

# Status of Nitrates in Rock County Groundwater

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Rick Wietersen, Environmental Health Director  
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11/2/2017



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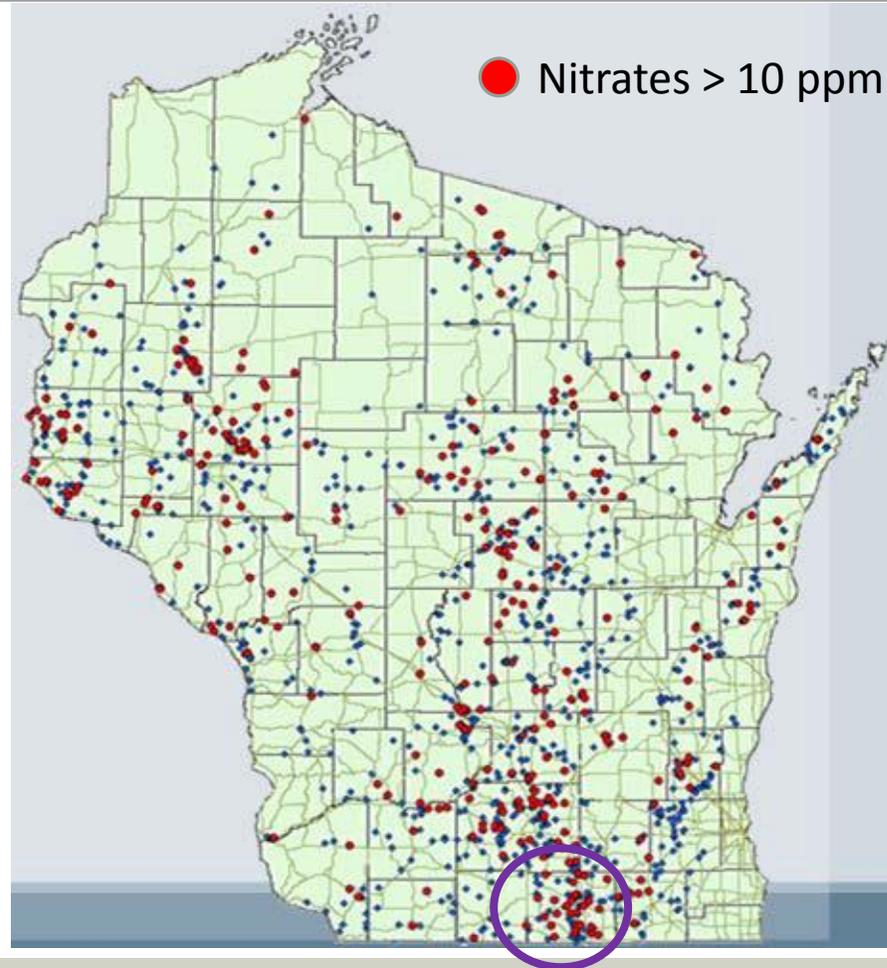
# Status of Nitrate Issue in Rock County

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- Collection of Nitrate Data
- Nitrate Monitoring Trends
- Rock County Nitrate Risk Tracking Tool
- Formation of a Nitrate Work Group



# Nitrates in Wisconsin



Map from Bruce Rheineck - WDNR



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# Collection of Nitrate Data

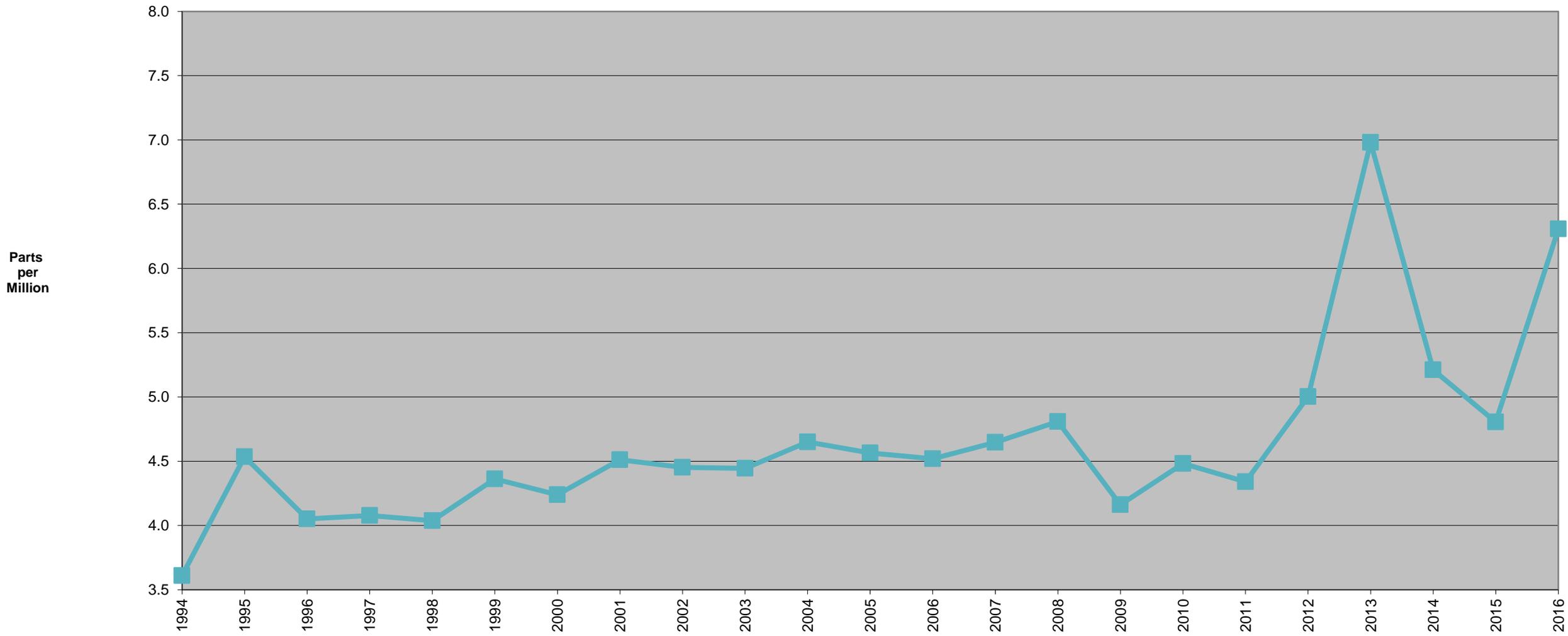
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- \* Municipal Well Impacts
- \* Transient Non-Community Well sampling
  - 150 public wells tested annually for nitrates
  - Costly well replacements
- \* Private Well Testing at Rock County Public Health Lab
  - Approximately 800 wells tested annually for nitrates
  - Over 30% exceed 10 ppm
- \* Targeted “Town Sampling Programs”
  - Fill in gaps in data
  - Increased Participation rates



# Nitrate Indicator Well Trends

Nitrate in Groundwater  
23 Year Trend in Rock County  
"Indicator" Transient Non-Community Wells (N=79)



# IMPLEMENTING A GROUNDWATER NITRATE RISK TRACKING TOOL IN ROCK COUNTY

A TAKING ACTION WITH DATA GRANTEE PROJECT

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UW-Whitewater Student Interns



## BACKGROUND

Elevated nitrates in drinking water can lead to methemoglobinemia, or “blue baby syndrome” and can potentially increase the risk of certain cancers. In Rock County, more than 30% of private wells exceed the health advisory level for nitrates.

## PROJECT OVERVIEW

This project is designed to identify and evaluate the main sources of nitrates in the groundwater and utilize Geographic Information Systems (GIS) to map the areas of highest nitrate risk. Some of the Nitrate Risk inputs include:

- USDA satellite land cover data used identify high N impact crops.
- Soil survey characteristics used to identify highly susceptible areas
- Irrigated lands delineated
- Septic system densities mapped

## MAIN RISK FACTORS FOR NITRATE IN GROUNDWATER



NITRATE  
GIS RISK  
TOOL

Irrigation image courtesy Flickr user Aqua Mechanical  
Toilet paper image courtesy Flickr user Steven DePolo

## OUR IMPACT

- + Project was a factor in creation of a county-wide Nitrate Work Group consisting of key agencies and the agricultural industry.
- + Four key partnerships built with Land Conservation, Planning Department, UW-Extension, and UW-Whitewater.

## NEXT STEPS

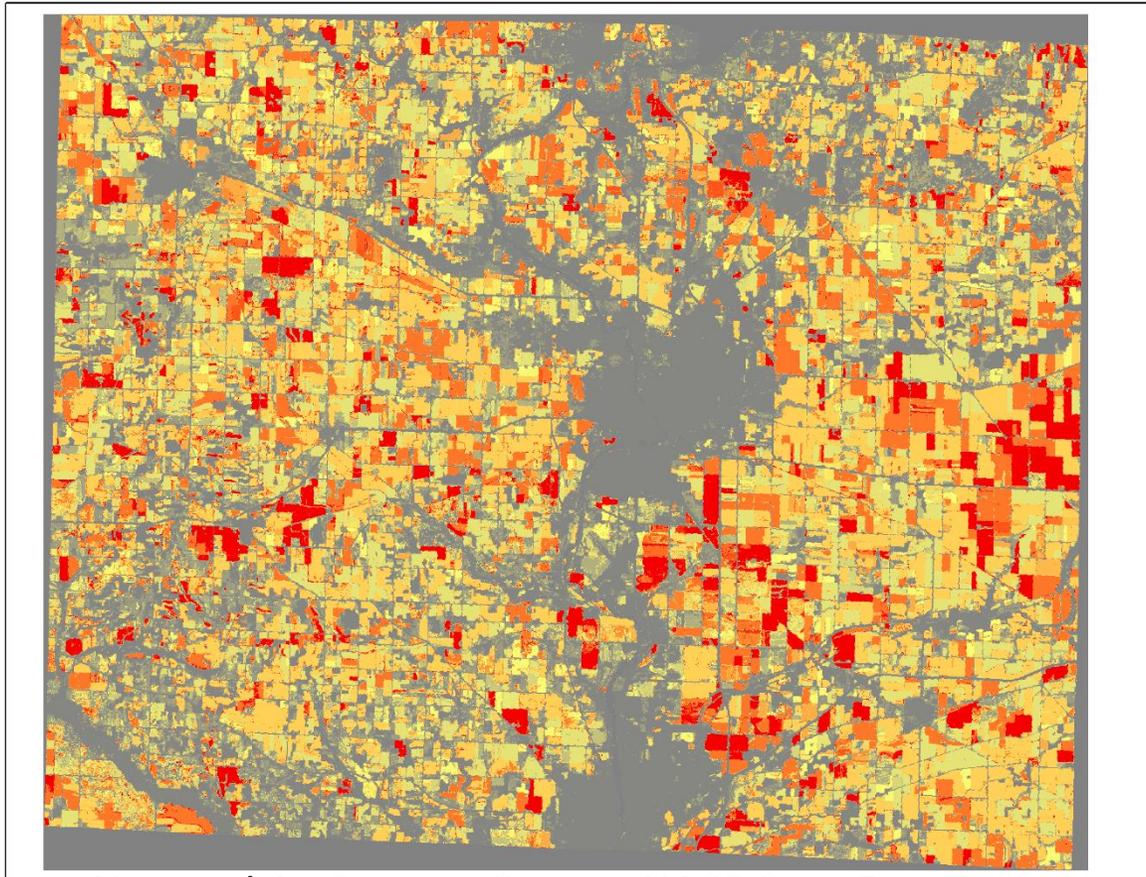
In the final three months of the grant, we plan to:

- Finalize/calibrate GIS Risk Tool
- Place Nitrate Risk Tool on website for public use.
- Share outcomes with community partners.
- Work with newly formed Rock County Nitrate Work Group to evaluate long-term solutions.



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# Land Cover Classification

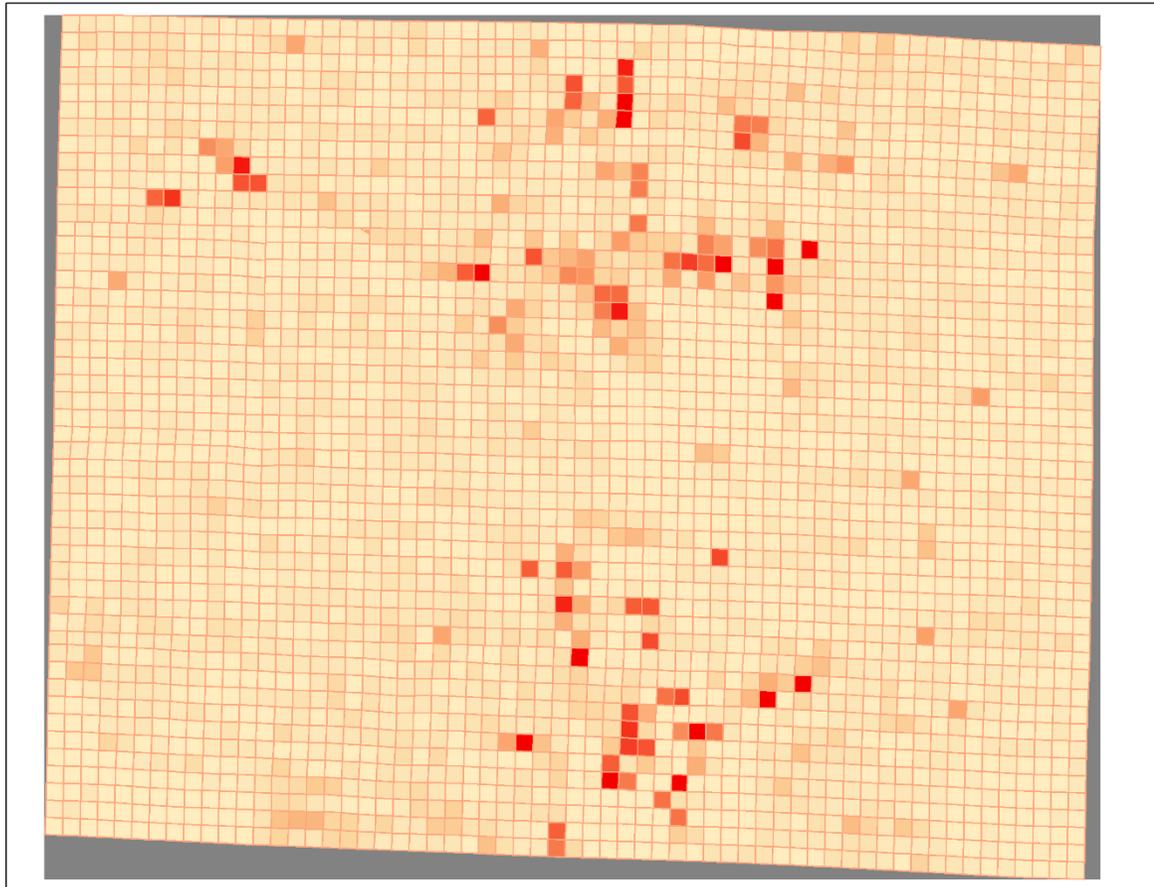


National Ag Statistic Service NASS Crop Data Layer

- Nitrogen fertilizer and leaching rates values were averaged throughout a 5-year time frame
- Values ranged from **0 to 53 lbs of Nitrogen per Acre** with areas in red representing the highest concentration.



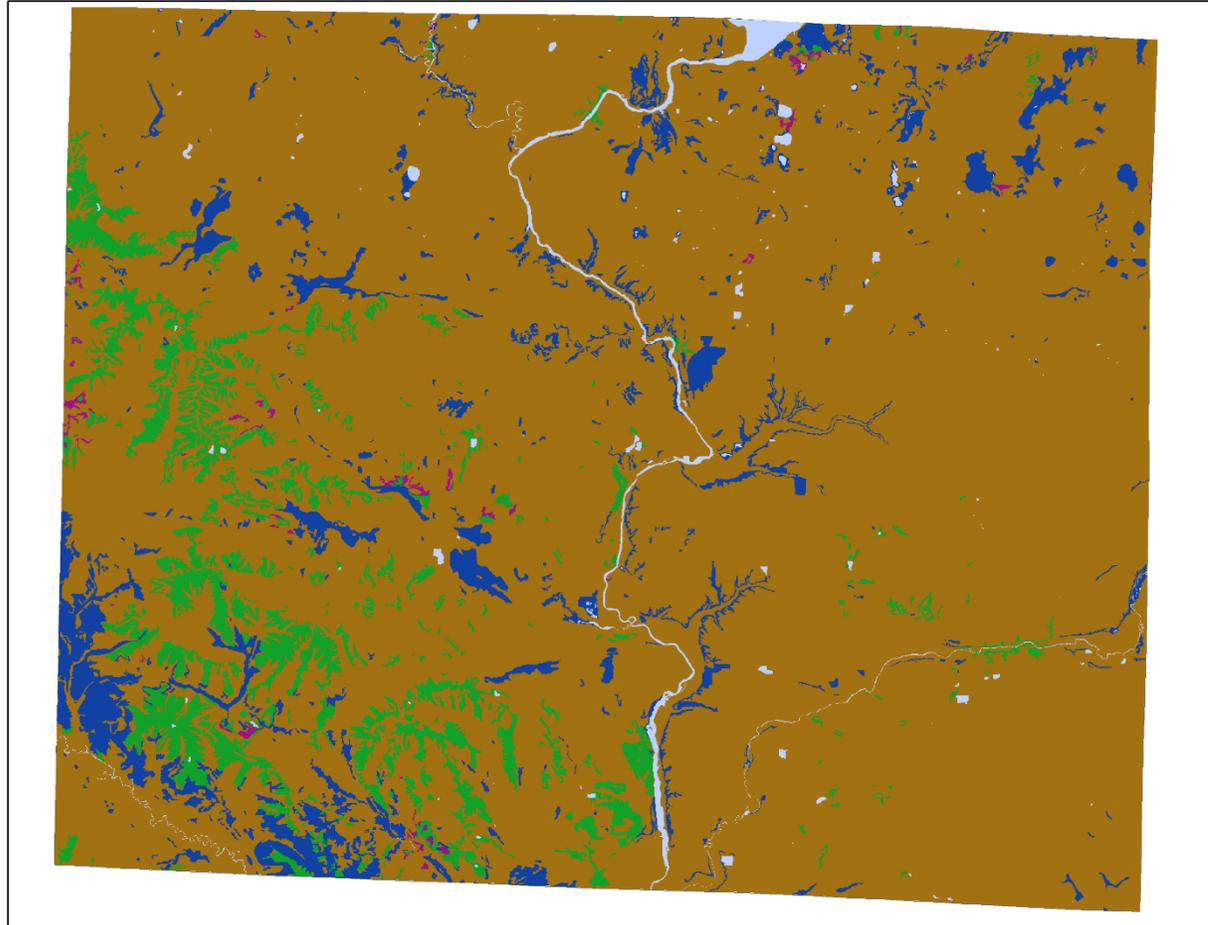
# Septic System Density Analysis



- The septic system density was represented by  $\frac{1}{4}$  by  $\frac{1}{4}$  county sections
- The number of septic systems with an area was multiplied by 20 to represent the nitrogen leaching and then divided by the total area to determine potential pound leached per acreage.
- Values ranged from **0 to 13.5 lbs/per acre** with areas in red representing the highest concentration of septic systems.



# Soil Analysis/Leaching Potential



- Most of Rock county has a B soil group
  - Dark Blue → Soil Group A
  - Brown → Soil Group B
  - Purple → Soil Group C
  - Green → Soil Group D
  - Light Blue → Water
- Each soil class was designated a multiplier for potential nitrate leaching.
- Soil Type A
  - Multiplier of 1.3
- Soil Type B
  - Multiplier of 1.1
- Soil Type C
  - Multiplier of 0.9
- Soil Type D
  - Multiplier of 0.7

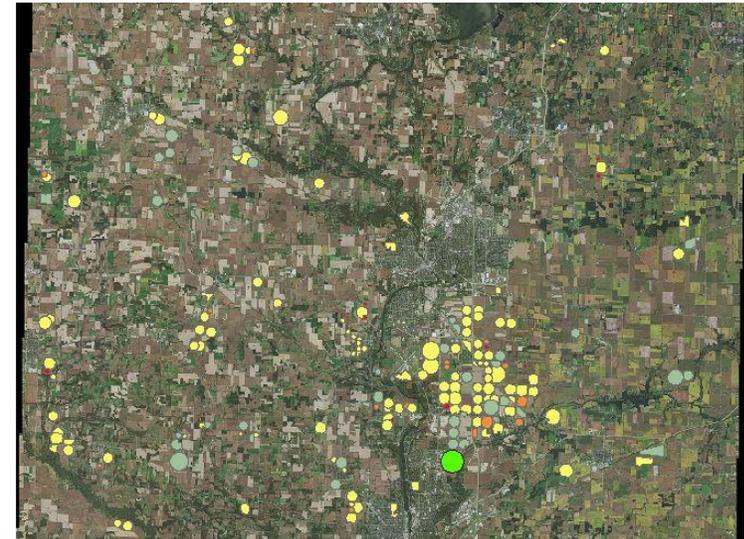
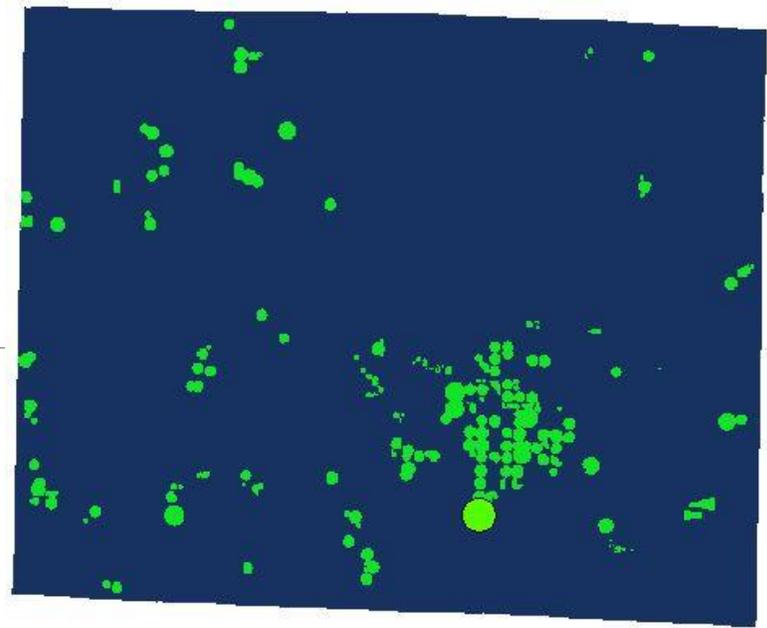


# Irrigation

Top photo shows the multiplier ratings of 1 for blue (non-irrigated) and 1.15 for green (irrigated)

The multiplier of 1.15 represents a 15% increase in leaching potential which would represent an efficient irrigation program.

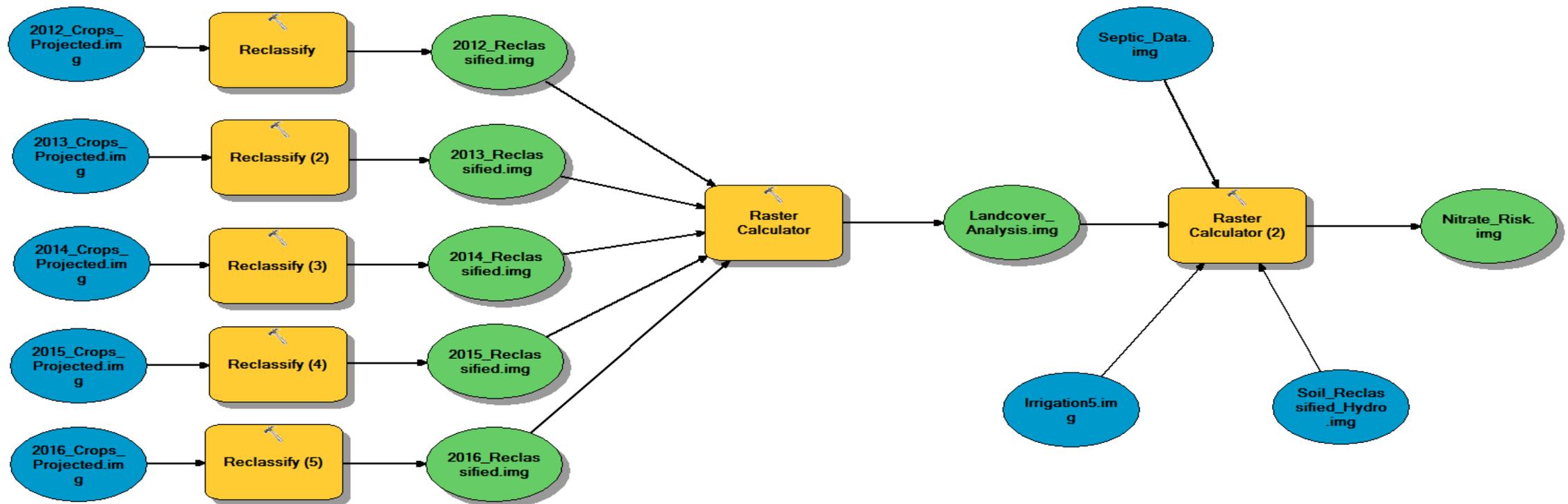
Bottom photo shows crop irrigation, highest values are in red indicating a large amount of water being used for those fields



# Nitrate Risk in Groundwater throughout Rock County

All four factors were compiled together to identify areas of possible high Nitrate contamination.

The total sum of potential Nitrogen leached was multiplied by the soil and irrigation

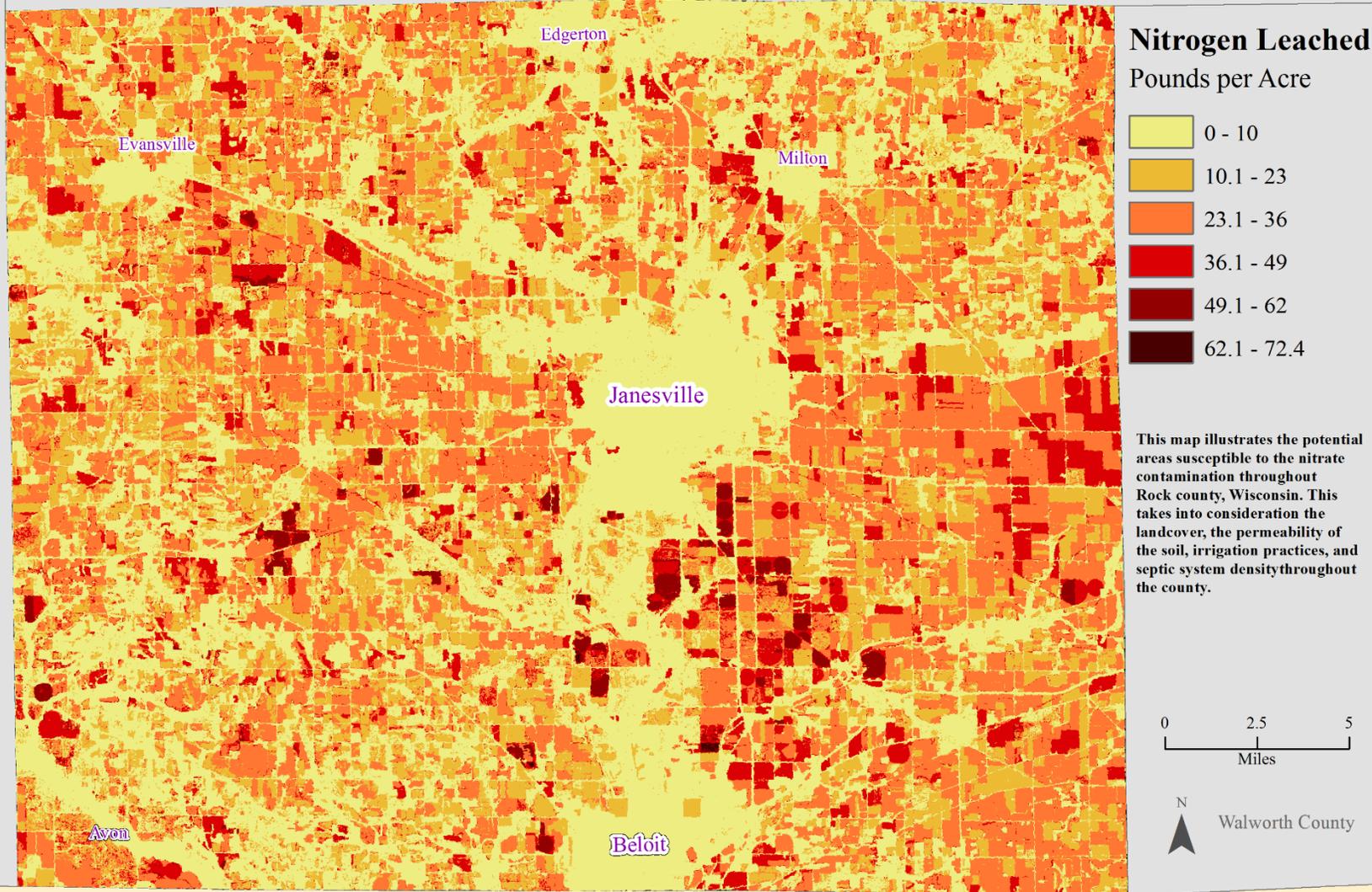


# Potential Risk of Nitrates in Groundwater

Rock County, Wisconsin

Dane County

Jefferson County



Soil Survey Geographic Database, 2007

Wisconsin DNR, 2011 - 2015

United States Department of Agriculture, 2012 - 2016

Health Department Record of Septic Systems, 2017

Illinois

David Kolodziejcki

May 2nd, 2016



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# Rock County Nitrate Work Group

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## WHY WAS IT FORMED?

- - Data was turned into a 'need for action'
  - - Relationships built between county agencies
  - - there is a strong 'farmer led' initiative
- 12 person group appointed by Rock County Board of Supervisors
  - Diverse Representation with strong Ag community presence
  - Formed in June 2017, expected to be renewed until 2020 or beyond





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# Nitrate Work Group Mission Statement

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***The Rock County Groundwater Nitrate Workgroup will analyze existing groundwater nitrate data, evaluate known best management practices to reduce nitrate leaching, and provide practical recommendations on short-term and long term methods to improve groundwater nitrate quality.***



# NITRATE BMP DEMO AREAS

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- **Identify Potential BMP Groundwater Areas (2017)**
  - o - geology, groundwater impacts, availability of indicator wells
  - o - Work with Wisc Natural History and Geologic Survey
- **Obtain Landowner Cooperation (Winter 2018)**
  - o Farm community support
  - o Grower incentives fund
- **Collect Historic and Baseline nitrate and cropping data (2018)**
- **Implement 'Farmer-Led' BMP practices (Fall 2018 to 2020 and longer)**

Cover crops  
Fertilizer sources  
Application timing

Nitrogen crediting  
Irrigation scheduling  
Variable rate applications

Crop Rotations  
Soil Testing  
Tissue testing

Realistic yield goals  
Tillage practices



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11/2/2017

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