Status of Nitrates in Rock County Groundwater

Rick Wietersen, Environmental Health Director
Rock County Public Health Department
11/2/2017

Public Health

Status of Nitrate Issue in Rock County

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

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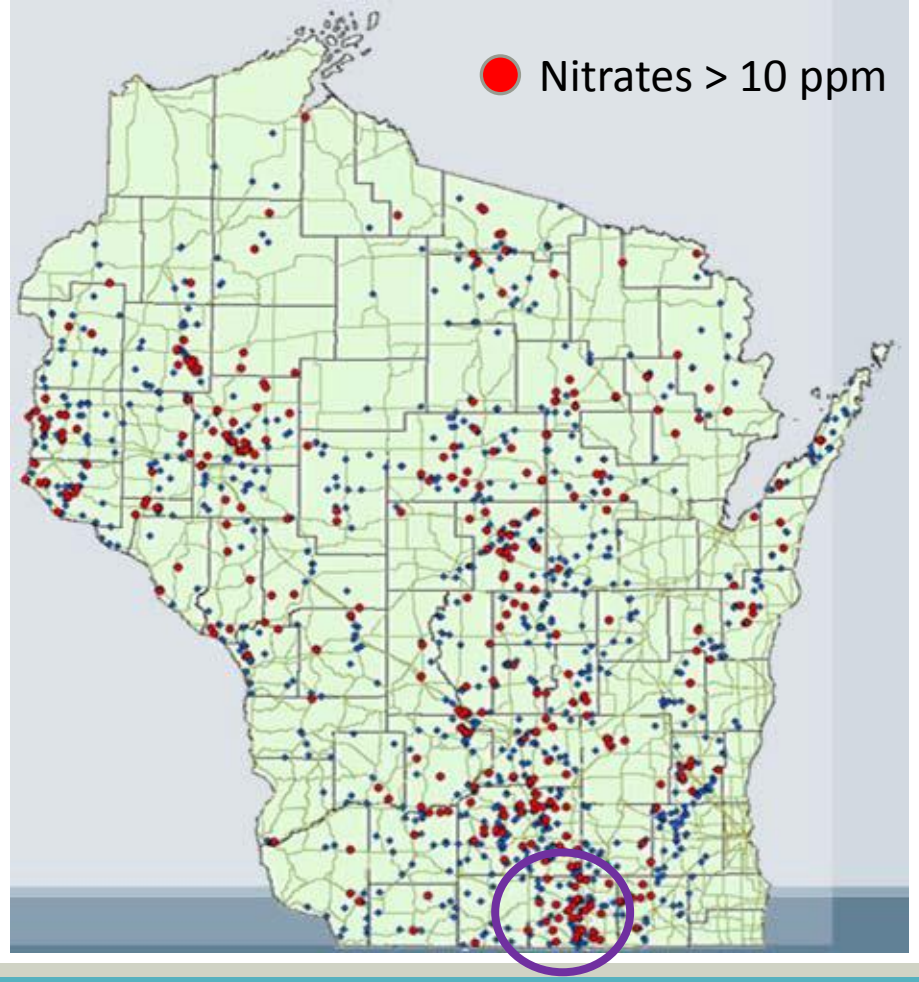
Nitrates in Wisconsin



Map from Bruce Rheineck - WDNR

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Collection of Nitrate Data

* 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

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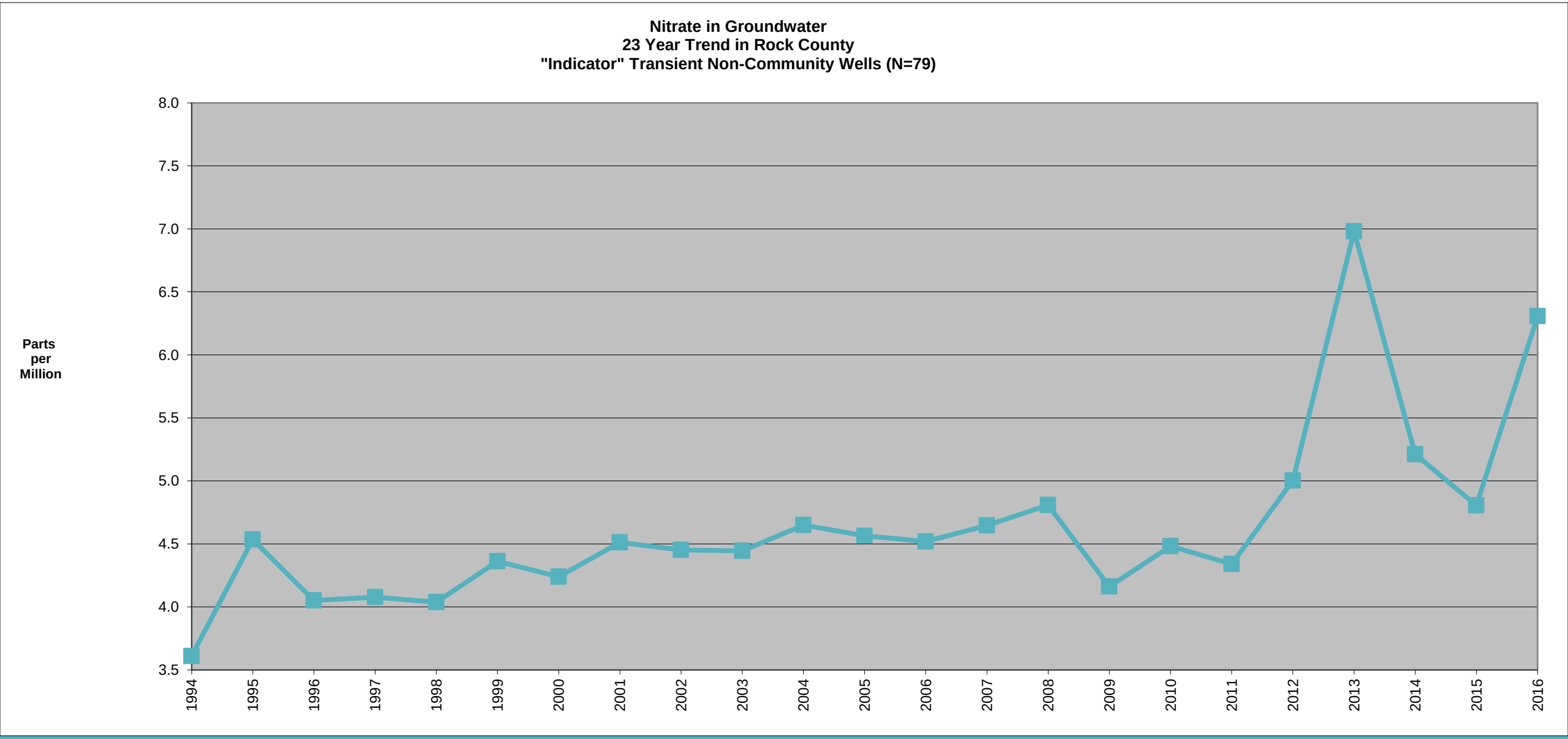
Nitrate Indicator Well Trends



IMPLEMENTING A GROUNDWATER NITRATE RISK TRACKING TOOL IN ROCK COUNTY

A *TAKING ACTION WITH DATA* GRANTEE PROJECT

Rick Wietersen, RS, MS; Adam Elmer, RS, BS
Rock County Public Health Department

Michael Leblanc; David Kolodziejski
UW-Whitewater Student Interns

Public Health

WISCONSIN EPHT

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

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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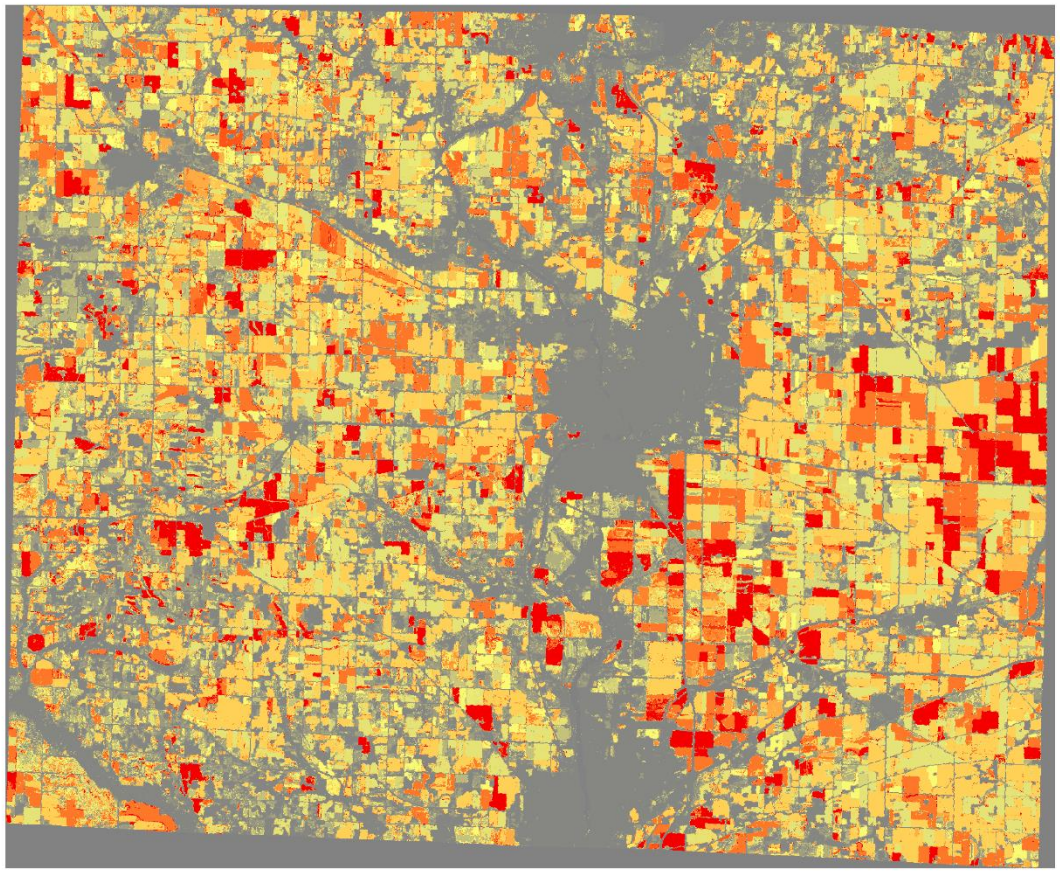
ROCK COUNTY PUBLIC HEALTH DEPARTMENT
This project was funded by the Wisconsin Environmental Public Health Tracking Program.

Questions and comments should be directed to Rick.Wietersen@co.rock.wi.us.

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.

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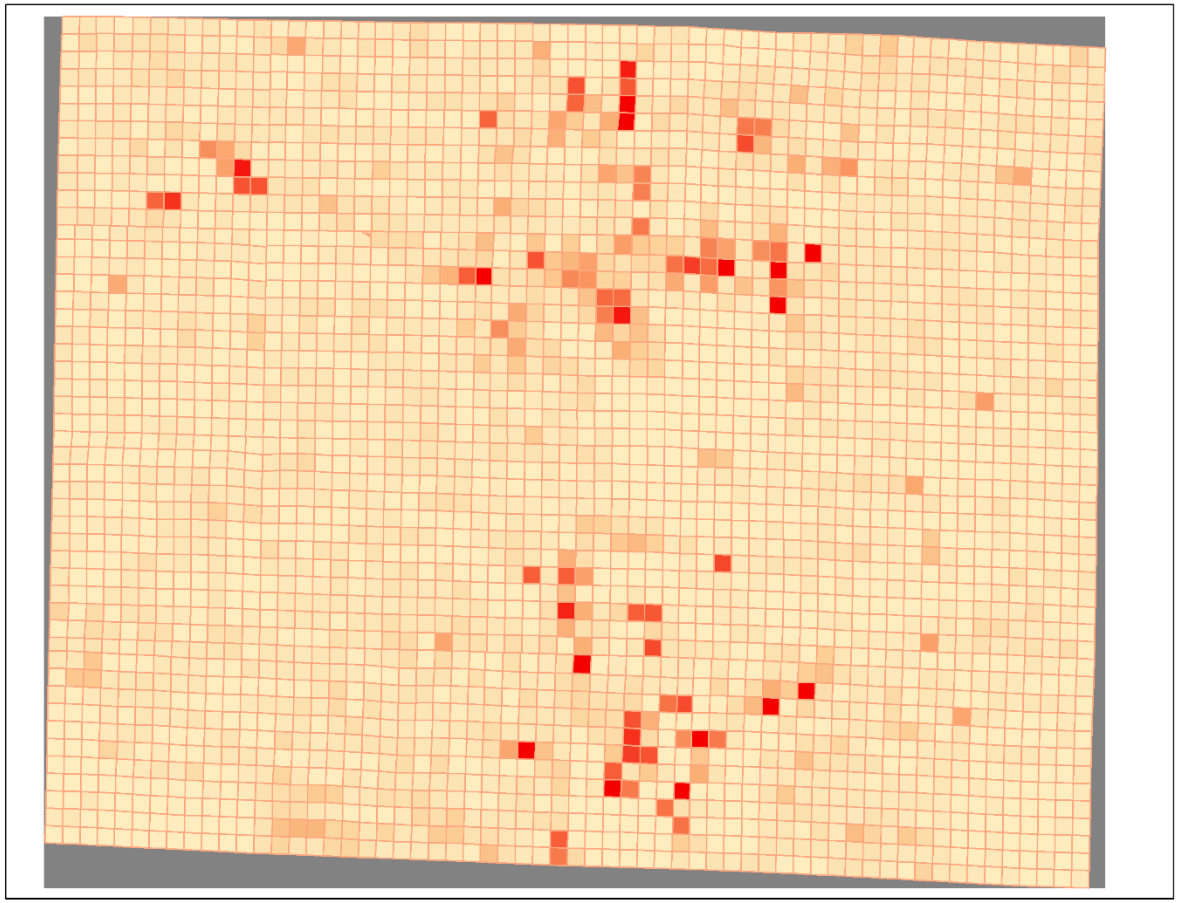
Septic System Density Analysis



- The septic system density was represented by ¼ by ¼ 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.

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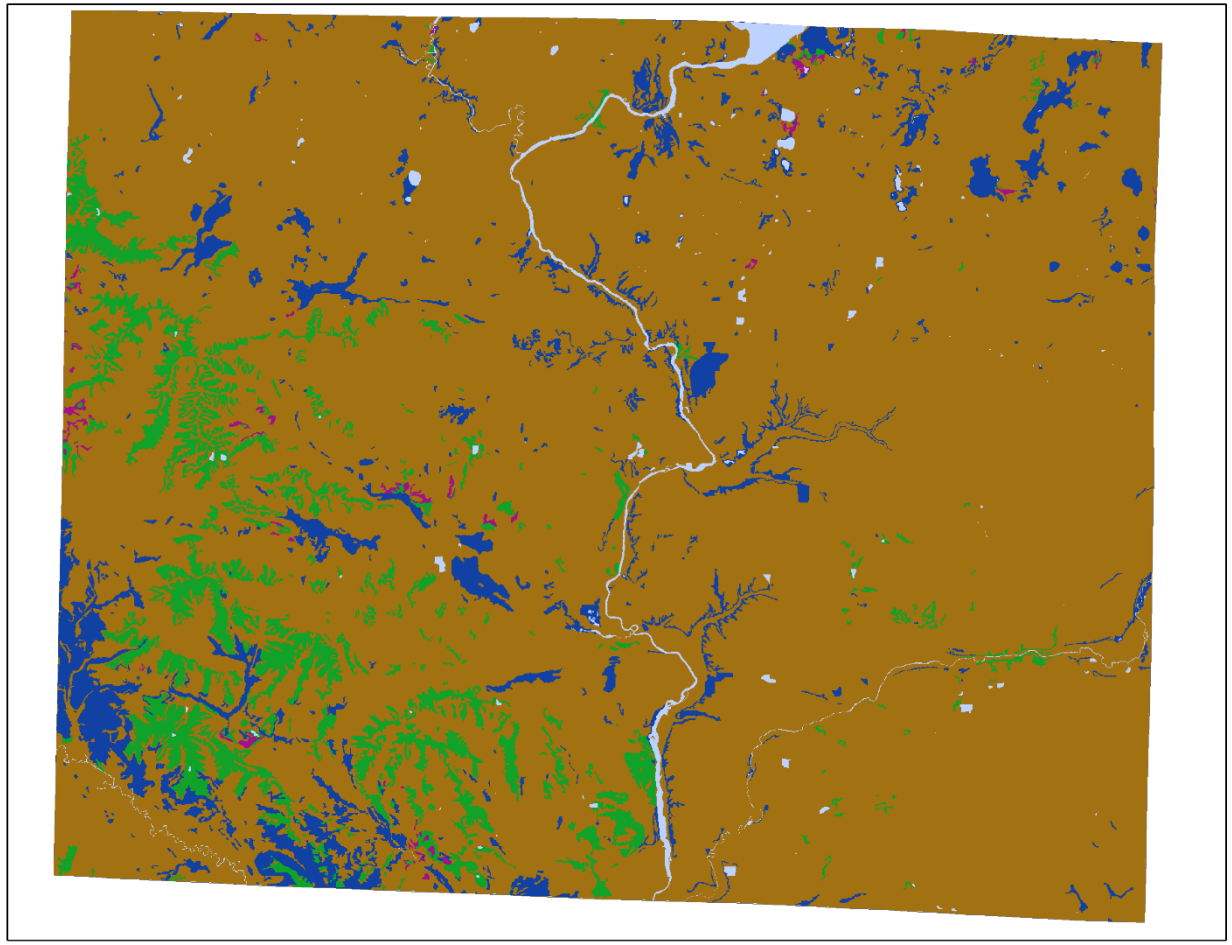
Soil Analysis/Leaching Potential



- 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

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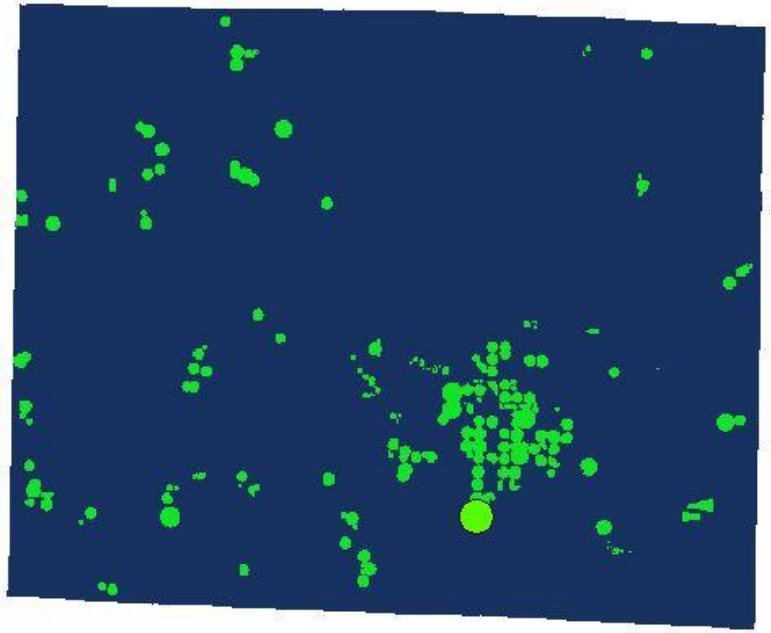
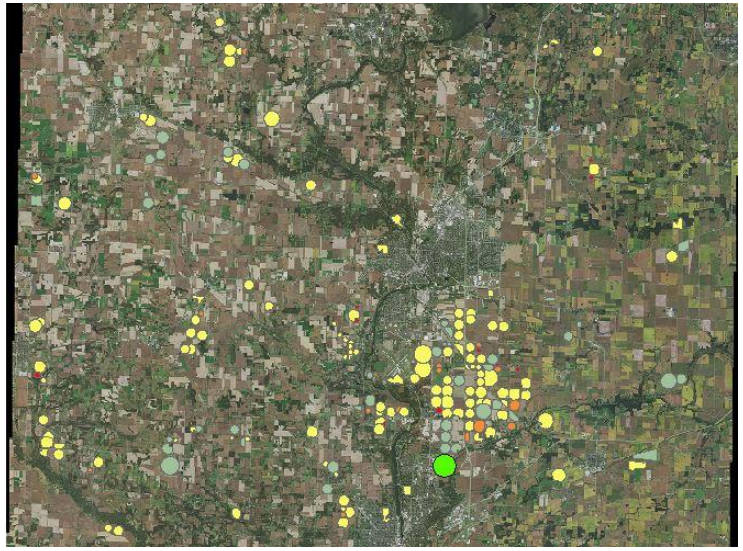
Irrigation



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



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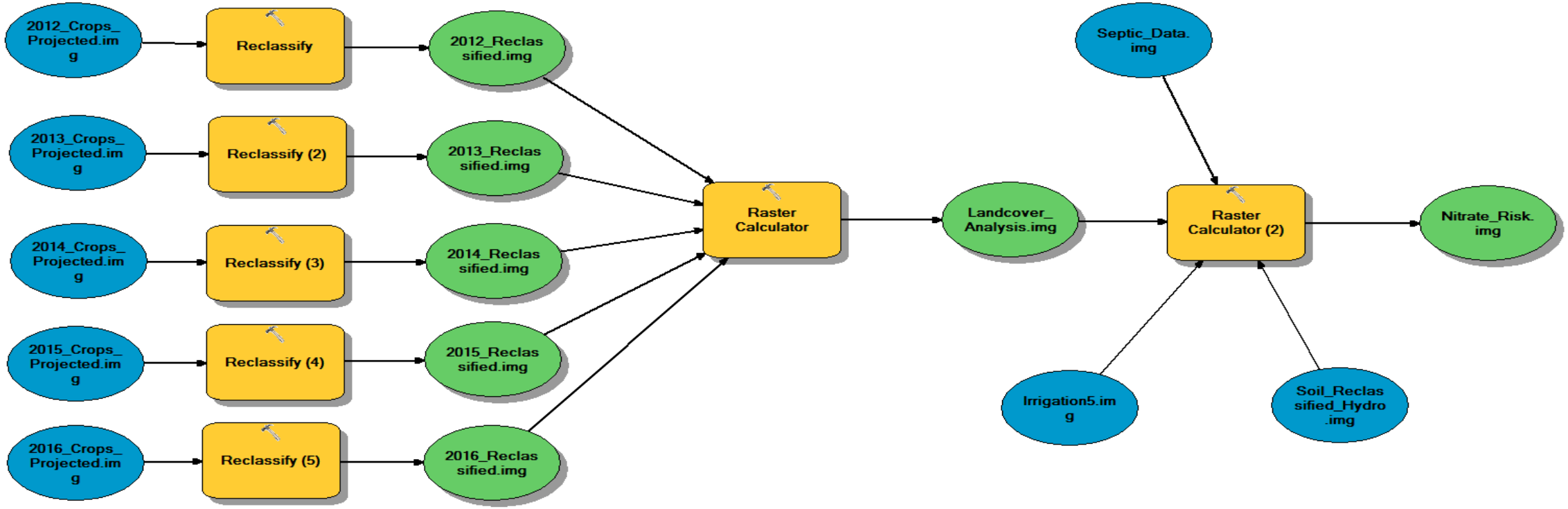
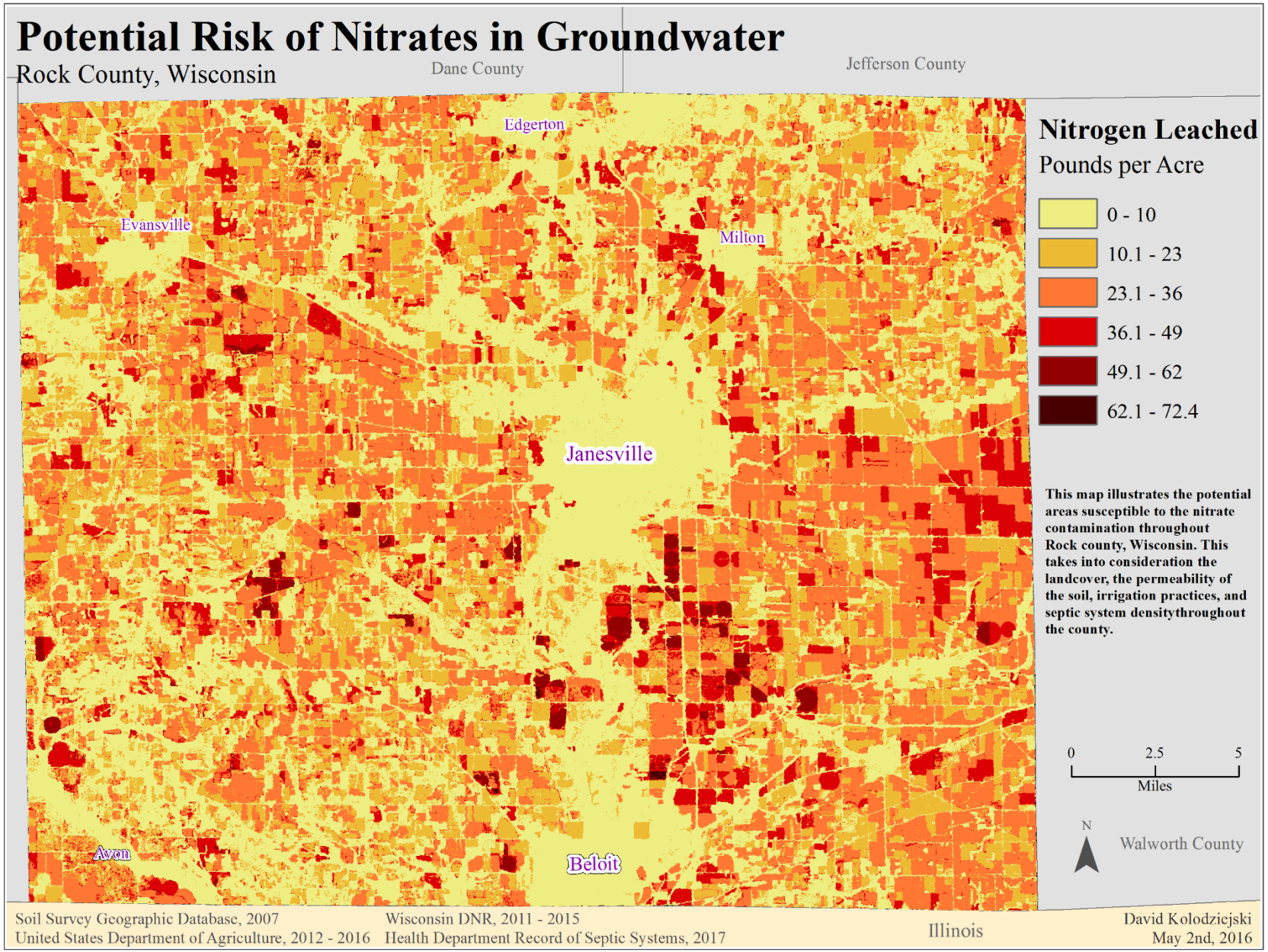
Nitrate Risk in Groundwater throughout Rock County

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





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Rock County Nitrate Work Group

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

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.

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NITRATE BMP DEMO AREAS

- **Identify Potential BMP Groundwater Areas** (2017)
  - - geology, groundwater impacts, availability of indicator wells
  - - Work with Wisc Natural History and Geologic Survey
- **Obtain Landowner Cooperation** (Winter 2018)
  - Farm community support
  - 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	Nitrogen crediting	Crop Rotations	Realistic yield goals
Fertilizer sources	Irrigation scheduling	Soil Testing	Tillage practices
Application timing	Variable rate applications	Tissue testing	

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