



# Wisconsin's Nutrient Reduction Strategy

## Wisconsin's Nutrient Reduction Strategy

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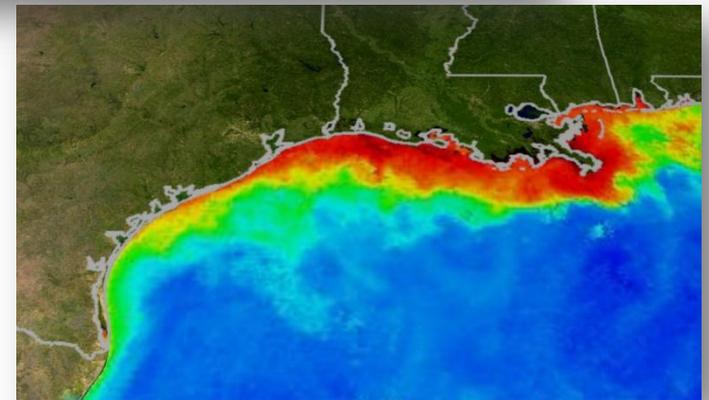
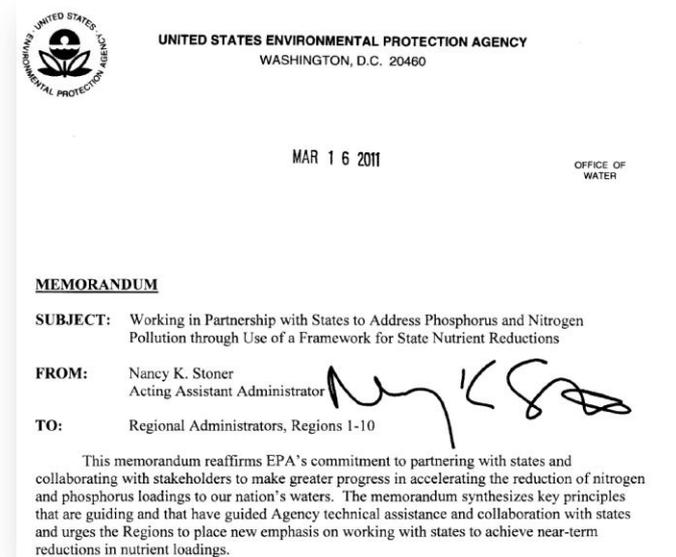
August 5, 2013 Draft

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# Developed in response to:

- EPA's March 2011 memo from Nancy Stoner
- Gulf Hypoxia Action Plan 2008
- Great Lakes Water Quality Agreement of 2012
- Nutrient related water quality problems in Wisconsin's lakes, streams and groundwater





# Wisconsin Response

- Given:
  - new phosphorus rules and regulations adopted in 2010;
  - point source phosphorus discharge limits in place since 1993 or earlier; and
  - programs on-going for 30 years, general approach:
    1. No need to start from scratch; build on existing programs
    2. Identify and fill program gaps
    3. Enhance coordination
    4. Have not proposed any new rules or regulations

# Inter-agency Work Groups

- Targeting/Priority Setting
- Tracking
- NRCS 590 – Standards Oversight Council
- Monitoring





Questions on overall approach



# 10 Chapters

1. Prioritize watersheds
2. Set watershed reductions (45% reduction)
3. Effective point source programs
4. Effective agricultural nonpoint source programs
5. Integrated point source – nonpoint source management
6. Effective storm water and septic system programs
7. Accountability and verification (tracking)
8. Monitoring
9. Annual reporting
10. Numeric nutrient water quality standards criteria



# Chapter 1: Priority Setting/Targeting

- EPA – Systematic and data driven analysis
- Appropriate watershed scale
  - HUC 10 watershed



# Hydrologic Unit Classification (HUC)

- Federal watershed delineation and naming system

| Major Basin       | HUC 8<br>(Wolf River) | HUC 10<br>(Black Earth<br>Creek) | HUC 12<br>(German Valley<br>Creek) |
|-------------------|-----------------------|----------------------------------|------------------------------------|
| Lake Superior     | 5                     | 22                               | 108                                |
| Lake Michigan     | 13                    | 90                               | 450                                |
| Mississippi River | 32                    | 256                              | 1244                               |
| Total             | 50                    | 368                              | 1802                               |



# Wisconsin HUC 8 Map





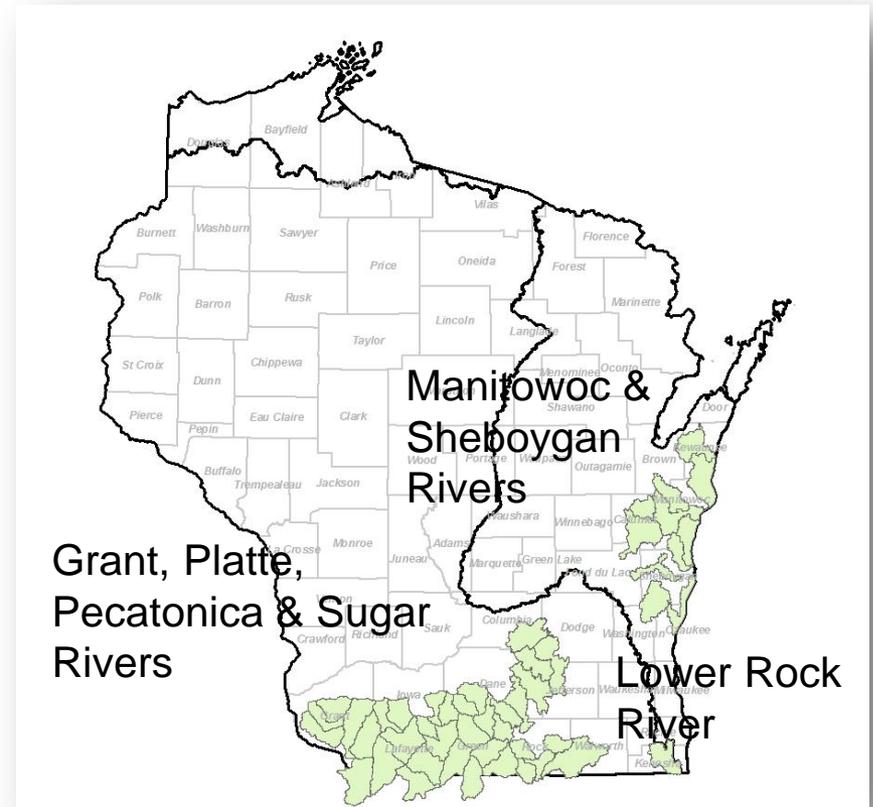
# Targeting/Priority Setting Work Group

- Jim Baumann -- DNR
- Ken Genskow – UWEX
- Corinne Billings -- DNR
- Brian Austin – DNR
- Adam Freihoefer – DNR
- Sara Walling – DATCP
- John Panuska -- UW
- Dale Robertson – USGS
- Pat Murphy – NRCS
- Kurt Calkins – Columbia Co.
- Jim VandenBrook – WLWCA
- Astrid Newenhouse -- UWEX



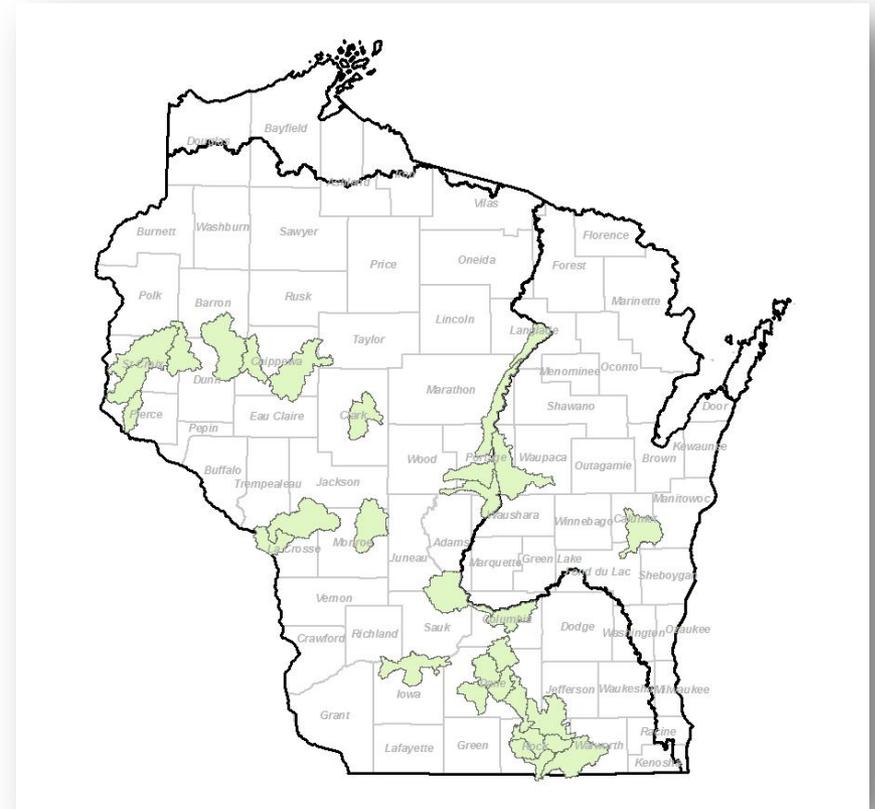
# Chapter 1: Priority Setting/Targeting

- Top Group (HUC 10) Watersheds for Nitrogen
- Based on stream concentrations and SPARROW model yields



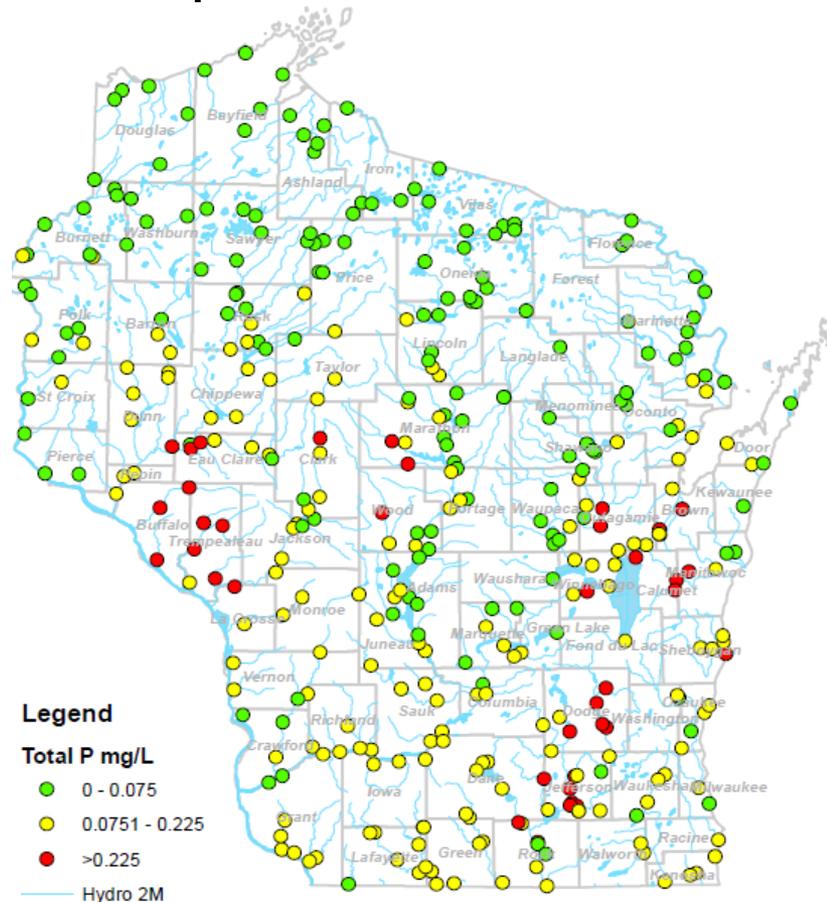
# Chapter 1: Priority Setting/Targeting

- Top Group (HUC 10) Watersheds for Safe Drinking Water/Groundwater
- Based on nitrate concentrations  $> 5$  mg/L in public wells and density of wells
  - Near urban areas, sandy soils, karst

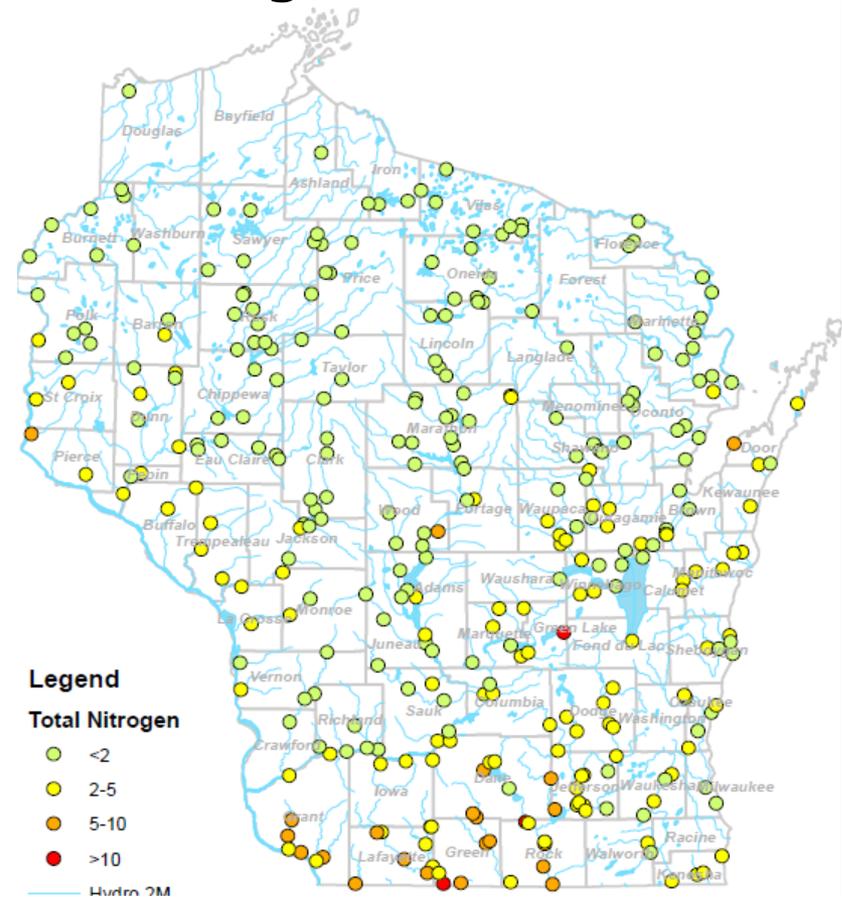


# Chapter 2: Reduction Targets: Status

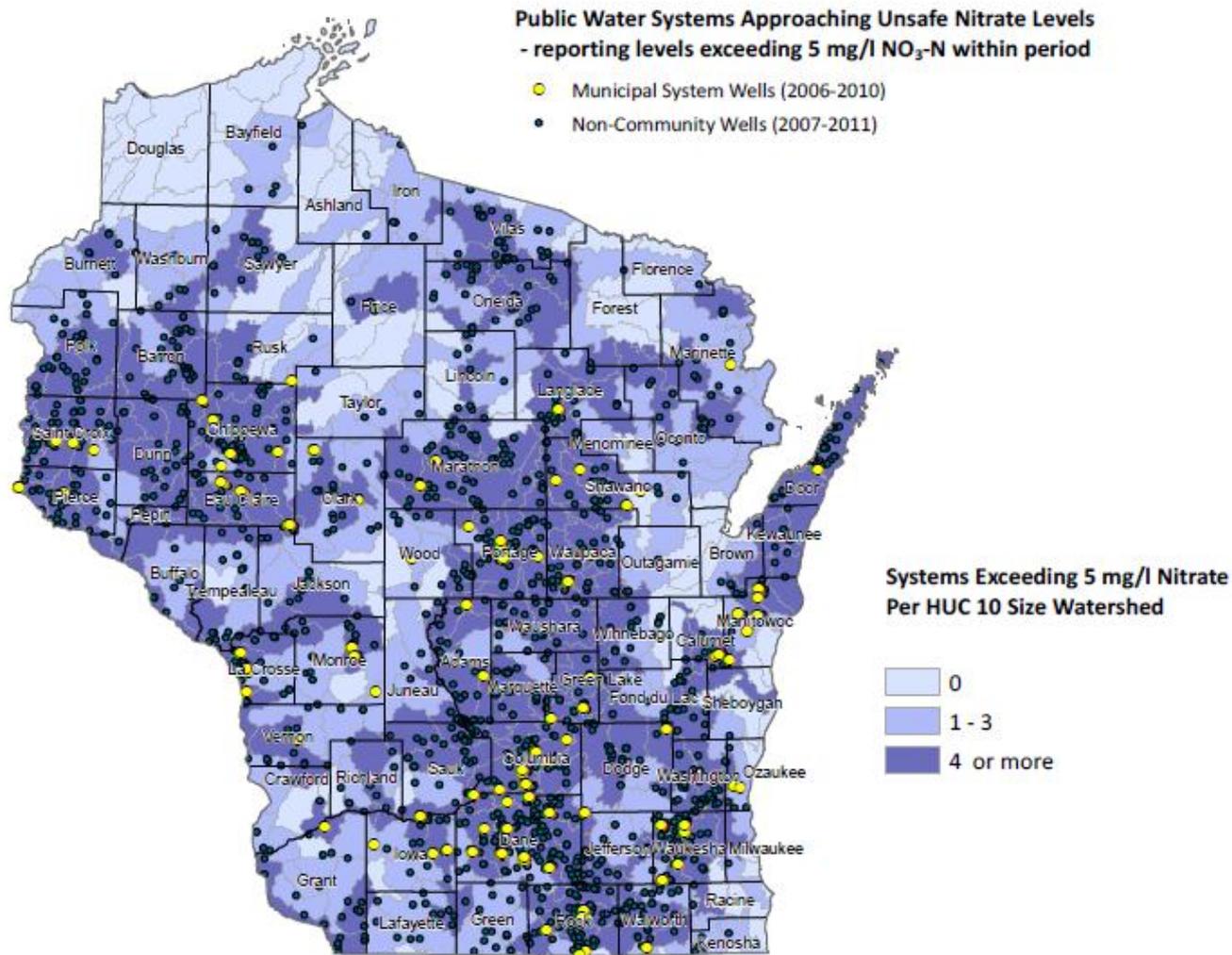
## Phosphorus in streams



## Nitrogen in streams



# Chapter 2: Reduction Targets: Status





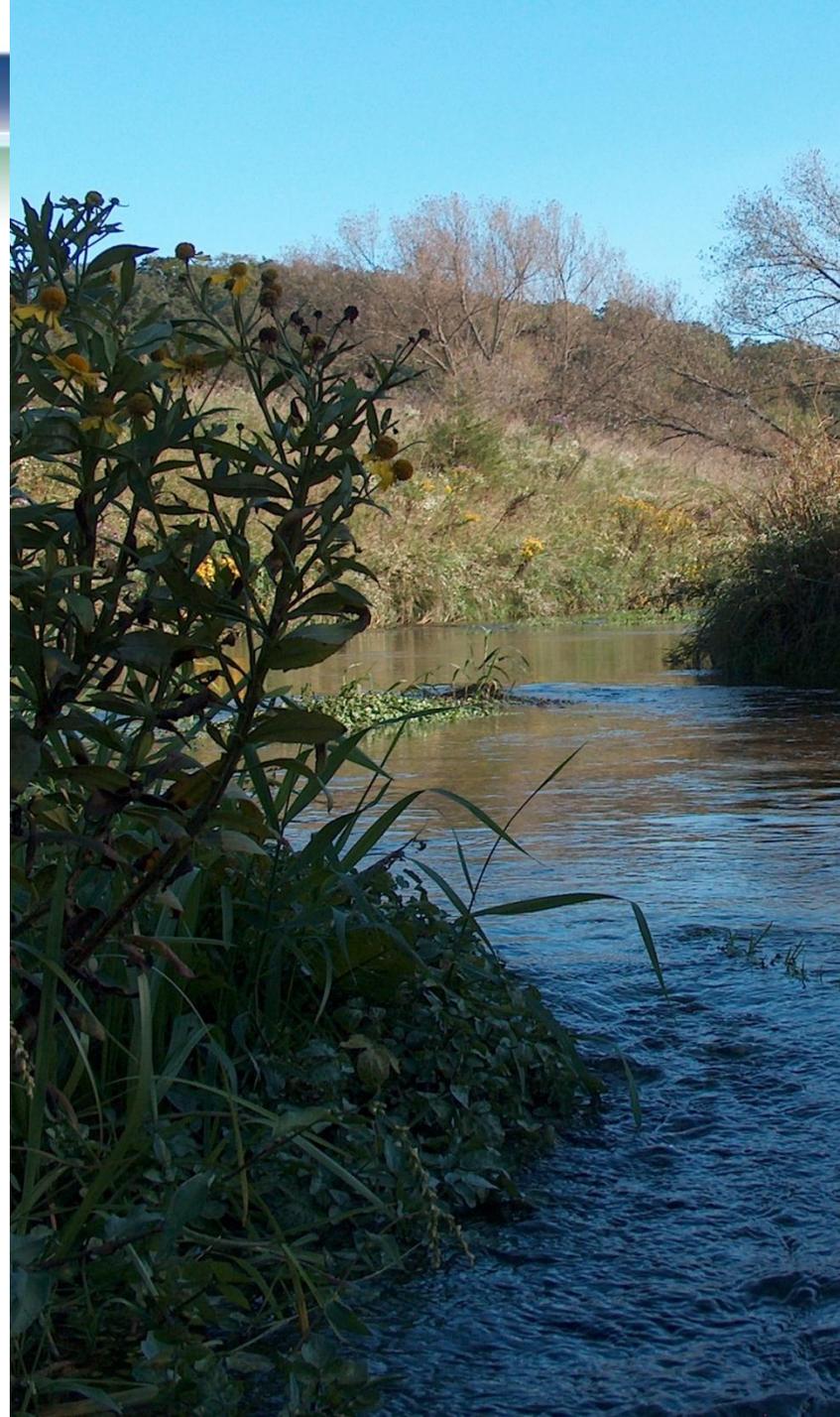
## Chapter 2: Reduction Targets: Trends

- Matt Diebel – DNR
- Dale Robertson -- USGS



# Long-Term Trends in River Water Quality in Wisconsin

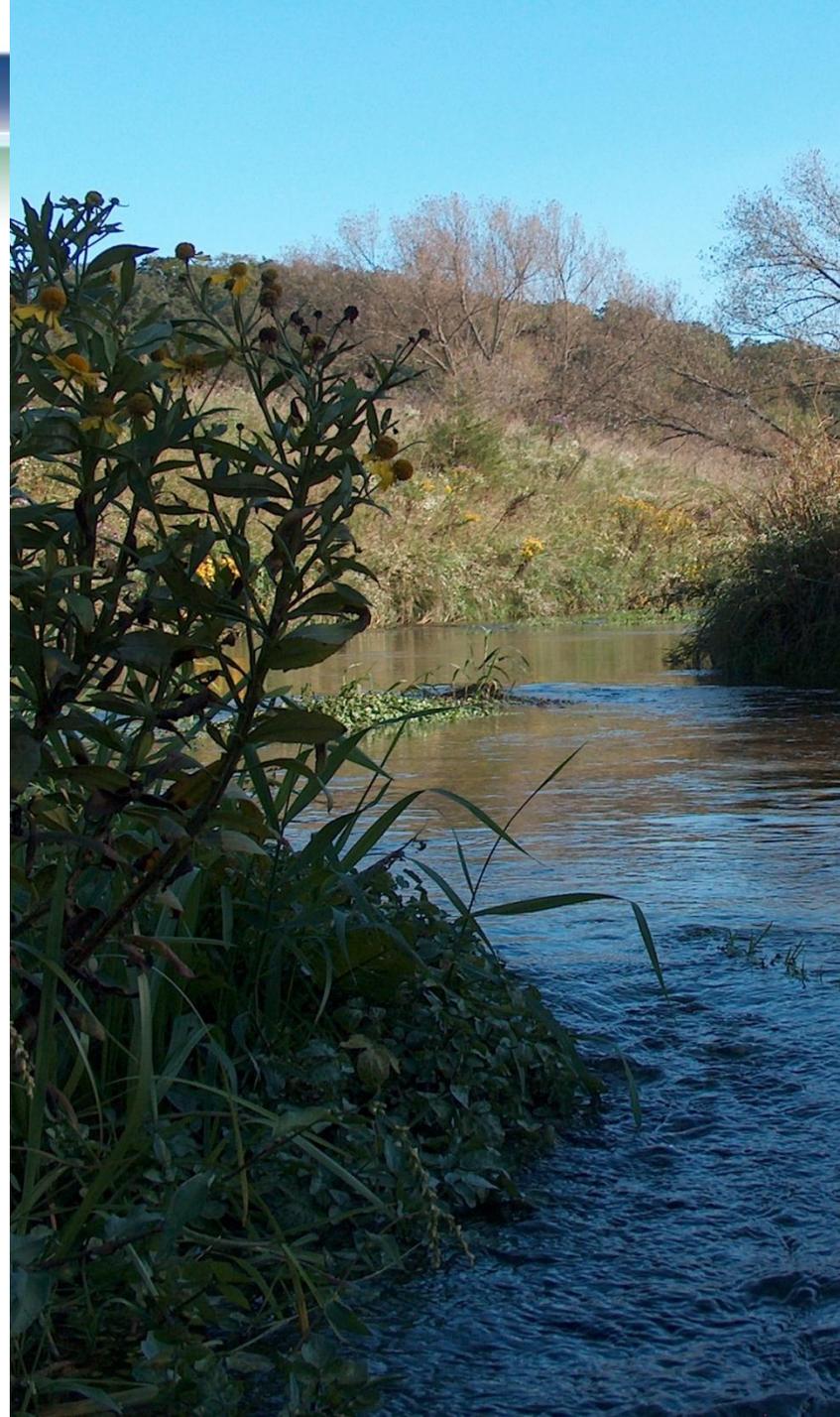
- Have policies and practices aimed at improving water quality worked?
- What water quality parameters have changed the most?
- What areas of the state have seen the biggest improvements or declines?
- Can we identify and head off worsening trends before they become

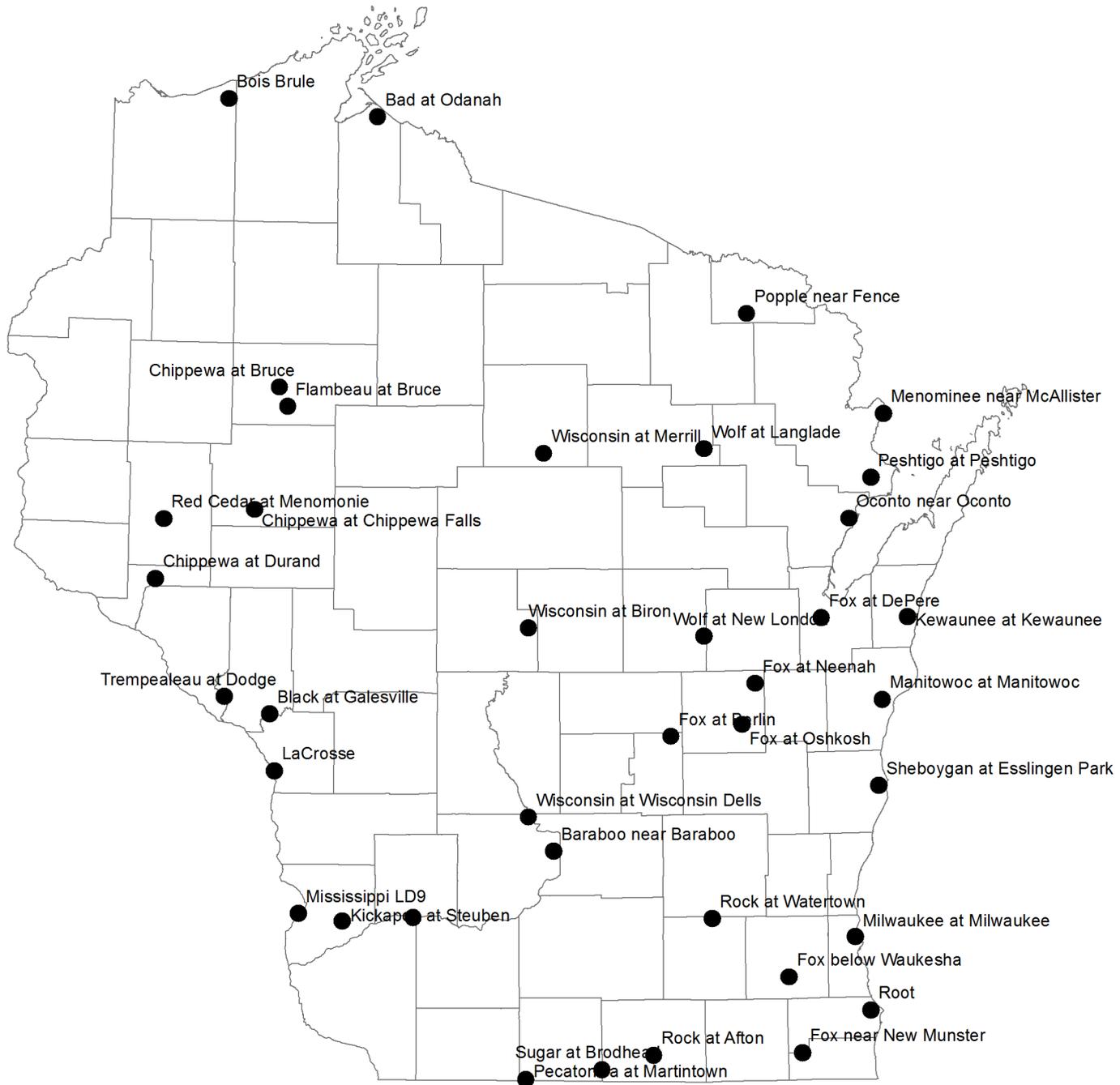




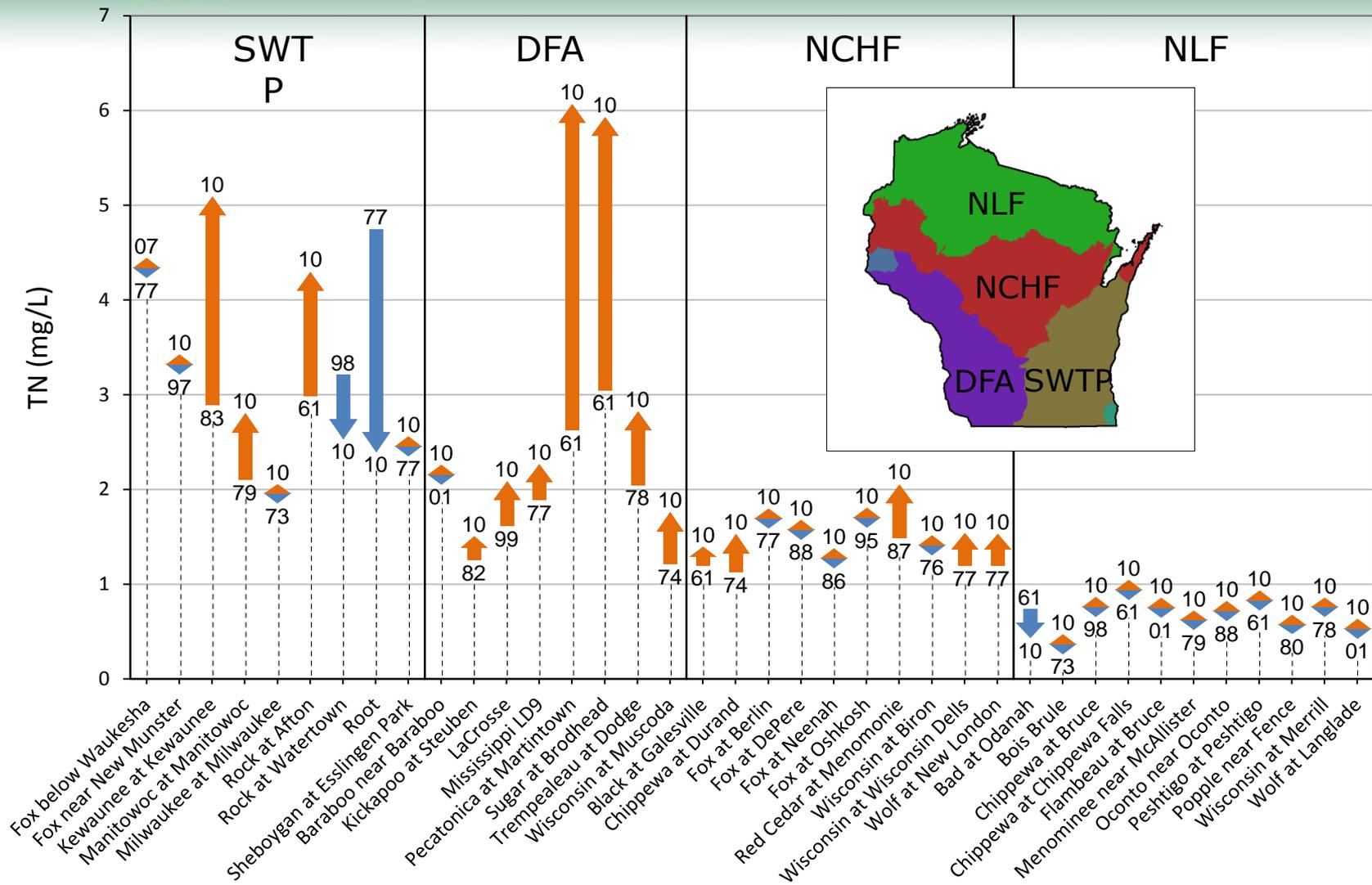
## Long Term Trends Monitoring Program

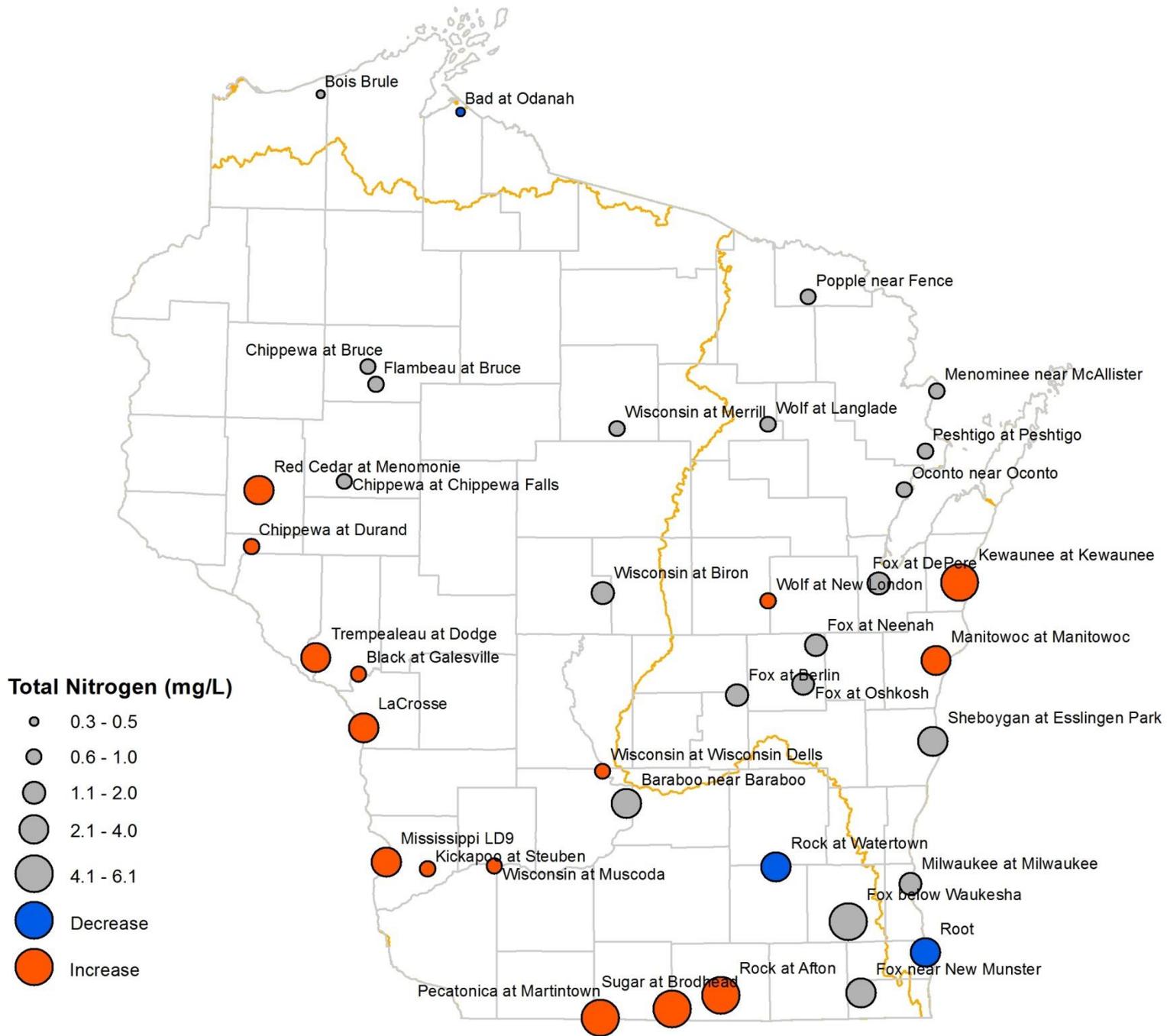
- 38 sites on large rivers across Wisconsin
- Started in 1961 (30-50 years per site!)
- Monthly or quarterly water quality samples.



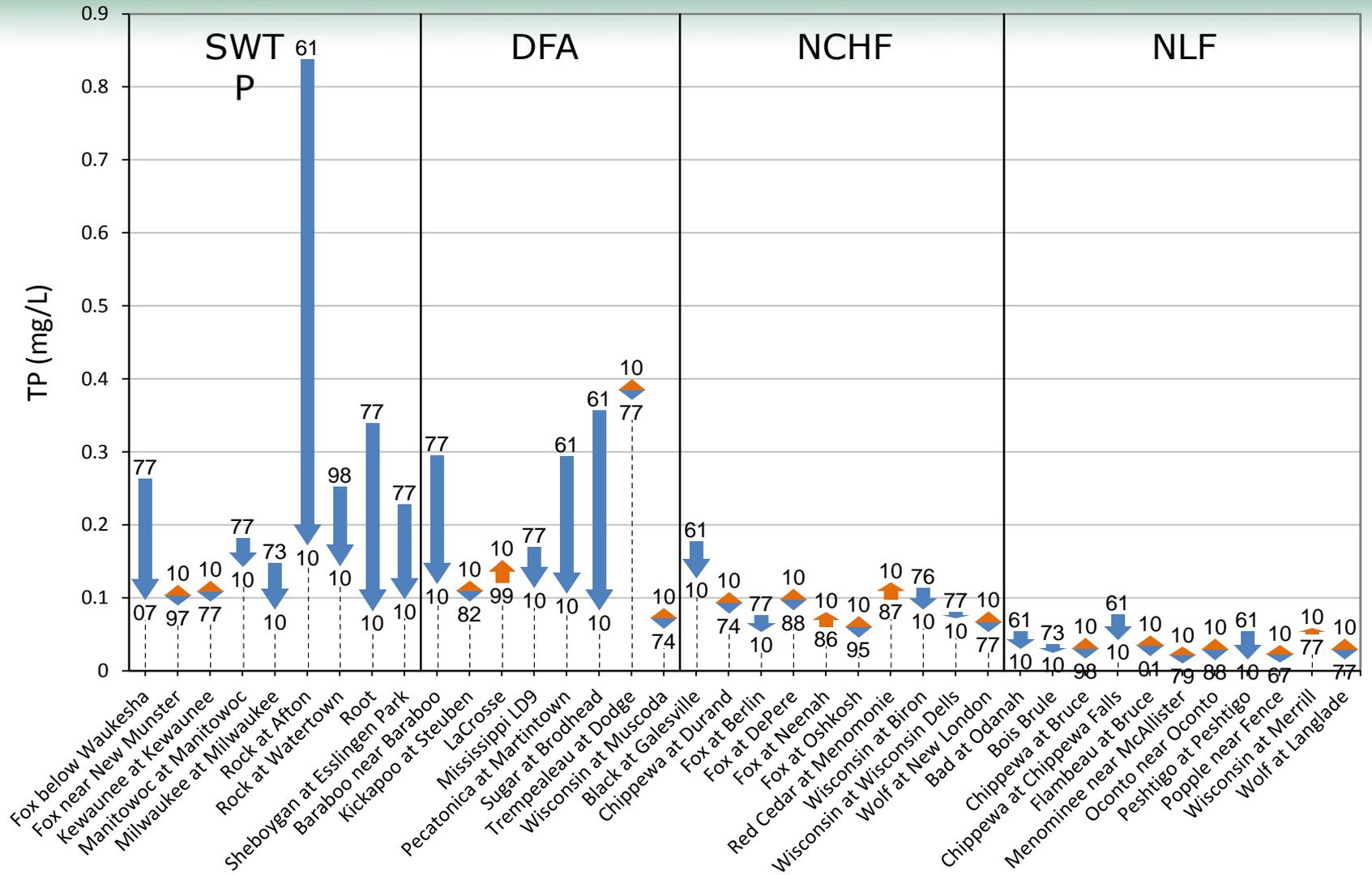


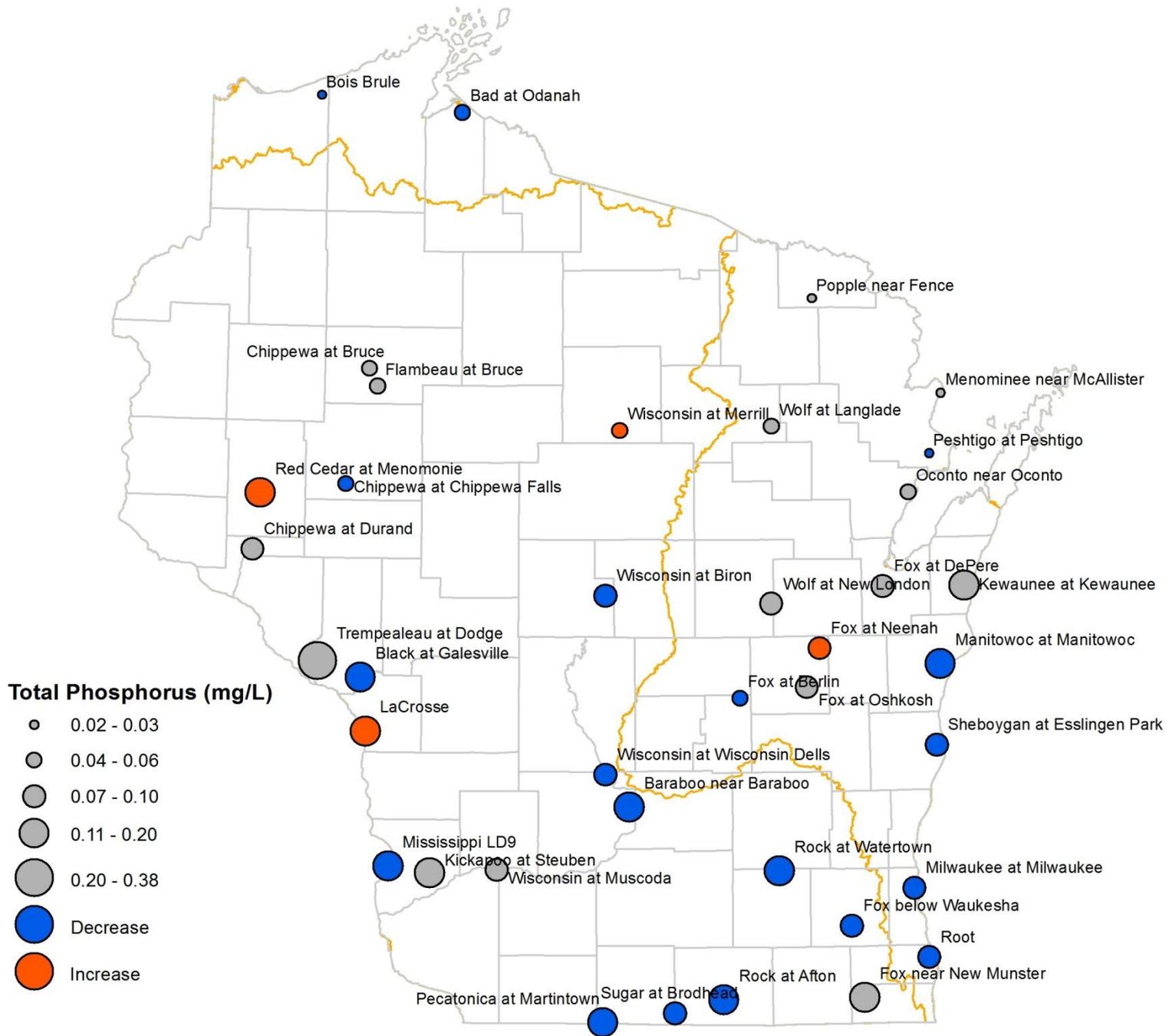
# Total Nitrogen





# Total Phosphorus







# Summary

1. Have policies and practices aimed at improving water quality worked?

On balance, yes, although it is hard to tell whether improvements are due to point or nonpoint source changes.

2. What water quality parameters have changed the most?

Phosphorus, sediment, and ammonia have generally decreased.

Nitrate and chloride have generally increased.

3. What areas of the state have seen the biggest improvements or declines?

Southern Wisconsin has seen the biggest improvements AND declines.

4. Can we identify and head off worsening trends before they become critical?

Chloride ← road salt

Nitrate ← agricultural nutrient management



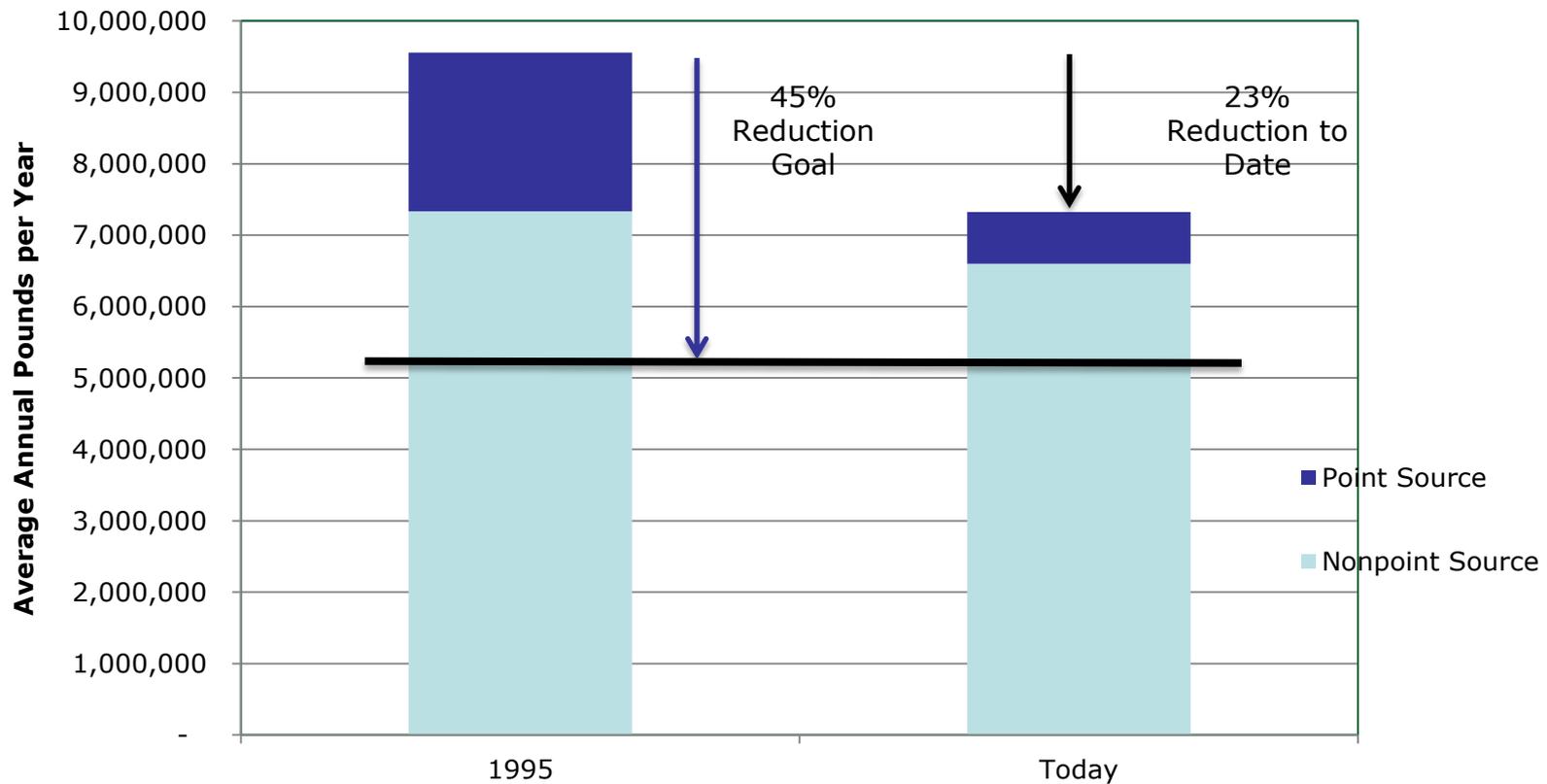
# Report Contents

1. Statistical methods
2. Results in tables, plots, maps
3. Potential causes of trends
4. Comparison with other regional water quality trend studies
5. Guidance on future of LTT program, including sampling frequency, stations, parameters.

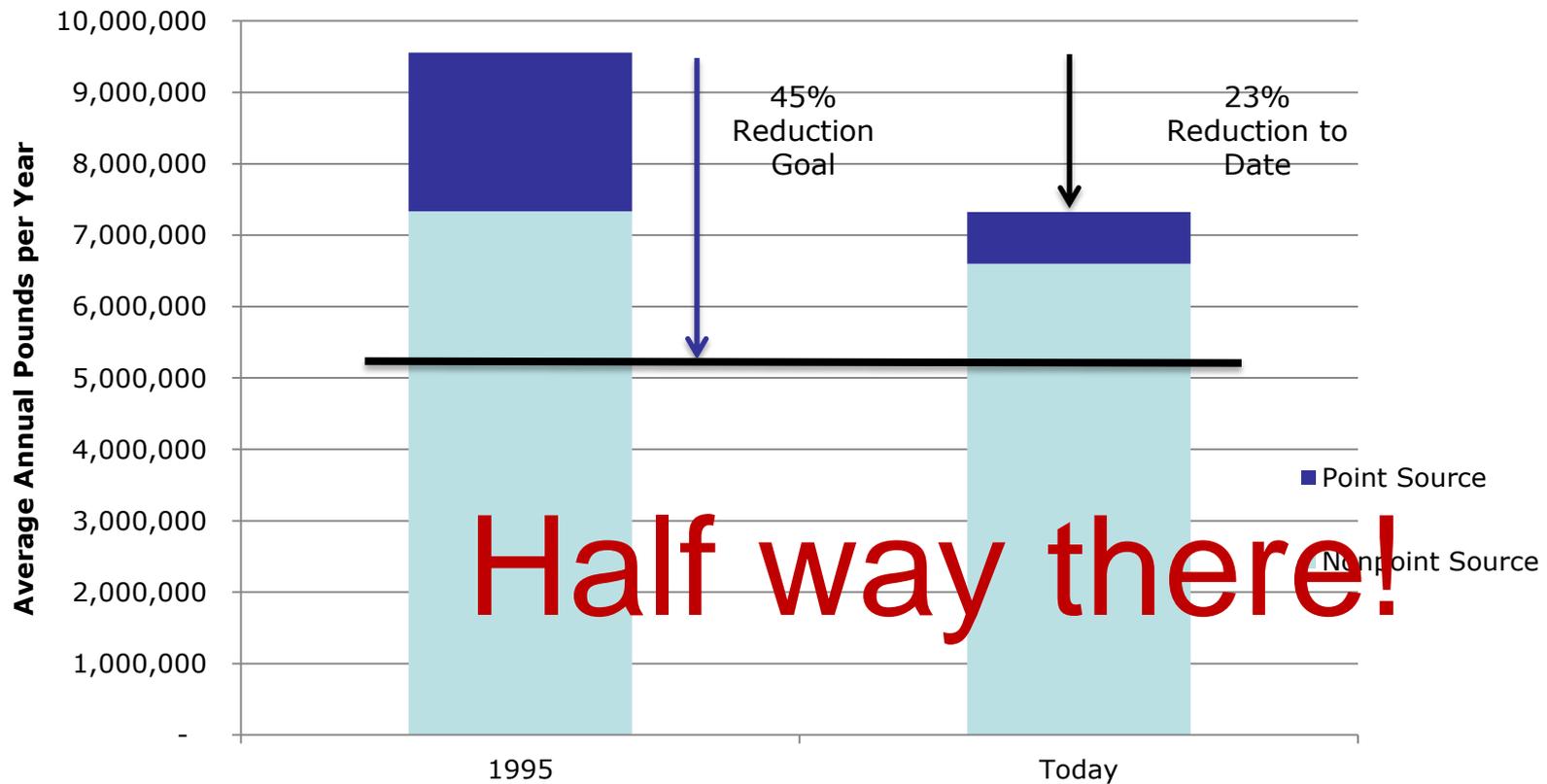
To be completed this year...

Questions? Contact Matt Diebel at  
[matthew.diebel@wisconsin.gov](mailto:matthew.diebel@wisconsin.gov)

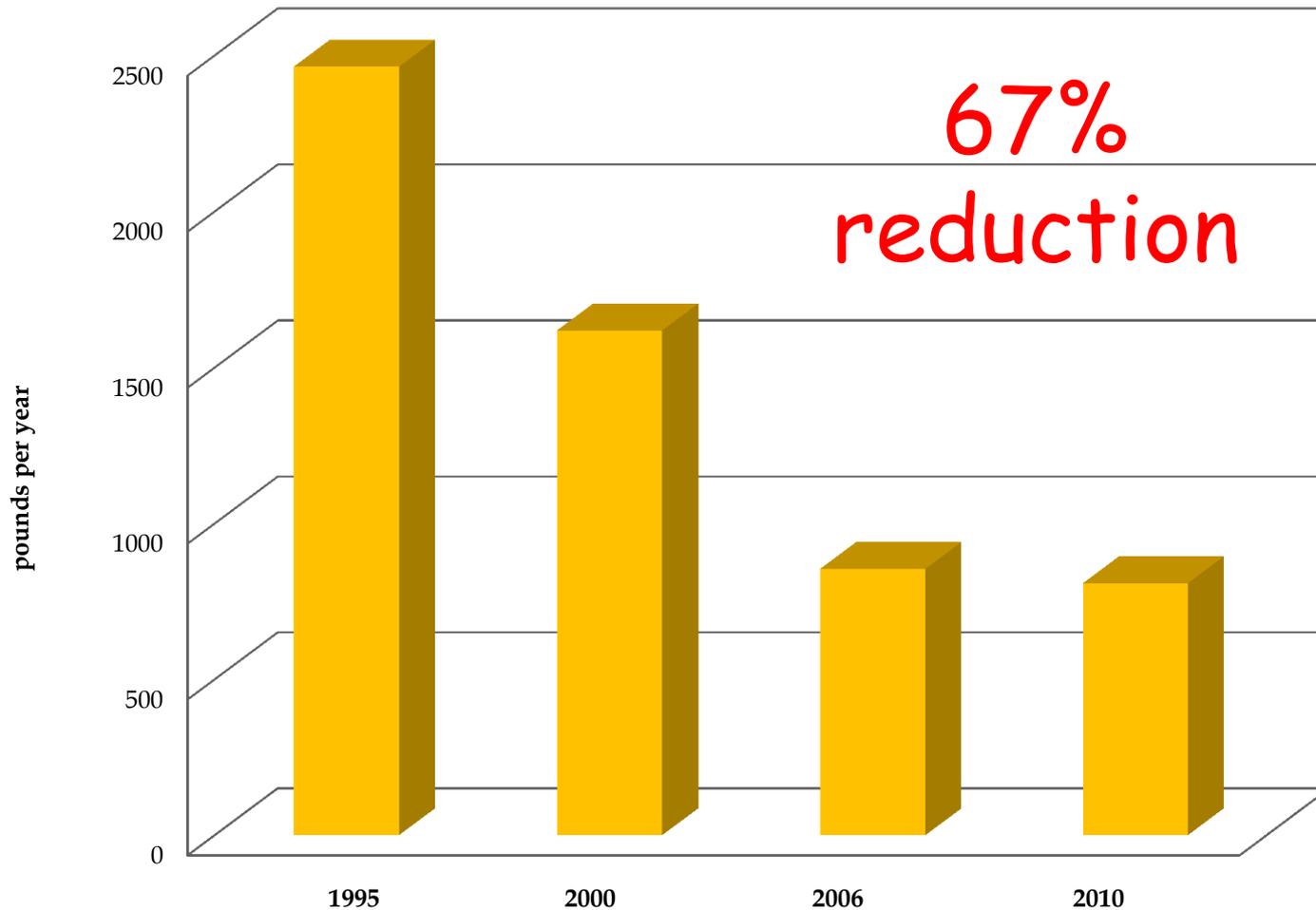
# Chapter 2: Reduction Targets: 45% Reduction Phosphorus – Mississippi River Basin



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# Point Source Phosphorus Discharges -- Mississippi River Basin



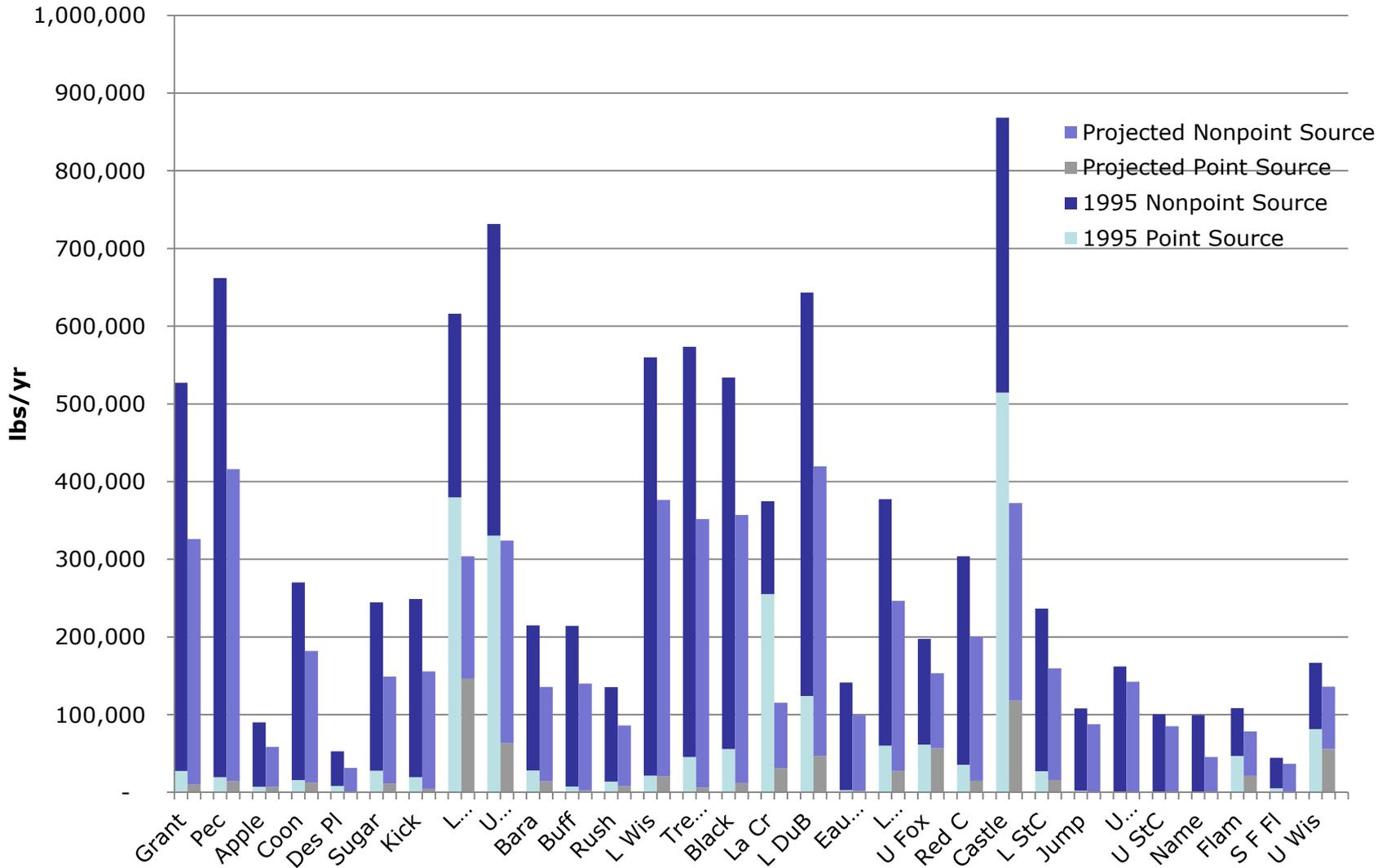
54% reduction in Lake Michigan Basin



# Chapter 2: 45% Phosphorus Reduction – Mississippi River Basin

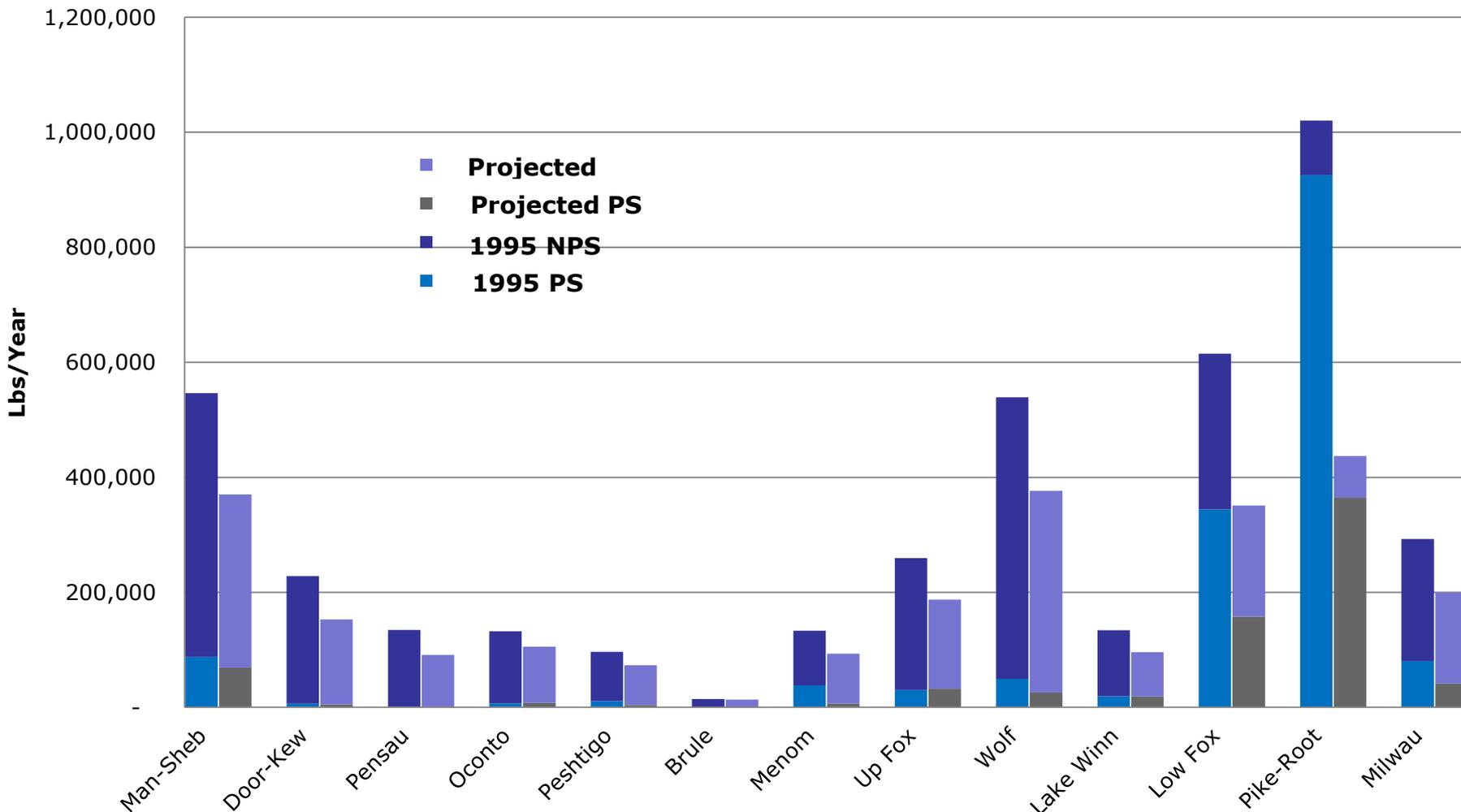
- Achievable with existing programs, continuing implementation needed
  - Past/present reductions in point source discharges to meet technology based limits in place since 1993
  - 10% reduction to date from nonpoint sources
  - 30% future reduction for agricultural lands
    - Consistent with Pleasant Valley pilot project
  - 10% future reduction from urban areas
- About 40% reduction in Lake Michigan Basin

# Mississippi River Basin – Phosphorus Projections





# Lake Michigan Annual Phosphorus Loads -- 1995 and Projected Future -- By 8-Digit HUC





# Chapter 3: Point Source Permits

- WPDES Programs in place for phosphorus:
  - Wastewater facilities –
    - technology and water quality based limits
    - Enhancing nitrogen monitoring
  - Confined Animal Feeding Operation (CAFO) permits
  - Municipal storm water (MS4) permits



# Chapter 4: Agricultural Nonpoint Sources

- Federal, state and local programs
  - Natural Resources Conservation Service (NRCS)
  - Farm Service Agency (FSA)
  - Dept. Agr. Trade Cons. Protection (DATCP)
  - Dept. Natural Resources (DNR), (incl. EPA 319 grants)
  - University of Wisconsin (UW) and Extension (UWEX)
  - Counties
- Over \$50 million available in 2013
- Nitrogen Science Summit – 2014
  - Greater livestock operation emphasis and less emphasis on tile drainage than other states
  - Build on Wisconsin research – Pioneer Farm/Discovery Farms

# NRCS 590 Nutrient Management

Patrick Murphy

State Resource Conservationist

Wisconsin NRCS





# NRCS 590 Practice Standard Update

- NRCS National Office updated the 590 practice standard effective December 2011
- NRCS practice standards are the basis for conservation planning resource assessment and cost sharing
- In Wisconsin partner agencies (and EPA) use NRCS practice standards to define “best management practices”
- Wisconsin Standards Oversight Council has selected the 590 team
- Initial meeting in late January
- 18 month target for completion

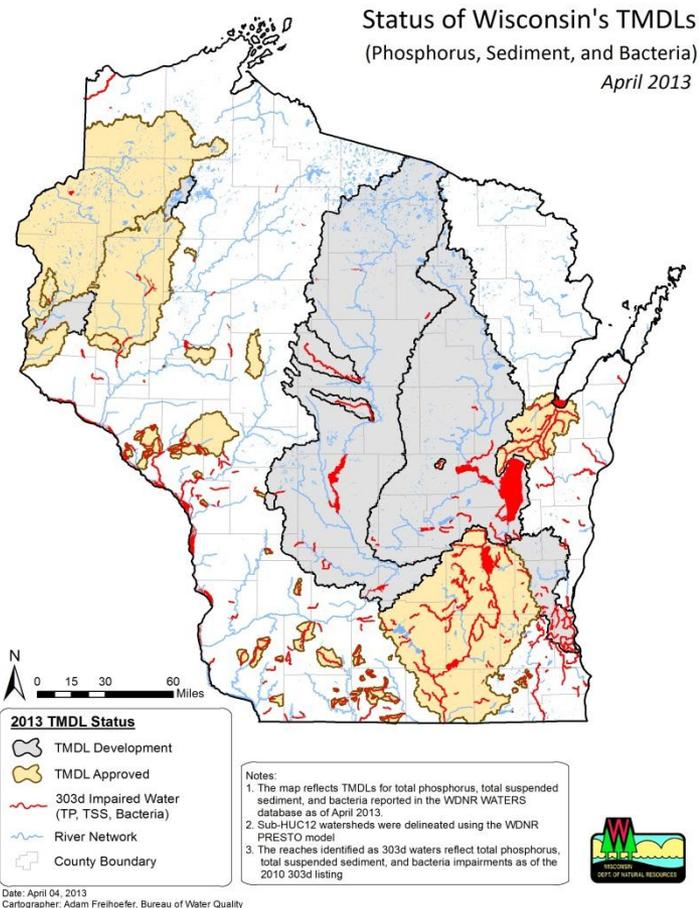


# NRCS 590 Practice Standard Update

- Anticipated changes for WI 590 standard are:
  - Develop a more detailed N leaching risk assessment
    - Similar to the Phosphorus Index – responsive model to evaluate the benefits or risks of N management alternatives
  - Develop a detailed winter spreading risk assessment
  - Implementation guidance for “Adaptive Nutrient Management”
  - Evaluate and integrate revised A-2809 Nutrient Recommendations
  - Simplified Record Keeping

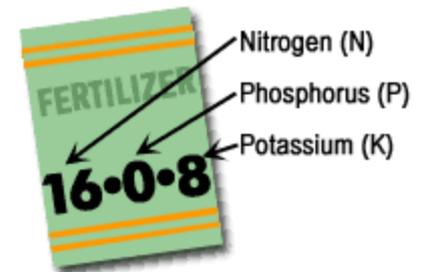
# Chapter 5: Integrating Point Source and Nonpoint Source Management

- TMDLs
- PRESTO analysis of point source and nonpoint source contributions at 652 sites
- Watershed adaptive management option
- Water quality trading



# Chapter 6: Storm Water (not point sources) and Septic Systems

- NR 151 urban storm water performance standards
- SPS 383 – Private On-site Wastewater Treatment Systems
- Lawn fertilizer phosphate restrictions
- Detergent, including dishwasher, phosphate restrictions





# Chapter 7: Tracking/Accountability

- System in place to track wastewater discharges phosphorus contributions
- No statewide system in place to track agricultural nonpoint source phosphorus contributions
  - Lack baseline
  - Lack good system of best management practice installation/maintenance
  - Lack means to translate BMP installation to load reductions



# Tracking and Annual Reporting

- Vision – phosphorus
  - Both point source and nonpoint source
  - Aggregated at HUC 12 level
- May be interim steps, and a few years to establish system
- Nitrogen in future



# Point Source -- Wastewater

- Use discharge monitoring reports
  - Phosphorus -- in place, no changes
  - Nitrogen -- phase in enhanced monitoring in Mississippi River Basin for major facilities and selected industries
    - In addition to ammonia
    - Continue sample results submittal as part of permit application -- statewide

Amy Callis



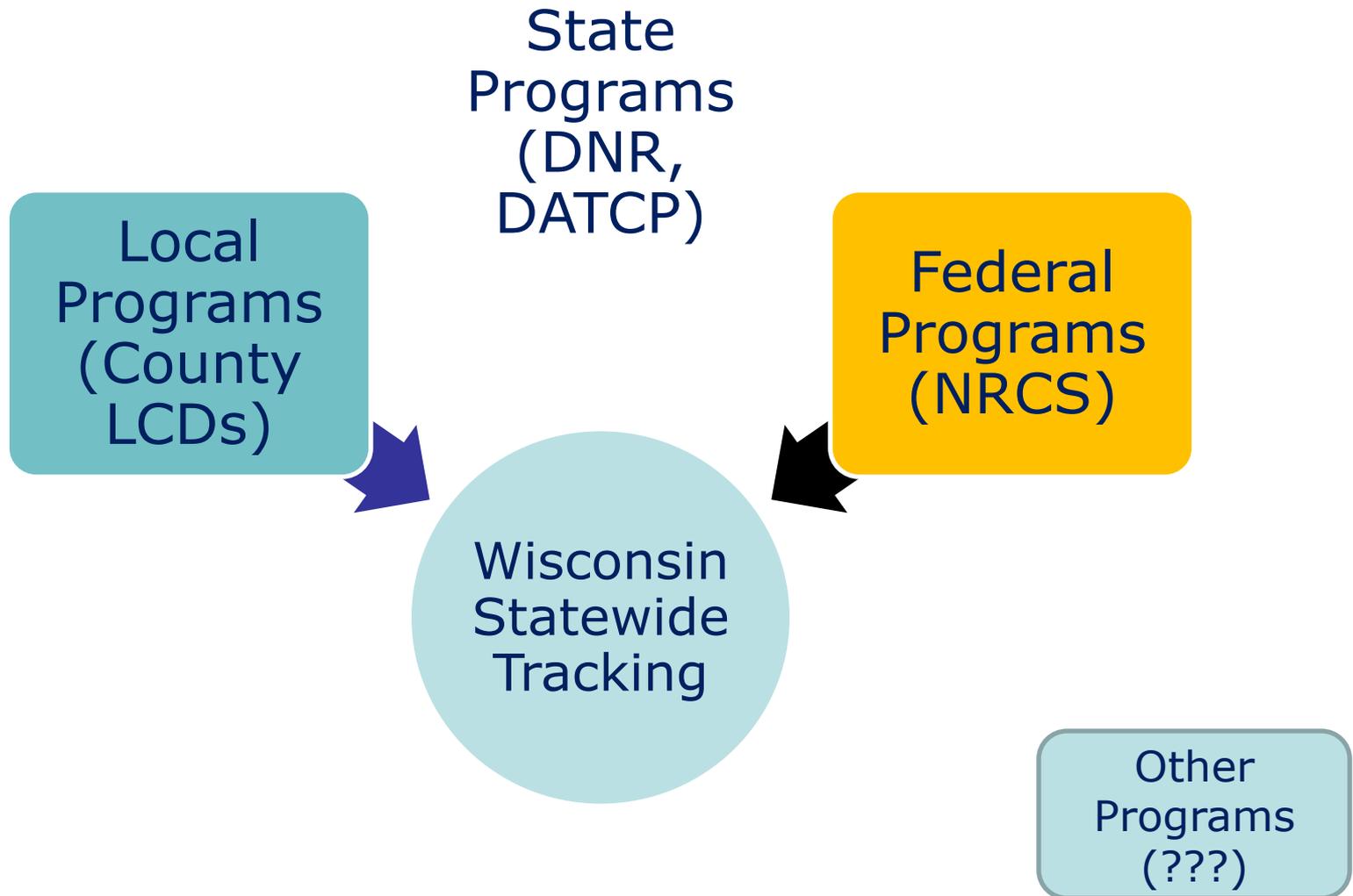
**RUNOFF MANAGEMENT SECTION, DNR**



# Tracking and Reporting Work Group

- Jim Baumann – DNR
- John Exo – UWEX
- Amy Callis – DNR
- Corinne Billings – DNR
- Theresa Nelson – DNR
- Jeff Helmuth – DNR
- Sara Walling – DATCP
- Pat Murphy – NRCS
- Jim VandenBrook -- WLWCA
- Laura Ward Good – UW
- Ken Genskow – UWEX
- Greg Leonard – Eau Claire Co.
- Steve Bradley – Portage Co.
- Kirk Langfoss – Marathon Co.
- Angela Wenninger – Marathon Co.
- Astrid Newenhouse -- UWEX

# Nonpoint Source Tracking

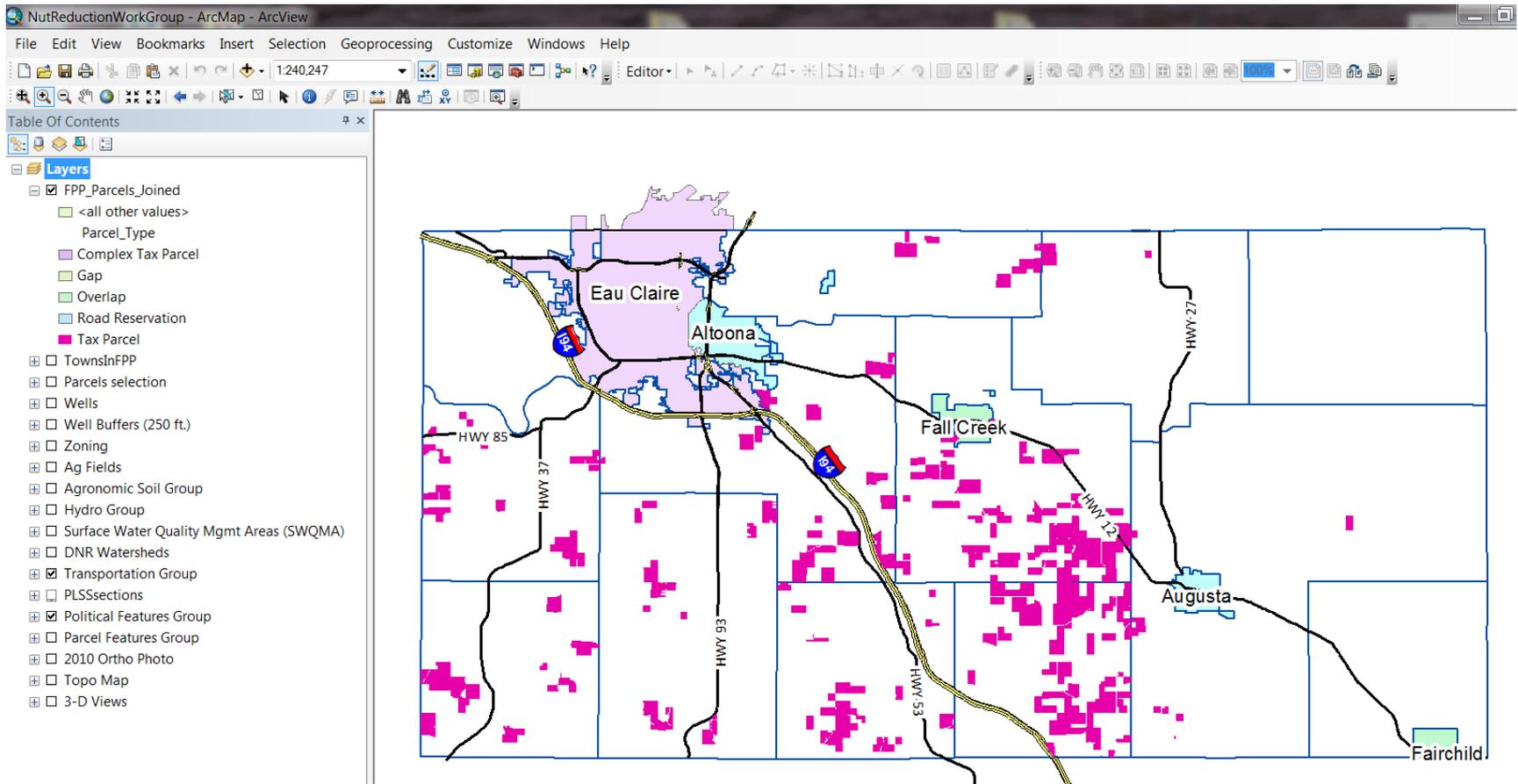




# Gaps & Barriers

- What information **is** currently being tracked?
- What information **should** be tracked?
- How should this information be aggregated?
- How should this information be reported?
- What should a tracking system look like?

# Example: County Tracking System



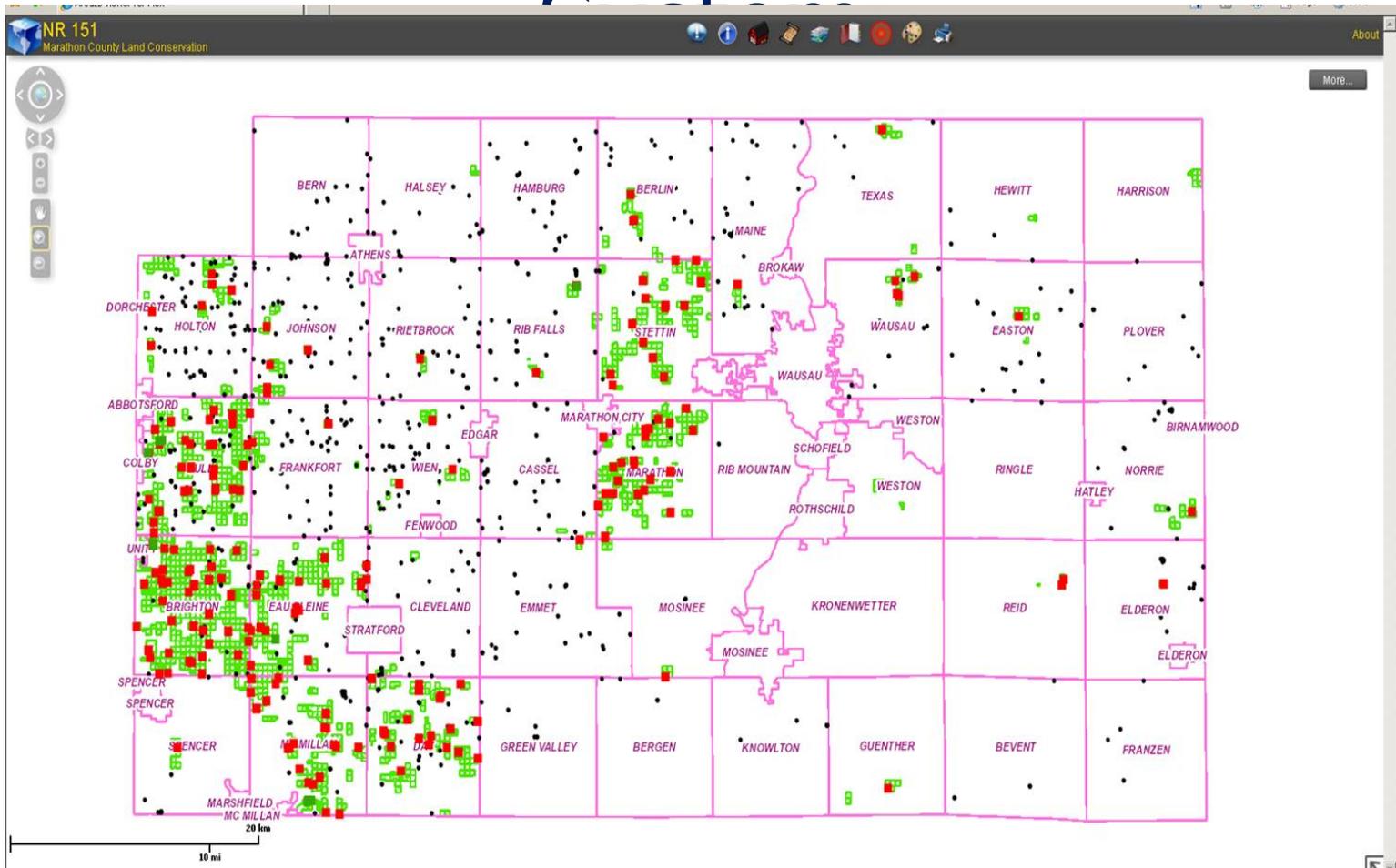
# Example Data Tracking

The screenshot shows the ArcMap interface with the following components:

- Table Of Contents:** Lists layers such as FPP\_Parcels\_Joined, Parcels selection, Ag Fields, and others.
- Map View:** Displays an aerial view of agricultural fields. Two fields are highlighted with cyan outlines and labeled with their respective data:
  - Field 1: PIN: 1800222605203400001, Alt: 002104103000, Ac: 40.000, Zoning Code
  - Field 2: PIN: 1800222605292100001, Alt: 002105806000, Ac: 40.000, Zoning Code
- Table:** A data table titled "Ag Fields" with the following data:

| Field Name or Number | Acres | Nutrient Mgt Plan Holder | Nutrient Plan Date (last u | Cost Share Date | Cost Share Source | pH  | OM  | P2O5 (ppm) | K2O (p | Buffer pH | Soil Test D |
|----------------------|-------|--------------------------|----------------------------|-----------------|-------------------|-----|-----|------------|--------|-----------|-------------|
| North Swamp example  | 12.8  | Eau Claire County        | 2013                       | <Null>          | <Null>            | 6.6 | 2.1 | 66         | 166    | <Null>    | 1/13/2013   |
| Middle Swamp example | 14.8  | Eau Claire County        | 2013                       | <Null>          | <Null>            | 6.6 | 1.1 | 66         | 166    | <Null>    | 2/13/2013   |
| South Swamp example  | 19    | Eau Claire County        | 2013                       | <Null>          | <Null>            | 6.6 | 2.1 | 66         | 166    | <Null>    | 2/13/2013   |

# Example: County Tracking



# Data Collected

Details Facilities Erosion **Manure Storage** Clean Water Nutrient Management Manure Management Miscellaneous

**NR151.05 (2) - New Construction and Alterations**  
*2. New or significantly altered manure storage facilities shall be designed and constructed to USDA NRCS standards.*

Storage Facility #1 0483

Inventory Date 4/15/2011

Is there a new or altered manure storage facility built after 10/1/2002?  Yes  No

When was it constructed/altered?

Is storage facility designed and constructed to USDA NRCS standards?  Yes  No  Not Sure  Does Not Apply

Basis for Determination Select...

Comments

**NR151.05 (3) - Closure**  
*3. Closure of a manure storage facility is required if the livestock operation ceases or manure has not been added or removed from the facility for a period of 24 months, unless an exception has been granted.*

Storage Facility #1 0483

Inventory Date 4/15/2011

Has storage facility been used within the last 24 months or has land owner received approval to retain facility?  Yes  No  Not Sure

Basis for Determination Select...

Is there a sub-standard manure storage facility?  Yes  No

When was the manure storage facility last used?

Has the storage facility been properly closed?  Yes  No  Not Sure  Does Not Apply

Comments

**NR151.05 (4) - Failing and Leaking Existing Facilities**  
*4. Existing manure storage facilities that pose an imminent threat to public health or fish and aquatic life or are causing a violation of groundwater standards shall be upgraded, replaced or closed.*

Storage Facility #1 0483

Inventory Date 4/15/2011

Was the facility in existence as of 10/1/2002?  Yes  No  Not Sure

Follows NR 151 using logic questions and stores data associated with the tax parcel

# Example Reporting

## Reporting Tables for LEVEL A

| <b>Table 1. County Farm Compliance Status Summary: Cropland Standards *</b> |                           |                        |                 |
|---|---------------------------|------------------------|-----------------|
| County Name: <u>Marathon</u>  |                           | County Code: <u>73</u> |                 |
| Cumulative Compliance Reporting Through 2/25/2013                           |                           |                        |                 |
| Watershed Code  | Full Compliance (Parcels) | No Compliance(Parcels) | Total (Parcels) |
| 040302021001  | 14                        | 0                      | 14              |
| 070700020602  | 7                         | 0                      | 7               |
| 070700020805  | 2                         | 0                      | 2               |
| 070700020901  | 18                        | 2                      | 20              |
| 070700020902  | 64                        | 23                     | 87              |
| 070700021001  | 19                        | 0                      | 19              |
| 070700021002  | 6                         | 4                      | 10              |
| 070700021003  | 105                       | 46                     | 151             |
| 070700021103  | 6                         | 0                      | 6               |
| 070700021205  | 1                         | 0                      | 1               |
| 070700021302  | 22                        | 0                      | 22              |
| 070700021303  | 4                         | 0                      | 4               |
| 070700021304  | 0                         | 5                      | 5               |
| 070700021501  | 25                        | 4                      | 29              |
| 070700021502  | 17                        | 0                      | 17              |
| 070700021503  | 77                        | 5                      | 82              |
| 070700021504  | 197                       | 18                     | 215             |
| 070700021505  | 82                        | 1                      | 83              |



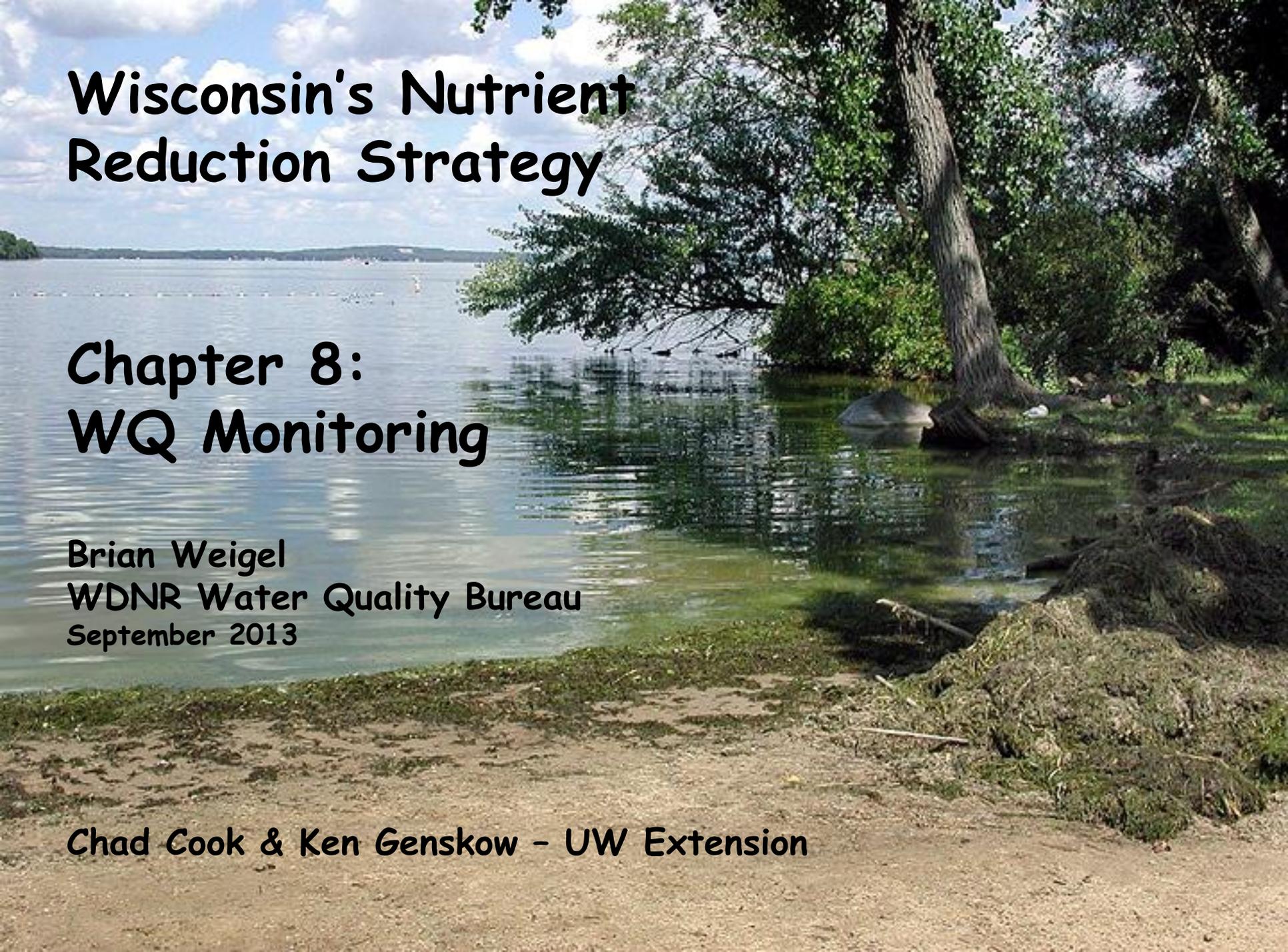
# Next Steps...

Survey County LCDs

Evaluate minimum reporting measures

Continue exploring methods of reporting

# Wisconsin's Nutrient Reduction Strategy



## Chapter 8: WQ Monitoring

Brian Weigel  
WDNR Water Quality Bureau  
September 2013

Chad Cook & Ken Genskow - UW Extension

# Monitoring...

an implied component of all 8 NRS elements

1. Targeting & Prioritizing
2. Determination of load reduction
3. Effectiveness of permit programs
4. Understanding nutrients in Agricultural areas
5. Documenting conditions in Urban areas and septic systems
6. Accountability & Verification of efforts
7. Reporting
8. Establishing nutrient criteria

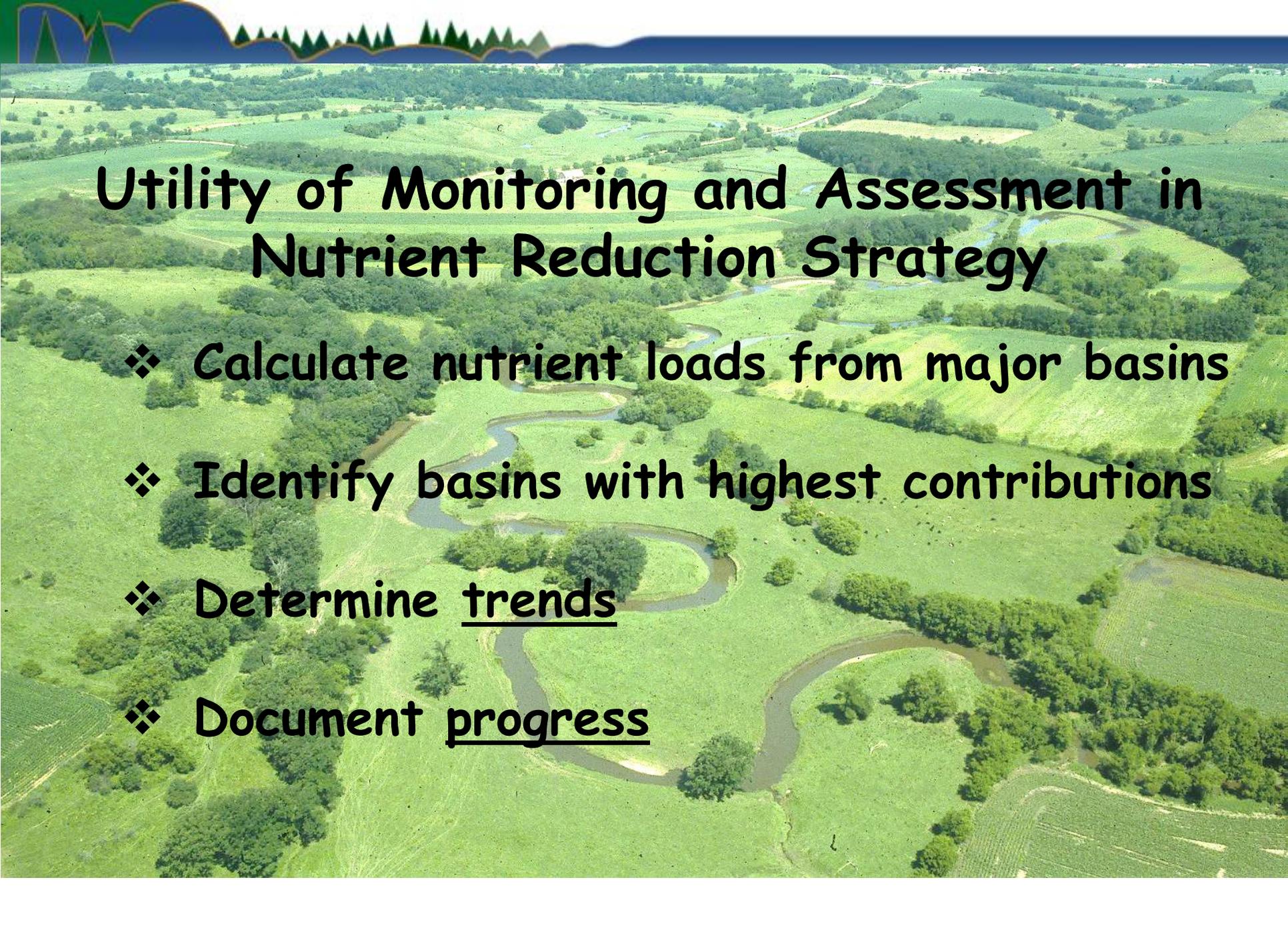




## **MONITORING GROUP**

**Brian Weigel, Mike Sorge, Andy Fayram, John Sullivan, Matt Diebel, Kris Stepenuck, Jeff Helmuth – WDNR; Rick Graham – DATCP; Dale Robertson, Matt Komiskey – USGS; Eric Allness – NRCS; Chris Arnold – Columbia Co.;  
Chad Cook – UW Extension**

- **Inventory of monitoring related to nutrient reduction**
- **Scope & intent:**
  - **Statewide incl. Great Lakes**
  - **Surface waters and Groundwater**
  - **Leverage staffing and funding**
  - **Build off existing programs**



# Utility of Monitoring and Assessment in Nutrient Reduction Strategy

- ❖ Calculate nutrient loads from major basins
- ❖ Identify basins with highest contributions
- ❖ Determine trends
- ❖ Document progress





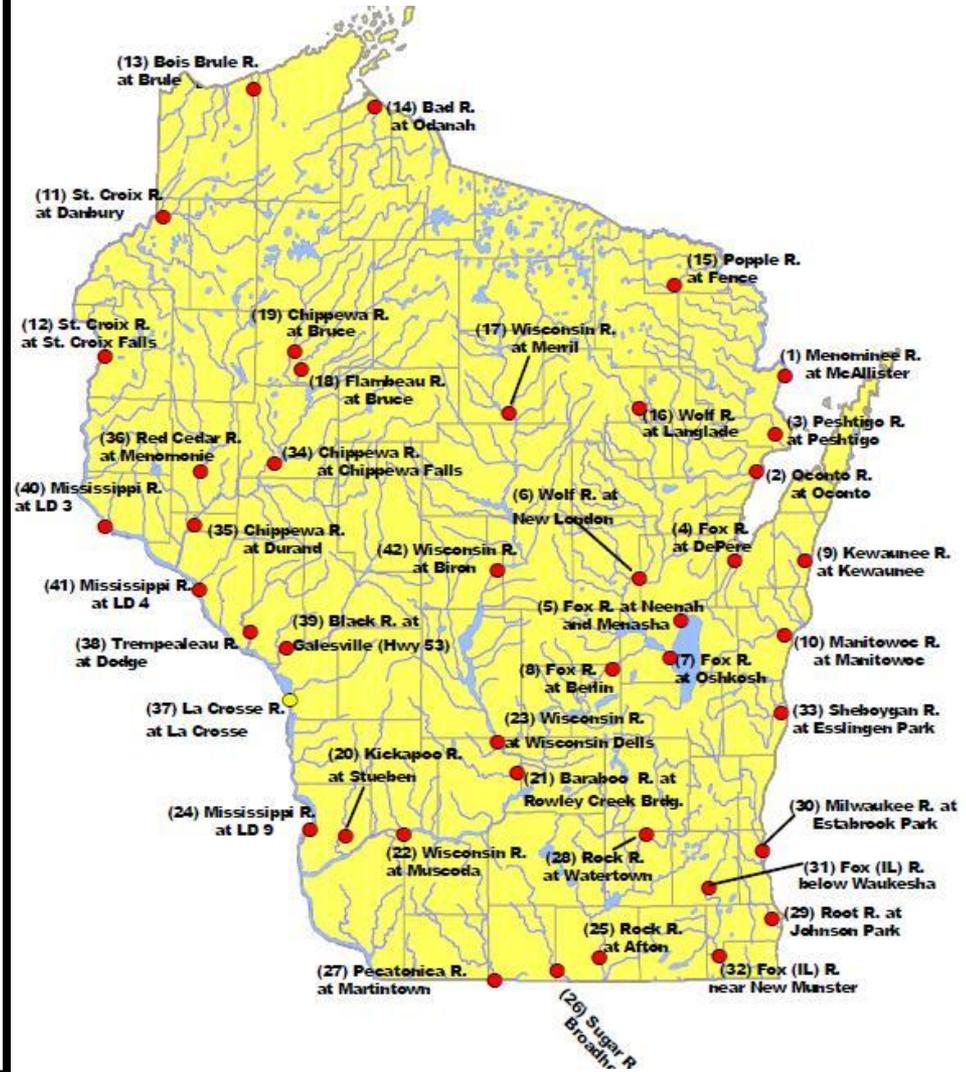
# Partial Inventory of Monitoring Efforts

- ❖ Long-Term Trend River Network (WDNR/USGS)
- ❖ Total Maximum Daily Load (TMDL) development (WDNR, Counties, USGS, WPDES facilities, citizens)
- ❖ Flow gages and associated Water Quality monitoring (site or regionally specific evaluations by USGS/NRCS/WDNR)
- ❖ 3-tiered approach incl. edge-of-field, small watersheds to large watersheds (NRCS w/USGS)
- ❖ Multi-partner efforts incl. water quality trading and adaptive management (WPDES facilities, Counties, WDNR, USGS, UW-Ext, Volunteers, NGOs)

# Long Term Trends (LTT) River Network

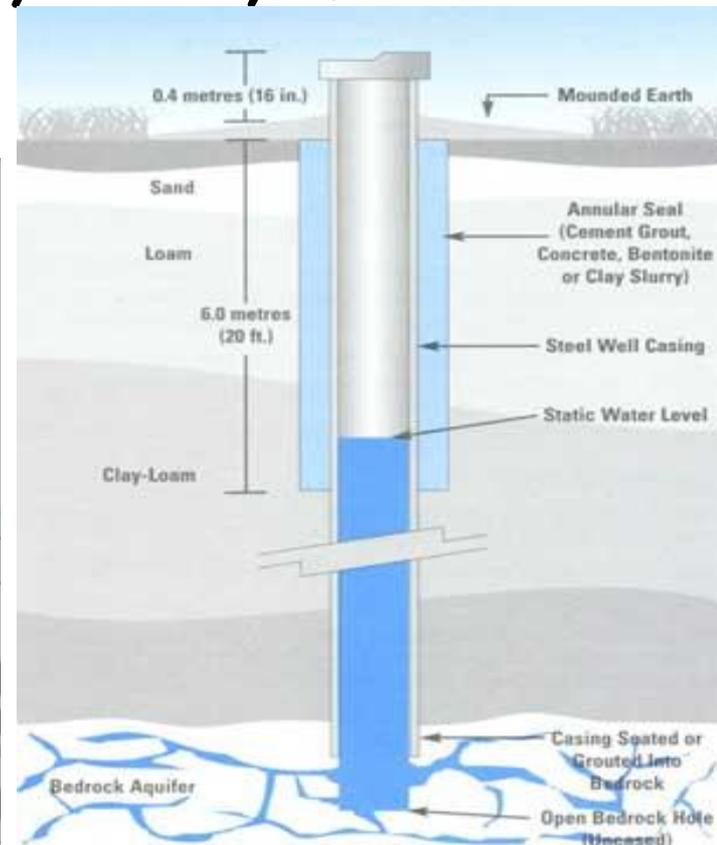
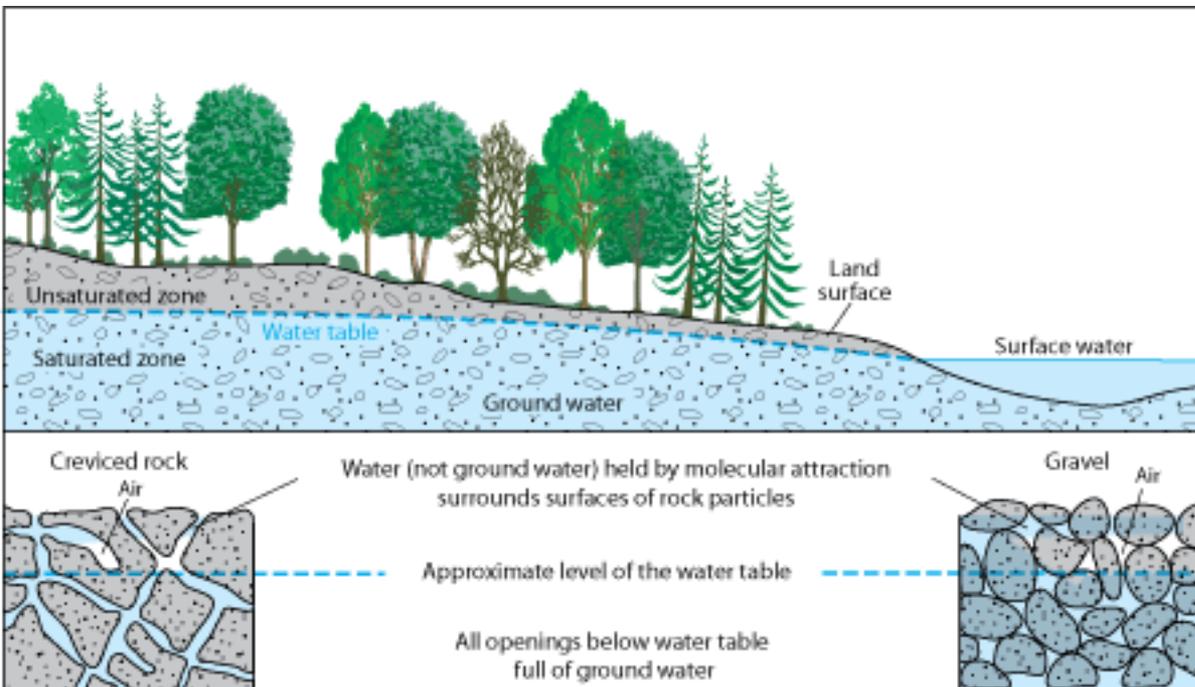
Partnership of WDNR & USGS

- ❖ 42 sites, since mid-60's, some time gaps in data
- ❖ ~ HUC 8 scale, comprehensive statewide
- ❖ Monthly nutrient & chem sampling, w/ flow gages
- ❖ Trends in nutrient loads



# Groundwater

- ❖ Nitrates, agrochemicals
- ❖ Public supply as permit requirement
- ❖ Private wells
- ❖ Trend network
- ❖ WDNR, WDATCP, WGNHS, USGS, & UW-Stevens Point





## Private well nitrates (1995-2004) GRN, UW-SP, & DATCP

- One result from each well
- 31 counties have townships in which >20% of wells exceed 10 mg/l
- >160,000 Wisconsin residents were drinking water from private wells with nitrate concentrations greater than 10 mg/l.





## Future Directions: Surface Water Monitoring

- ❖ LTT fixed network (HUC 8)
- ❖ ID highly enriched waters
  - ❖ HUC 10 rotation
- ❖ Special project or management evaluation (~HUC 12)
  - ❖ NRCS evaluation, Discovery & Pioneer farms
- ❖ Site specific (<HUC 12)
  - ❖ Adaptive Management & Trading



# Future Directions: Groundwater Monitoring

- ❖ LTT fixed network
  - ❖ Spatially representative, geology, 3D
- ❖ Identify high nitrates
  - ❖ Public and private wells
- ❖ Special project/mgmt eval.
  - ❖ Cause & effects of mgmt on different landscapes statewide





Thanks to our partners in continued collaboration!

## WDNR Surface Water Contacts

- ❖ Tim Asplund, Chief, Monitoring Section
- ❖ Katie Hein, Lakes Monitoring Leader
- ❖ Mike Shupryt, Streams and Rivers Monitoring Leader

## WDNR Drinking and Groundwater Contacts

- ❖ Mary Ellen (Mel) Vollbrecht, Chief, Groundwater Section
- ❖ Jeff Helmuth, Hydrogeologist Program Leader



# Chapter 9: Annual Reporting

- Annual Nutrient Summit
- Reports on website



# Chapter 10: Numeric Nutrient Water Quality Criteria

- Adopted and EPA approved phosphorus criteria for streams, rivers, lakes, reservoirs and Great Lakes
- Conducting further research on nitrogen in streams
  - Focusing on high nitrogen/low phosphorus streams



# Written Comments

September 18<sup>th</sup>

Jim Baumann

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(608)261-6425



Questions?