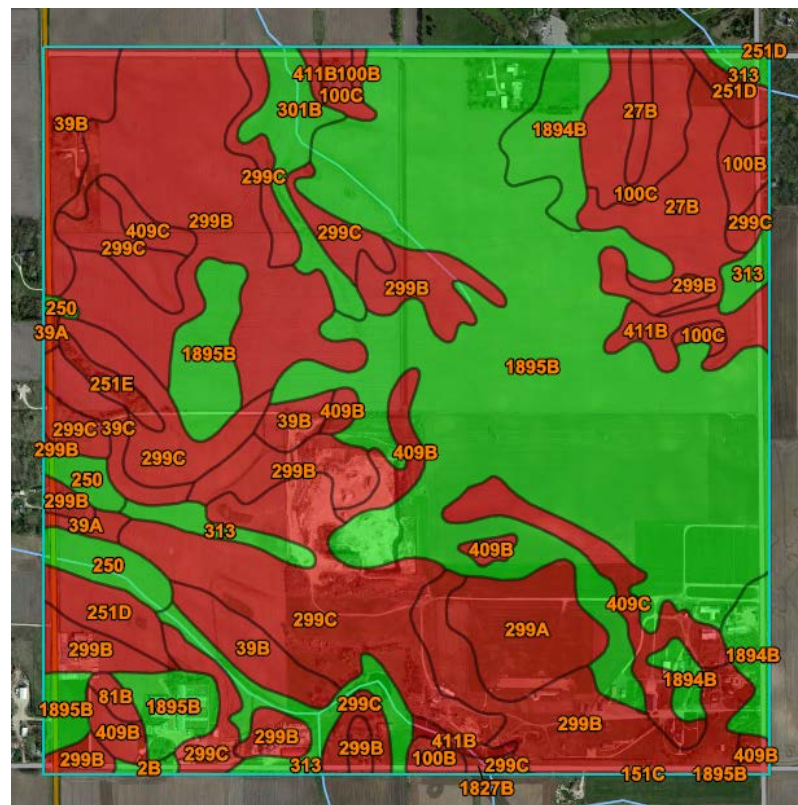
Need to follow Nitrogen Fertilizer Guidelines for  
Agronomic Crops in Minnesota

# Resources to Help Determine if Your Land Meets the Criteria



Coarse textured soils dominant -  
at the surface and through the soil  
profile

- Sand
- Sandy loam
- Loamy sand and;
- Must meet conditions of water movement through the soil profile
- Be less than 12% slope



Example shown at section scale

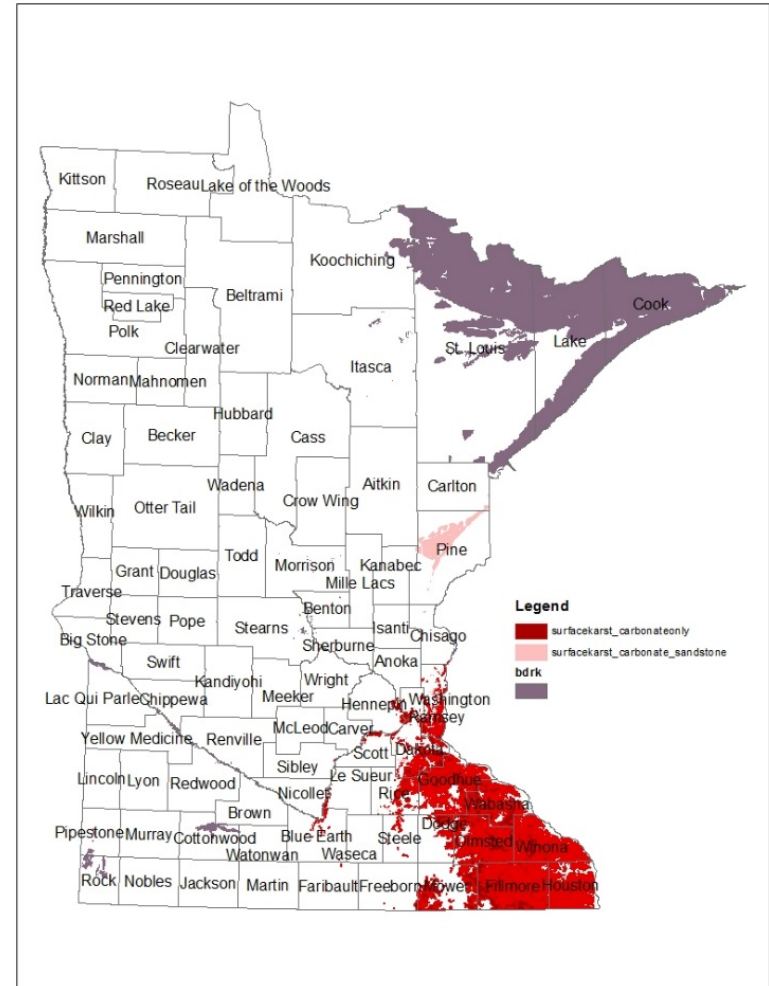
Source: Natural Resources  
Conservation Service

Applies to areas with vulnerable groundwater

These will include Geologic Information:

- Near surface bedrock
- Karst

Source: Pollution Sensitivity of Near Surface Materials, Minnesota Department of Natural Resources (2016)



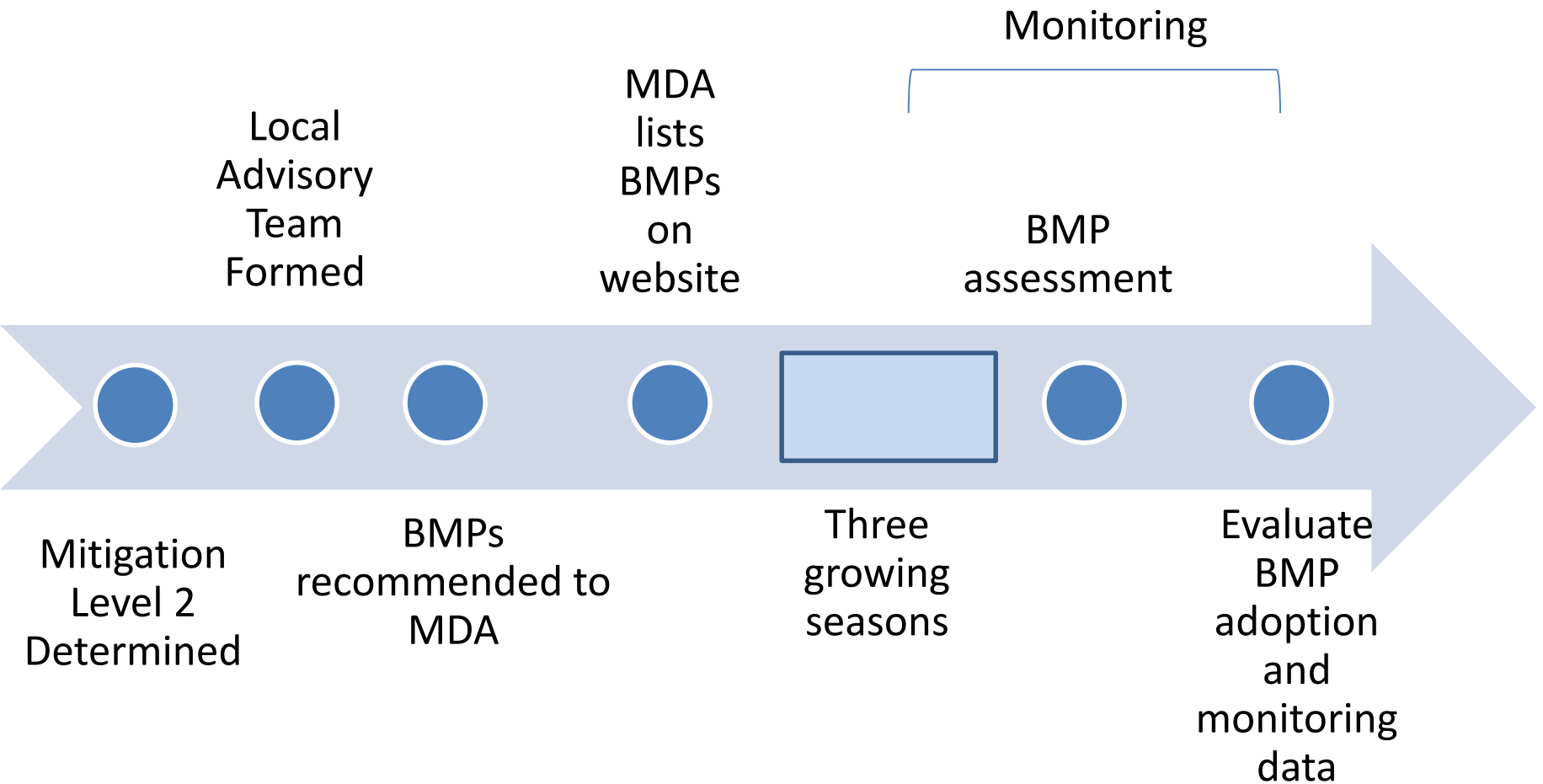
Shown as a statewide feature (and can be shown at a more local scale (subject to limits of scale))

# Nitrogen Fertilizer Rule

## Part Two

- Follows the Nitrogen Fertilizer Management Plan
- Based on current nitrate levels
- Townships or Drinking Water Supply Management Areas
- Selected from a list of options based on local and regional conditions
- **Input from local advisory team**
- **Only regulate if BMPs are not adopted**
- Applied on a site specific basis via Commissioner's Order

# Example Process



# Commissioner's Order Example

## **Regulatory Options:**

- Appropriate Regional BMPs
- Record keeping
- Attend training
- Collect well water samples
- Credit N from previous crop and manure
- Soil Testing
- Nitrification inhibitor
- Irrigation Management

**Local Advisory Team**



**Commissioner's Order**



## **Example**

### **Commissioner's Order:**

- Record keeping
- Credit nitrogen from all sources
- Soil testing
- Select BMPs



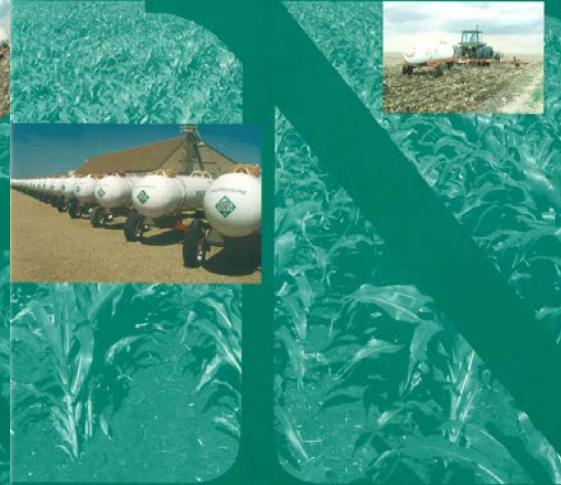
## Best Management Practices for Nitrogen Use in MINNESOTA

BEST MANAGEMENT PRACTICES FOR NITROGEN APPLICATION

UNIVERSITY OF MINNESOTA  
EXTENSION

### Best Management Practices for Nitrogen Use in SOUTH-CENTRAL MINNESOTA

BEST MANAGEMENT PRACTICES FOR NITROGEN APPLICATION



UNIVERSITY OF MINNESOTA  
EXTENSION

### Best Management Practices for Nitrogen Use in SOUTHEASTERN MINNESOTA

BEST MANAGEMENT PRACTICES FOR NITROGEN APPLICATION



UNIVERSITY OF MINNESOTA  
EXTENSION

### Best Management Practices for Nitrogen Use in SOUTHWESTERN AND WEST-CENTRAL MINNESOTA

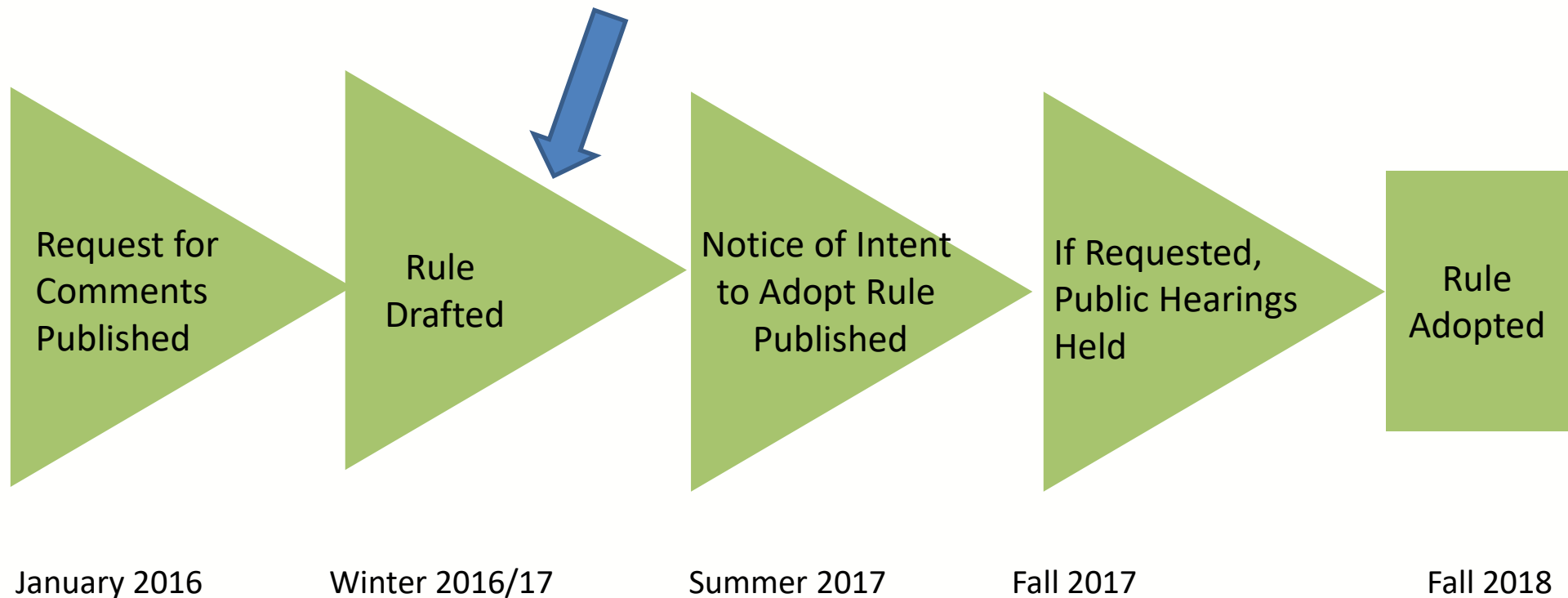
BEST MANAGEMENT PRACTICES FOR NITROGEN APPLICATION



# Public Input

- Request for Comments October 29, 2015 – January 29, 2016
- 23 entities commented
- Form letters
- Regulate sooner – three year timeline too long
- MDA should regulate the crops or vegetation
- Concern – nitrate is coming from other sources

# Rule Timeline



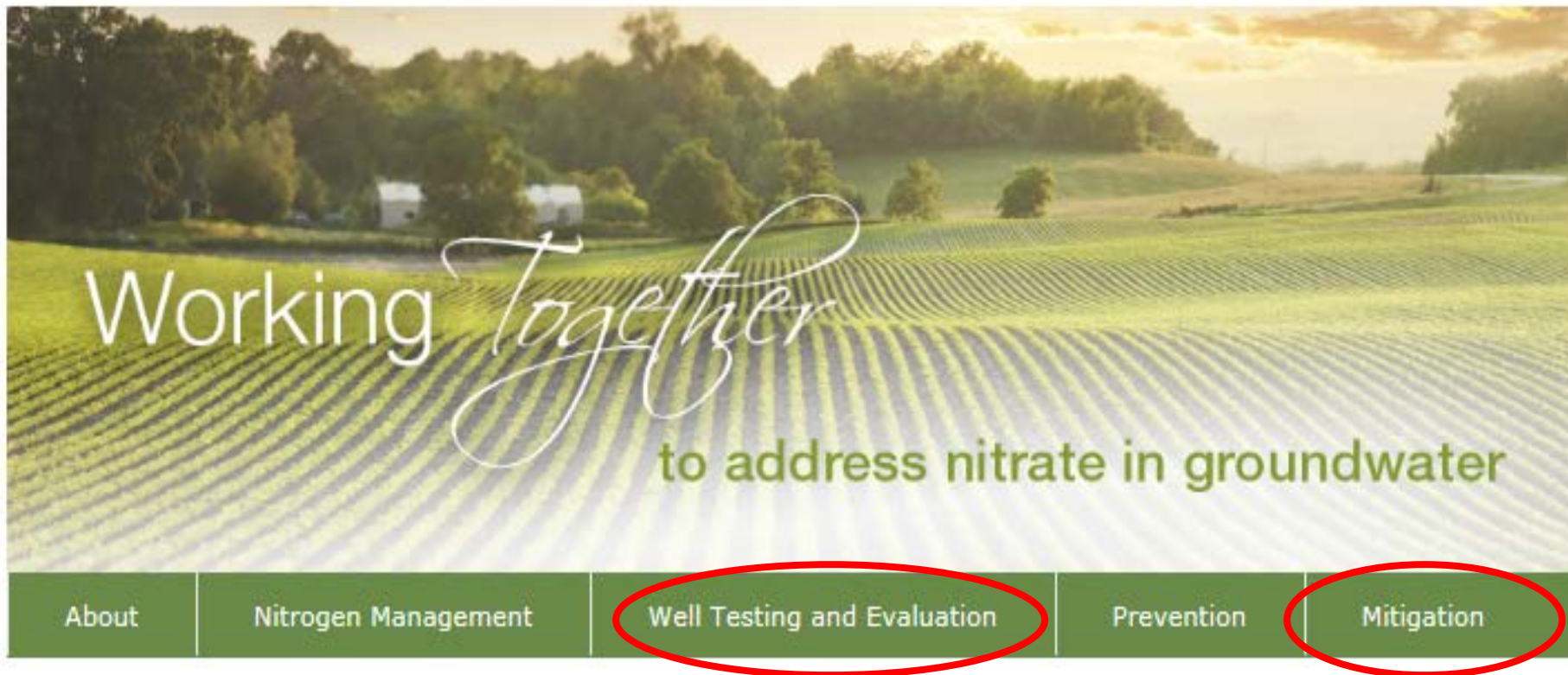
# Primary Goal of the Revised NFMP

**“...is to involve the agricultural community in problem solving at the local level. We all need to work together to respond to and address localized concerns about unsafe levels of nitrate in groundwater.”**

Commissioner of Agriculture, Dave Frederickson

[www.mda.state.mn.us/nfmp](http://www.mda.state.mn.us/nfmp)  
[www.mda.state.mn.us/nfr](http://www.mda.state.mn.us/nfr)

## Minnesota Nitrogen Fertilizer Management Plan



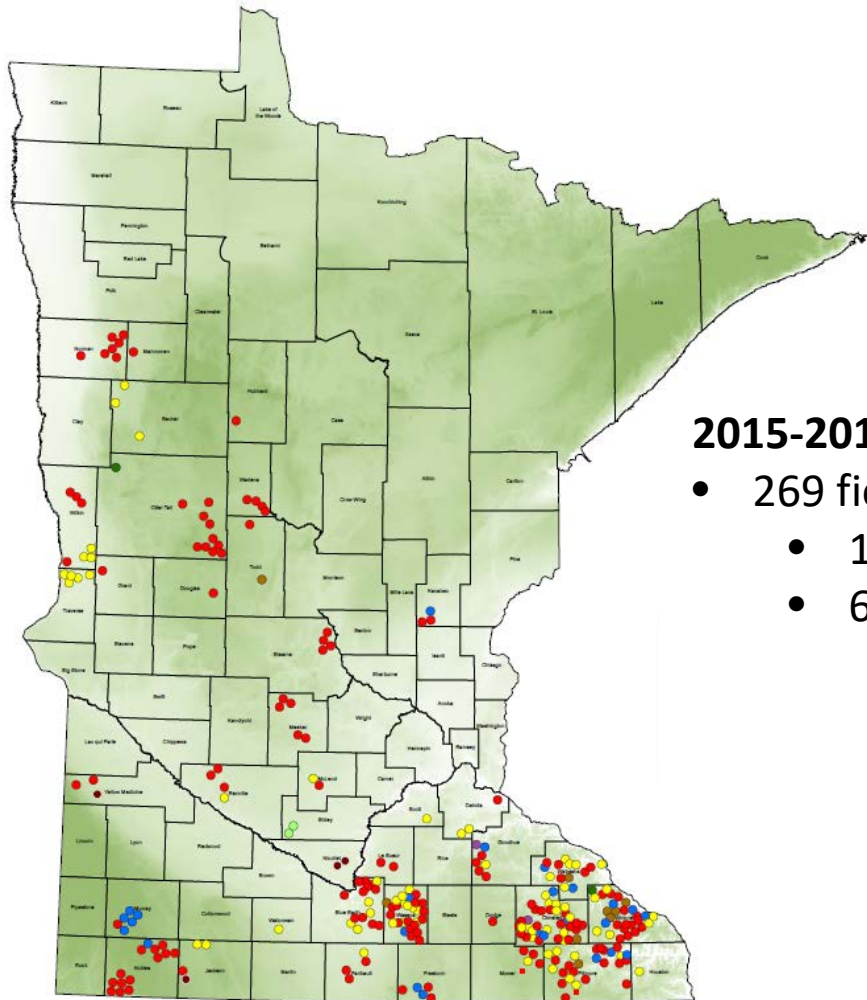


# Prevention Activities

- Education on the nitrogen fertilizer BMPs
- Develop BMP demonstration sites
- Explore cover crops and other types of vegetative cover
- Participate in Local Water Planning updates and implementation activities



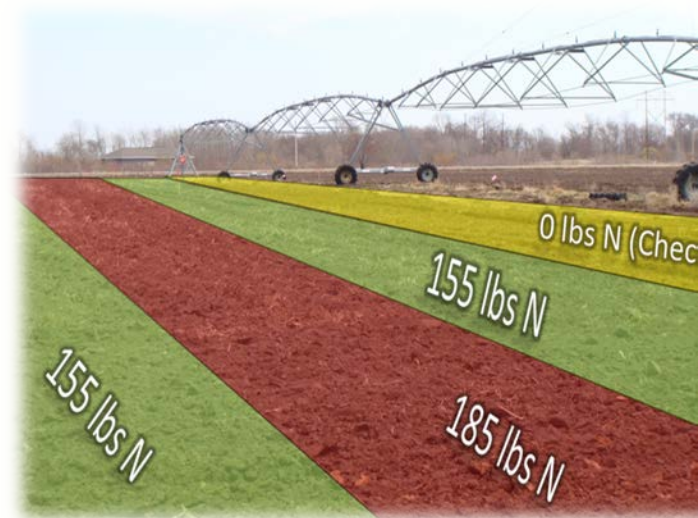
# Nutrient Management Initiative



On-farm, replicated field trials to evaluate the efficiency of different nitrogen management practices (rate, timing, stabilizer products)

## 2015-2016 Nutrient Management Initiative

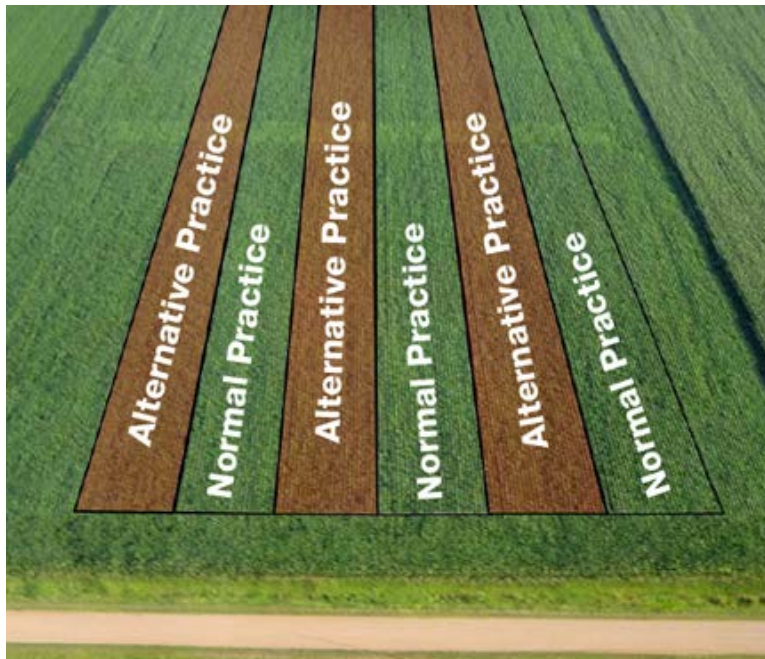
- 269 field trials
  - 189 Farmers
  - 68 Crop Advisers



# Nutrient Management Initiative

**Answer farmer's nitrogen management questions on their own fields.  
Provide agronomic, economic, and water quality information.**

Use strip trials to compare different management options



- ✓ Nitrogen Rate
- ✓ Nitrogen Stabilizer Products
- ✓ Nitrogen Timing

# Nutrient Management Initiative

## Value of the NMI Program

- ✓ Conversations about nutrient management
- ✓ Working directly with farmers and crop advisers
- ✓ Local data
- ✓ Learning from results
- ✓ Data to influence decision-making



# Thank you!

Larry Gunderson

651-201-6168

Larry.Gunderson@state.mn.us

For more information:

<http://www.mda.state.mn.us/nfmp>