Illinois Nutrient Loss Reduction Strategy

Nutrient Monitoring Council

4th Meeting, April 5, 2016, Springfield, IL

ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY | Improving our water resources with collaboration and innovation

Nutrient Monitoring Council Members (4/5/16)

Illinois EPA
Gregg Good, Rick Cobb

Illinois State Water Survey
Laura Keefer

Aqua Illinois
Kevin Culver

Illinois Natural History Survey
Andrew Casper

Illinois Dept. of Natural Resources
Ann Holtrop

University of Illinois
Paul Davidson

Sierra Club
Cindy Skrukrud

MWRDGC
Justin Vick

Illinois Corn Growers Association
Laura Gentry

U.S. Army Corp of Engineers-Rock Island
Marvin Hubbell

U.S. Geological Survey
Kelly Warner (Paul Terrio – Alternate)

National Center for Supercomputing Apps
Jong Lee

Today's Guests???

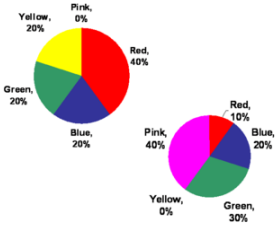
NMC Charges (Revised 10/26/15)

1. Coordinate the development and implementation of monitoring activities (e.g., collection, analysis, assessment) that provide the information necessary to:

   a. Generate estimations of 5-year running average loads of Nitrate-Nitrogen and Total Phosphorus *leaving the state of Illinois* compared to 1980-1996 baseline conditions; and
   b. Generate estimations of Nitrate-Nitrogen and Total Phosphorus loads *leaving selected NLRS identified priority watersheds* compared to 1997-2011 baseline conditions; and
   c. Identify Statewide and NLRS priority watershed *trends in loading over time* using NMC developed evaluation criteria.

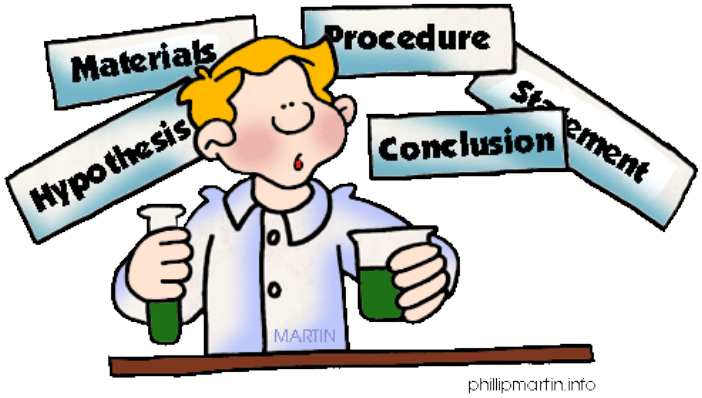
2. Document *local water quality outcomes* in selected NLRS identified priority watersheds, or smaller watersheds nested within, where future nutrient reduction efforts are being implemented (e.g., increase in fish or aquatic invertebrate population counts or diversity, fewer documented water quality standards violations, fewer algal blooms or offensive conditions, decline in nutrient concentrations in groundwater).

3. Develop a *prioritized list of nutrient monitoring activities and associated funding* needed to accomplish the charges/goals in (1) and (2) above.



Nutrient Science Advisory Committee (NSAC) Update

- Members and Chair
- Charge
- Update – Paul Terrio, USGS



Nutrient Science Advisory Committee Members

Todd Royer, Indiana University, NSAC Chair
Candice Bauer, USEPA Region V
Walter Hill, Illinois Natural History Survey (retired)
Douglas McLaughlin - National Council for Air and Stream Improvement, Inc.
Paul Terrio, USGS-Illinois Water Science Center
Matt Whiles, SIU-Carbondale

NSAC Charge and NSAC Update from Paul Terrio, USGS

- Determine the numeric criteria for nutrients most appropriate for Illinois waterbodies based on the best science available.
- Consider whether standard should be statewide or watershed specific.
- **Paul Terrio** Update

Friday, April 19, 1996 4 Sections

River sediment serious — U.S.

Indiana channelization key to problem

By Bill Byrne
Journal writer

PAUL TERRIO
U.S. Geological Survey

Serious

Paul, you can thank Kevin Culver for this youthful looking picture of you!

Zoe Zaloudek, Water Is Photo Contest

USGS
science for a changing world

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

Status of USGS Super Gages Network

Nutrient Monitoring Council
April 5, 2016
Springfield, IL

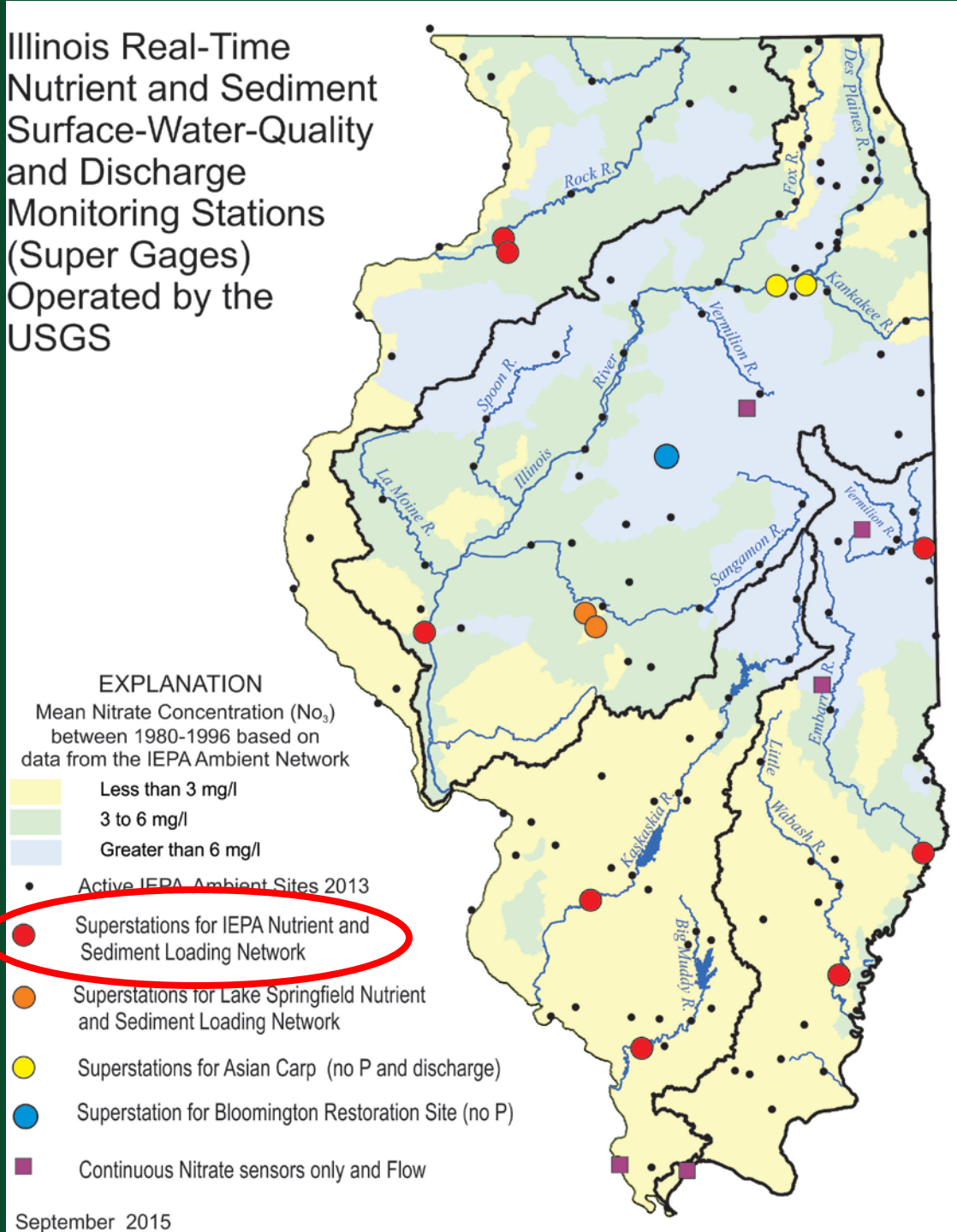
Paul Terrio, USGS

U.S. Department of the Interior
U.S. Geological Survey

The Plan

- Basins covering almost 75% of area of the State
  - **Rock River**
  - **Green River**
  - **Illinois River**
  - **Kaskaskia River**
  - **Big Muddy**
  - **Little Wabash**
  - **Embarras River**
  - **Vermilion River**
- Current USGS gaging station (flow)
- Current IEPA Ambient site/Historical Data

USGS



USGS Super Gage Update

Status – April 5, 2016

- Physiochemical parameters – all sites
- Nitrate – all sites
- Turbidity – all sites
- Phosphate – 3 sites
  - Illinois River
  - Big Muddy River
  - Kaskaskia River

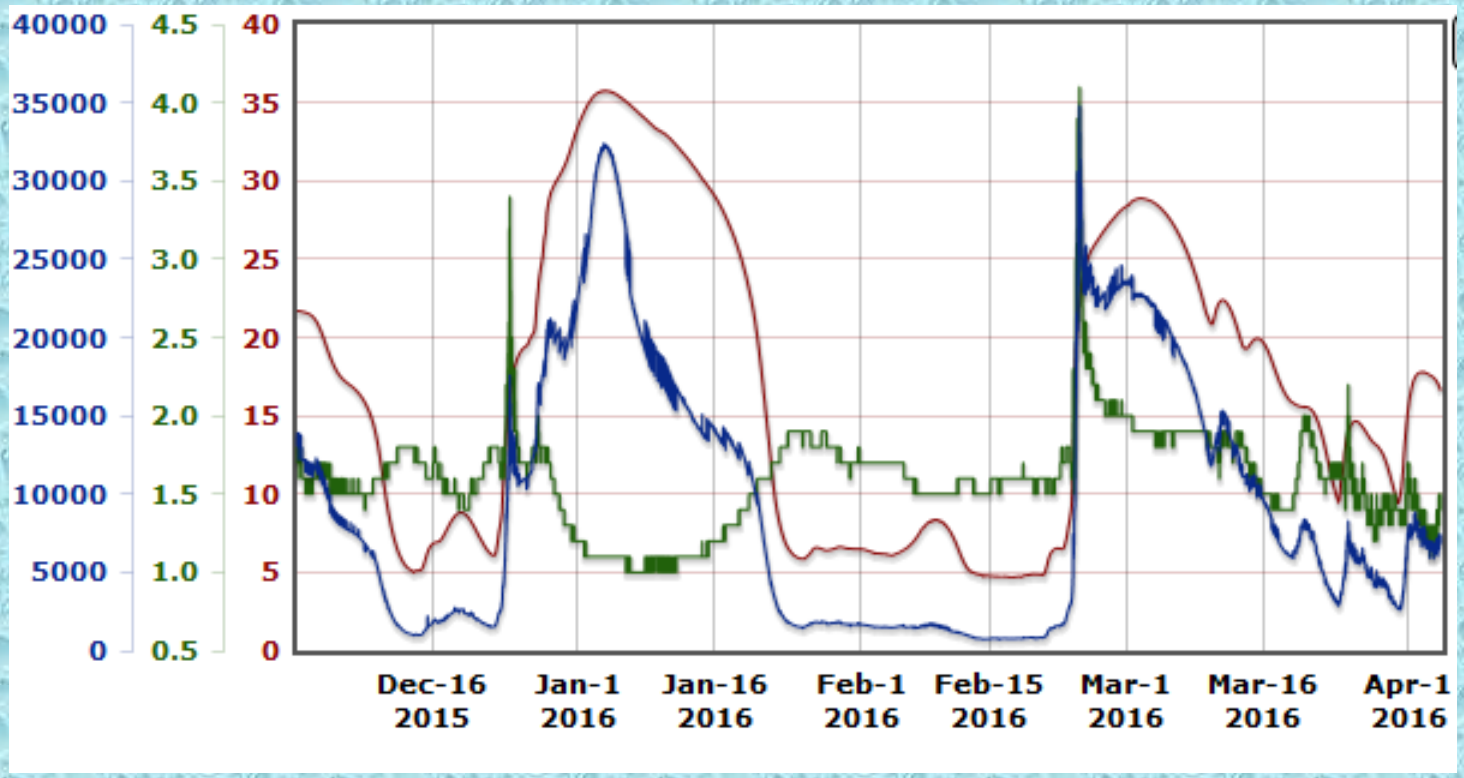
Phosphate analyzers removed during cold weather (late Nov. through mid March)

Challenges

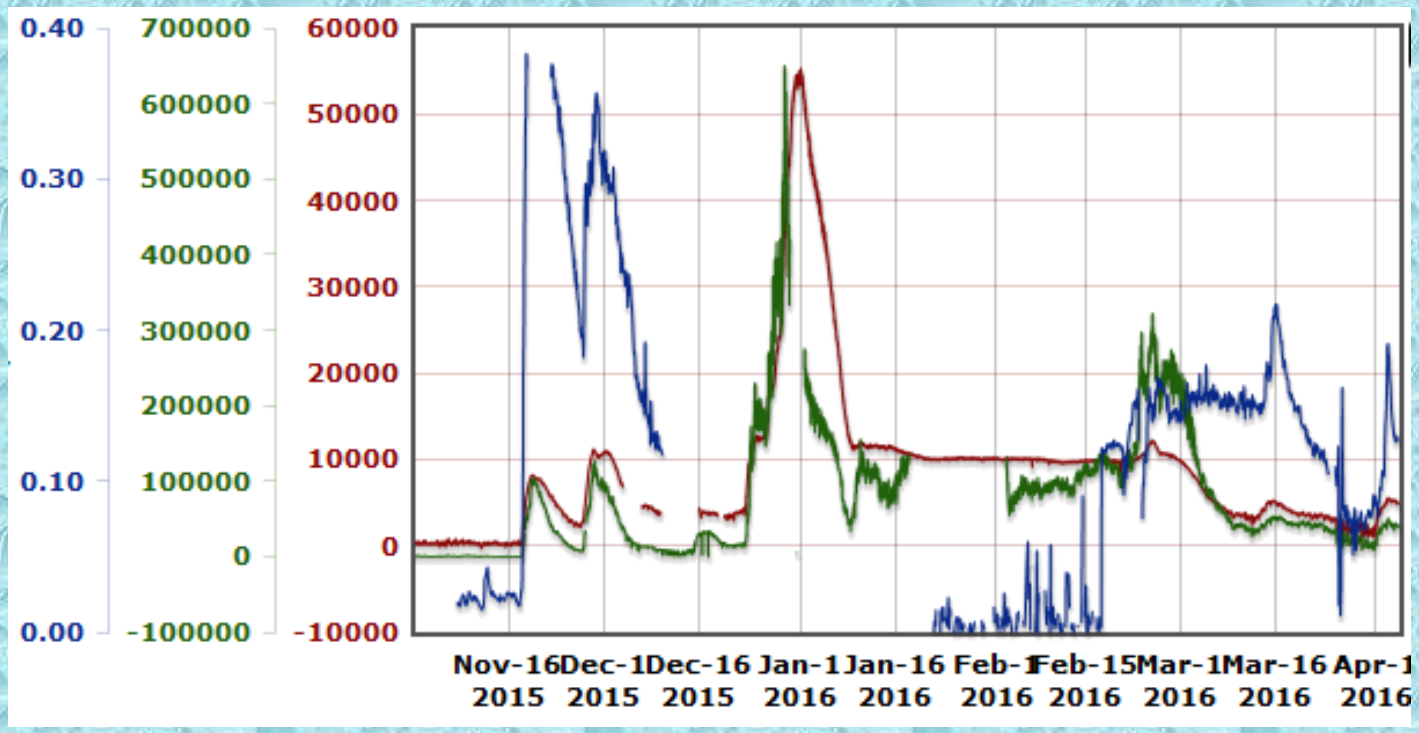
- **I**nfrastructure at Rock River damaged from ice
- **V**ermilion River is problematic
  - Turbidity / Sediment
  - Phosphate concentration
  - Installation limitations
    - Channel configuration (on a bend)
    - Bank slope
    - Bank Width
- **F**low conditions (low and high)
- **P**hosphate analyzers increased to 2-hour frequency for performance
  - Cost of reagents
- **W**orking with the manufacturer on a new intake filter configuration to reduce turbidity interferences
- **R**eagent procurement - not speedy.

Successes

Illinois River at Florence, IL (05586300)



Kaskaskia **R**iver at **N**ew **A**thens (05595000)

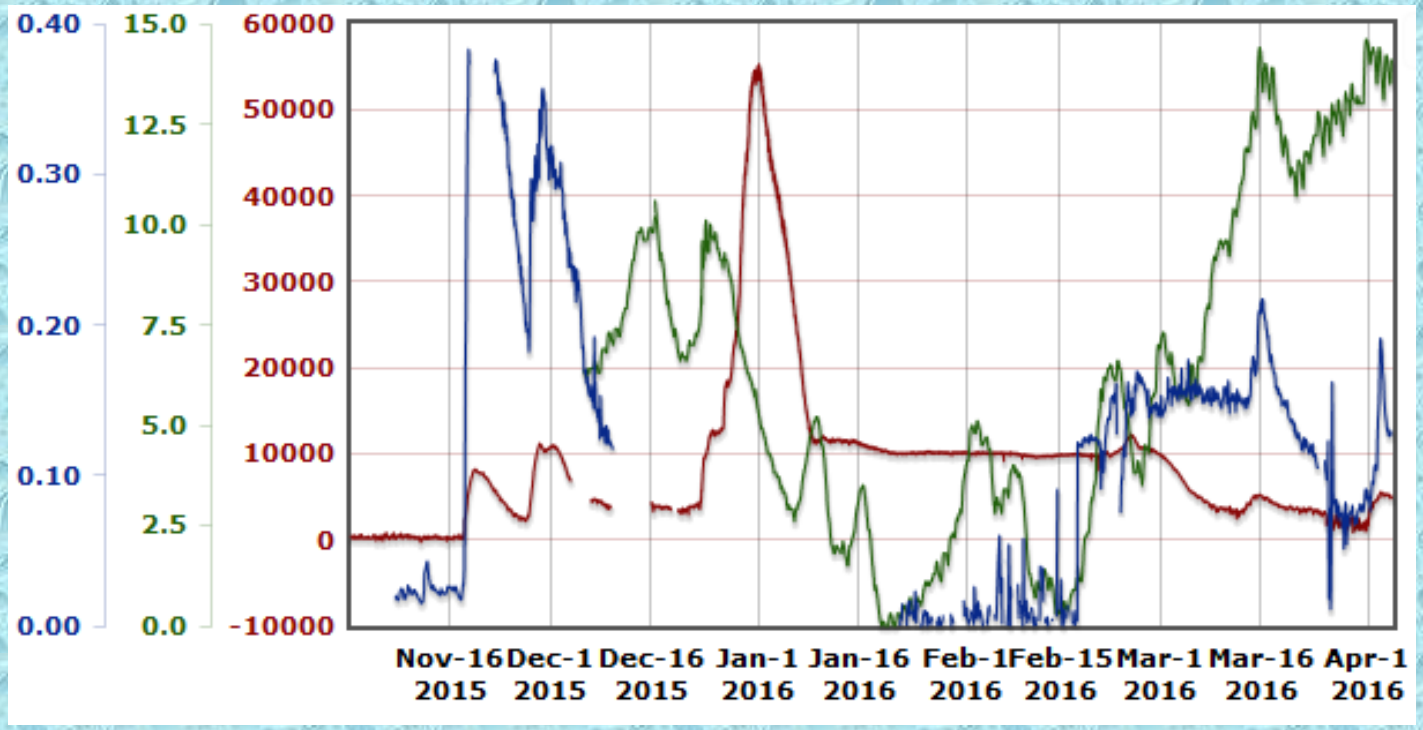


Discharge, cubic feet per second

Nitrate plus nitrite, water, unfiltered, pounds of nitrogen per day

Phosphate, water, unfiltered, milligrams per liter as PO4

Kaskaskia **R**iver at **N**ew **A**thens 05595000



Discharge, cubic feet per second

Temperature, water, degrees Celsius

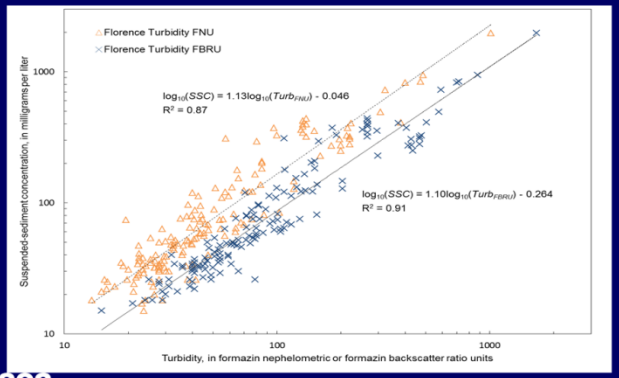
Phosphate, water, unfiltered, milligrams per liter as PO4

Future Plans

- Build record for surrogates (2015-2016)
- Report w/ surrogate relationships (2016-2017)

Turbidity and SSC at the Illinois River at Florence

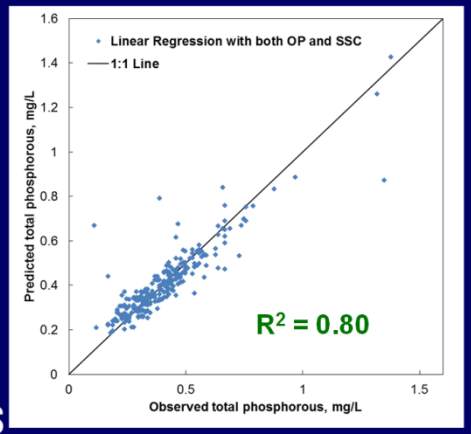
To measure suspended sediment concentration, USGS uses Turbidity as a surrogate



USGS

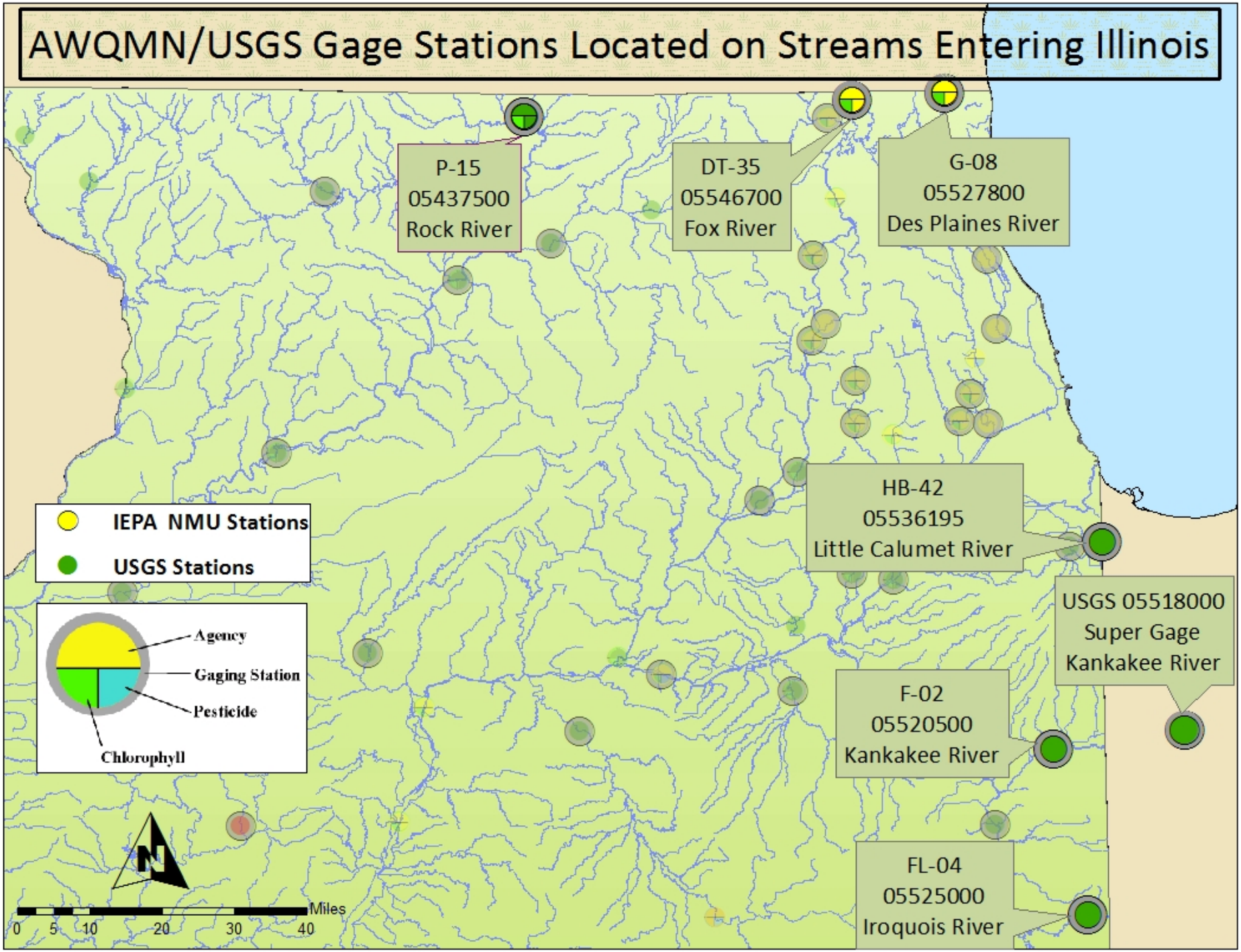
Total Phosphorus Predicted with Orthophosphorus and Suspended Sediment (IL River Valley City 1991 – 2013)

$$TP = 0.109 + 1.1\,OP + 0.00063\,SSC$$



USGS

USGS


AWQMN/USGS Gage Stations Located on Streams Entering Illinois
P-15
05437500
Rock River
DT-35
05546700
Fox River
G-08
05527800
Des Plaines River
HB-42
05536195
Little Calumet River
USGS 05518000
Super Gage
Kankakee River
F-02
05520500
Kankakee River
FL-04
05525000
Iroquois River
IEPA NMU Stations
USGS Stations
Agency
Gaging Station
Pesticide
Chlorophyll
N
0 5 10 20 30 40
Miles

Dr. Mark David (U of I) Offer 3/10/16

- Author of NLRS "Science Assessment"
- Resigning from NMC, Pending Retirement
- Paul Davidson replacing him on Policy Working Group and now, NMC
- Still interesting in working with data
- Send me Nitrate and Total Phosphorus data for 2012-2015
- NLRS Science Assessment was from 1997-2011
- USGS Super Gages taking over in late 2015-2016
- One-time, free offer as gift to the NMC! ☺
- Illinois EPA has sent Dr. David all the data per request

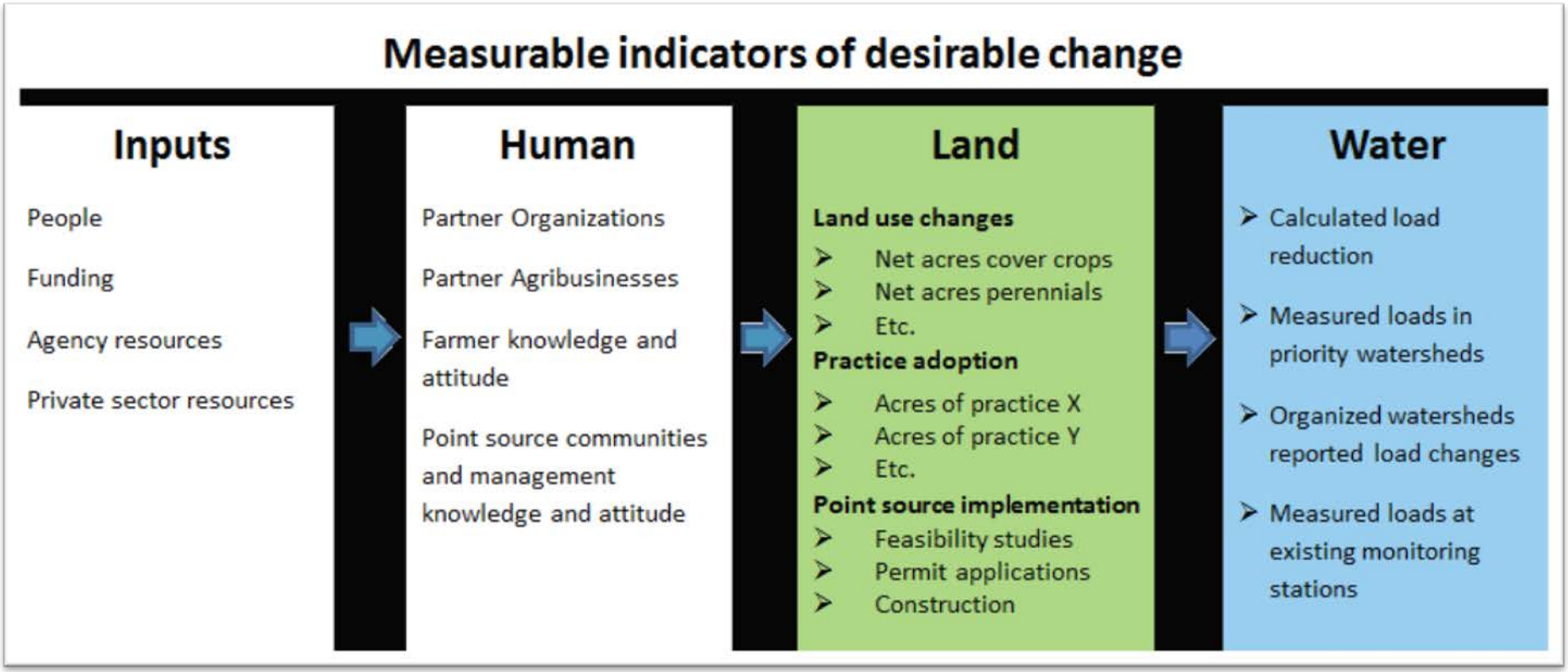
AWQPF and NMC Activity and Priorities

- Warren Goetsch (IDA) – Agricultural Water Quality Partnership Forum
- Gregg Good (IEPA) – Nutrient Monitoring Council
- Our Collective Goal – *"To show nutrient reduction and water quality progress through monitoring."*

Our Collective Goal

- *"To show nutrient reduction and water quality progress through monitoring."*
  - N and P reduction in NLRS Priority Watersheds or Sub-Watersheds (Charge 1b)
  - Trends Over Time (Charge 1c)
  - Local Water Quality Outcomes (Charge 2)
- Seeking guidance from Policy Working Group Meeting – request made at 3/8/16 meeting

Tracking BMP Implementation Logic Model



Source: Iowa State University, Extension and Outreach, Measures of Success Committee

Tracking BMP Implementation – Iowa Logic Model

Activity Tracking and Reporting

- Single person from each organization sends Input and Human indicators to IWRC twice a year—July and January.
- IWRC compiles the individual updates for a stakeholder-wide update and formal report.

Inputs

Reporting Element 1 – Inputs

Please describe the following items related to resources available and/or invested in both point and non-point related efforts during the reporting period for the Nutrient Loss Reduction Strategy.

Staff:

Programs:	Category:	Funding:	Description:

Other Agency or Private Sector Resources: Please provide a summary of other agency and private sector resources to support NLRS activities

Example Inputs

- CREP program
- NLRS Roadshow
- Grant programs
- Water quality assessment programs

Human Indicators

Reporting Element 2 – Human

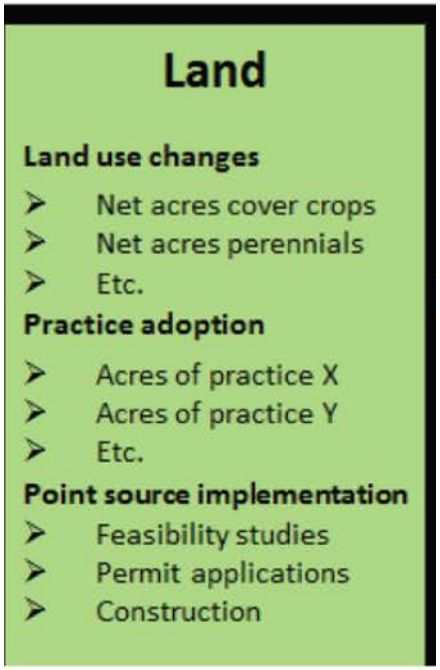
Please describe the following items related to resources available and/or invested in Organization/Agency-Supported Outreach Activities during the reporting period for the Nutrient Loss Reduction Strategy and/or practices detailed in the science assessment.

Description:	Number:	Attendance:	Topics Covered:	Partnerships:	Response/Feedback:
Field Days					
Presentations					
Conferences					
Workshops/Meetings					
Print or Media					
Radio and Television					
Newsletters					
Awards/Recognition Activities					
Surveys					
Additional Activities and Partnership Organizations:					

Example Human Indicators

- Demonstration field days
- Presentations
- Survey results
- Workshops and meetings
- Print and digital media

Tracking BMP Implementation – Iowa Logic Model



AWQPF Tech Subgroup Committee Charge

1. Determine the best way to share and aggregate bmp implementation data across agencies (so we can track our progress in accomplishing the Illinois Nutrient Loss Reduction Strategy).
2. Determine what BMP implementation parameters will be tracked (e.g. cover crops, wetlands, buffer strips, etc.) and how it will be aggregated (e.g. per watershed, statewide, lump practices into categories like edge of field, etc.). This includes identifying future data parameters required from producer surveys or transect surveys to track progress in accomplishing the NLRS.
3. Assess existing BMP implementation data availability over time to advise the policy work group as they select a BMP implementation baseline year.

Tech Subgroup Members

FSA
Kim Martin, Natalie Prince

USDA-NASS
Mark Schleusener

Illinois Dept of Ag
Warren Goetsch, Steve Chard, Kevin Rogers

Illinois EPA
Amy Walkenbach, Trevor Sample

USDA-NRCS
Eric Gerth

Ag Partners
Lauren Lurkins

ILICA
Ryan Arch

IDNR
Mike Chandler, Lisa Beja

Metrics and what are we using to measure them

Land	FSA	USDA-NRCS	Illinois EPA	IDA	IDNR	NASS	Ag Partners
Red. N rate from backgrnd to MRTN 10%							
Nitrification inhibitor w/ all fall-applied fert on tile-drained corn							
Split appl. 50% fall + 50% sp on tiled corn							
Spring-only appl. on tile-drained corn							
Split appl. of 40% fall, 10% pre-plant, and 50% side dress							
Cover crops on all corn/soybean tile ac							
Cover crops corn/soybean non-tile ac							
Bioreactors on 50% of tile-drained land							
Wetlands on 25% of tile-drained land							
Buffers on all applicable crop land							
Perennial/energy = to pasture/hay ac							
Perennial/energy crops 10% tile-drained							
Water table management							

Metrics and what are we using to measure them

Land	*Units*	USDA-NRCS	Illinois EPA	FSA	IDNR	NASS
Red. N rate from backgrnd to MRTN 10%	*Cropland acres*					NASS Survey
Nitrification inhibitor w/ all fall-applied fert on tile-drained corn	*Cropland acres*					NASS Survey
Split appl. 50% fall + 50% sp on tiled corn	*Cropland acres*					NASS Survey
Spring-only appl. on tile-drained corn	*Cropland acres*					NASS Survey
Split appl. of 40% fall, 10% pre-plant, and 50% side dress	*Cropland acres*					NASS Survey
Cover crops on all corn/soybean tile ac	*Cropland acres*			To HUC8 level		NASS Survey
Cover crops corn/soybean non-tile ac	*Cropland acres*			To HUC8 level		NASS Survey
Bioreactors on 50% of tile-drained land	*# Acres treated*	EQIP	319 Grant			NASS Survey
Wetlands on 25% of tile-drained land	*Acres wetland/ # Acres treated*		319 Grant	To HUC8 level	To HUC8 level	NASS Survey
Buffers on all applicable crop land	*Acres buffers*		319 Grant	To HUC8 level	To HUC8 level	
Perennial/energy = to pasture/hay ac	*Cropland acres*			To HUC8 level		NASS Survey
Perennial/energy crops 10% tile-drained	*Cropland acres*			To HUC8 level		NASS Survey
Water table management	*# Acres effected*	EQIP	319 Grant			

Tracking BMP Implementation – Iowa Logic Model

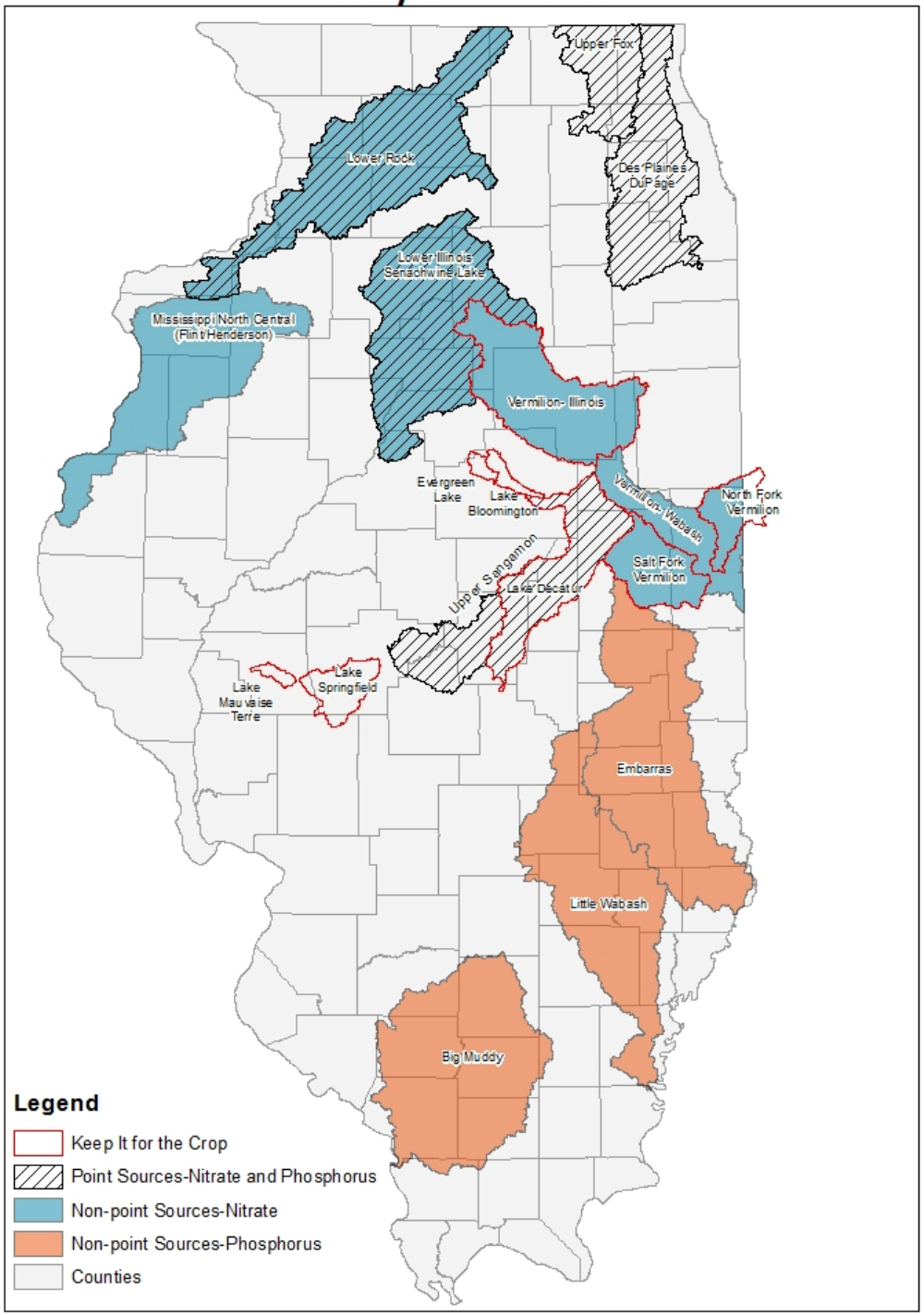
Water

- Calculated load reduction
- Measured loads in priority watersheds
- Organized watersheds reported load changes
- Measured loads at existing monitoring stations

Metrics and what are we using to measure them

What are we using to measure it?

Water	FSA	USDA-NRCS	Illinois EPA	IDA	IDNR	NASS	Ag Partners
➢ Calculated load reduction			Region V Load Estimation Spreadsheet, 319 Grant projects		GIS Model		
➢ Measured loads in priority watersheds							
➢ Organized watersheds reported load changes	Nutrient Monitoring Council will do these.				GIS Model		
➢ Measured loads at existing monitoring stations							
Others_____							
Others_____							



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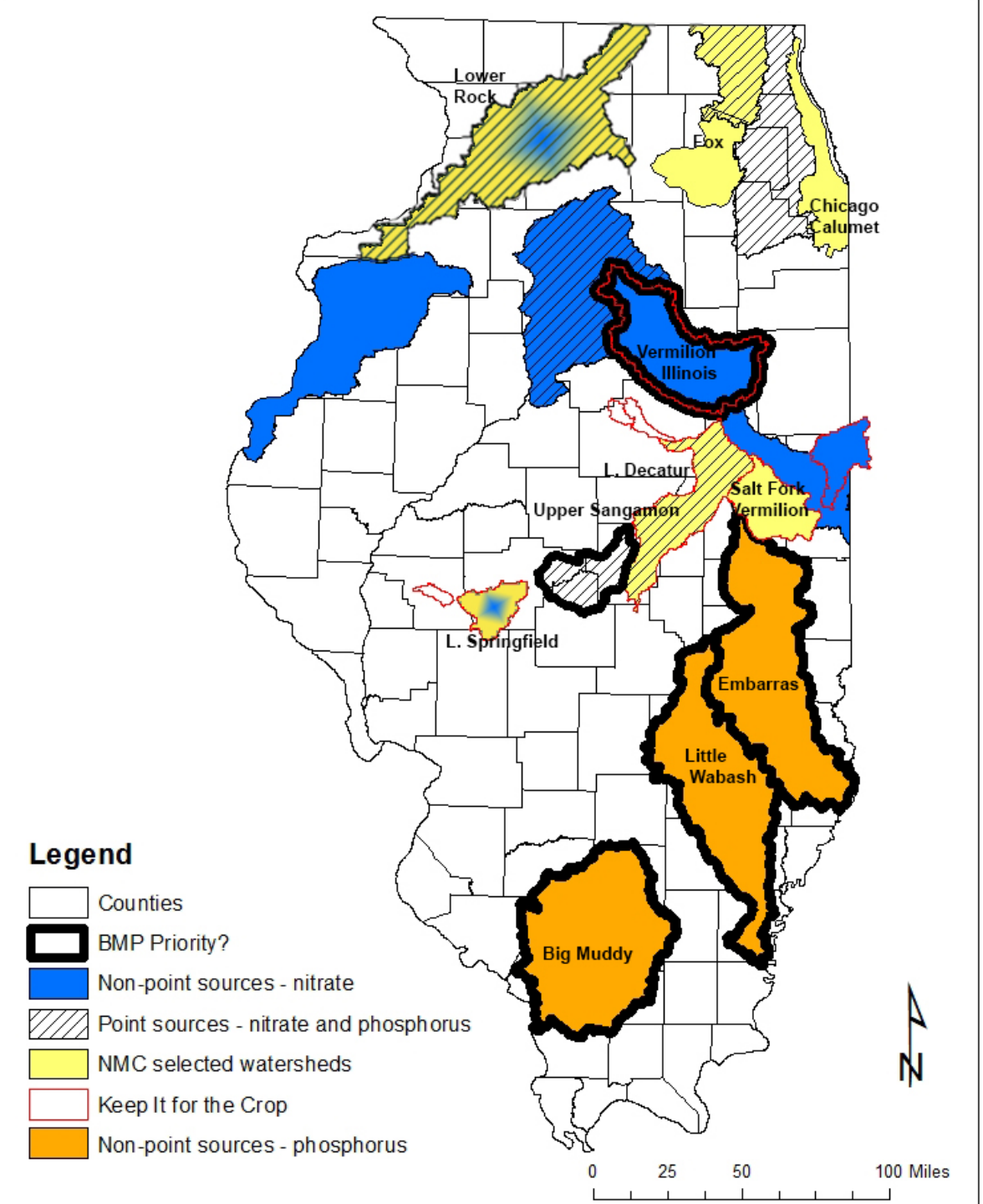
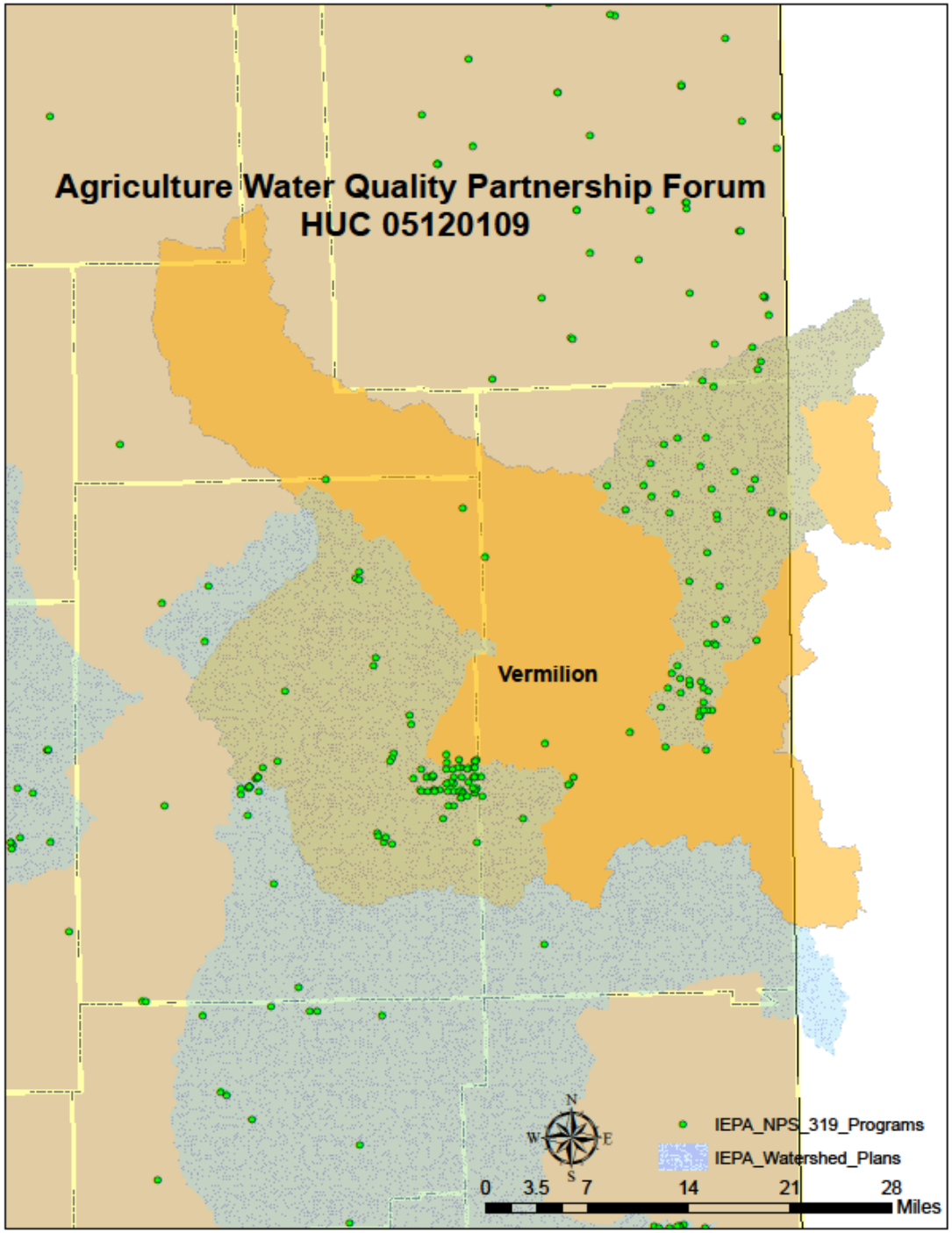

Lower Rock
Fox
Chicago Calumet
Vermilion Illinois
L. Decatur
Upper Sangamon
Salt Fork Vermilion
L. Springfield
Embarras
Little Wabash
Big Muddy
Legend
Counties
BMP Priority?
Non-point sources - nitrate
Point sources - nitrate and phosphorus
NMC selected watersheds
Keep It for the Crop
Non-point sources - phosphorus
N
0
25
50
100 Miles


Agriculture Water Quality Partnership Forum
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IEPA_Watershed_Plans
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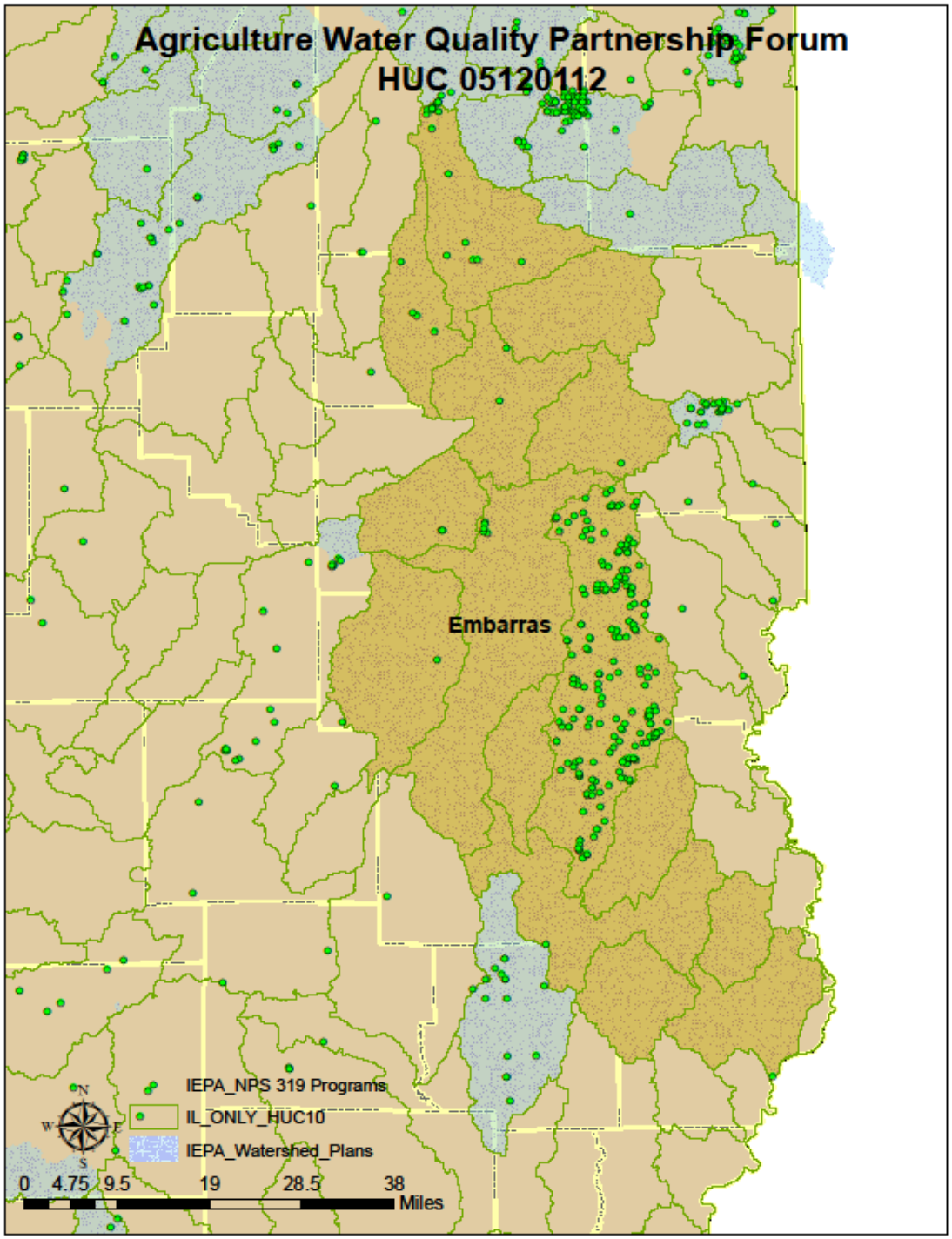
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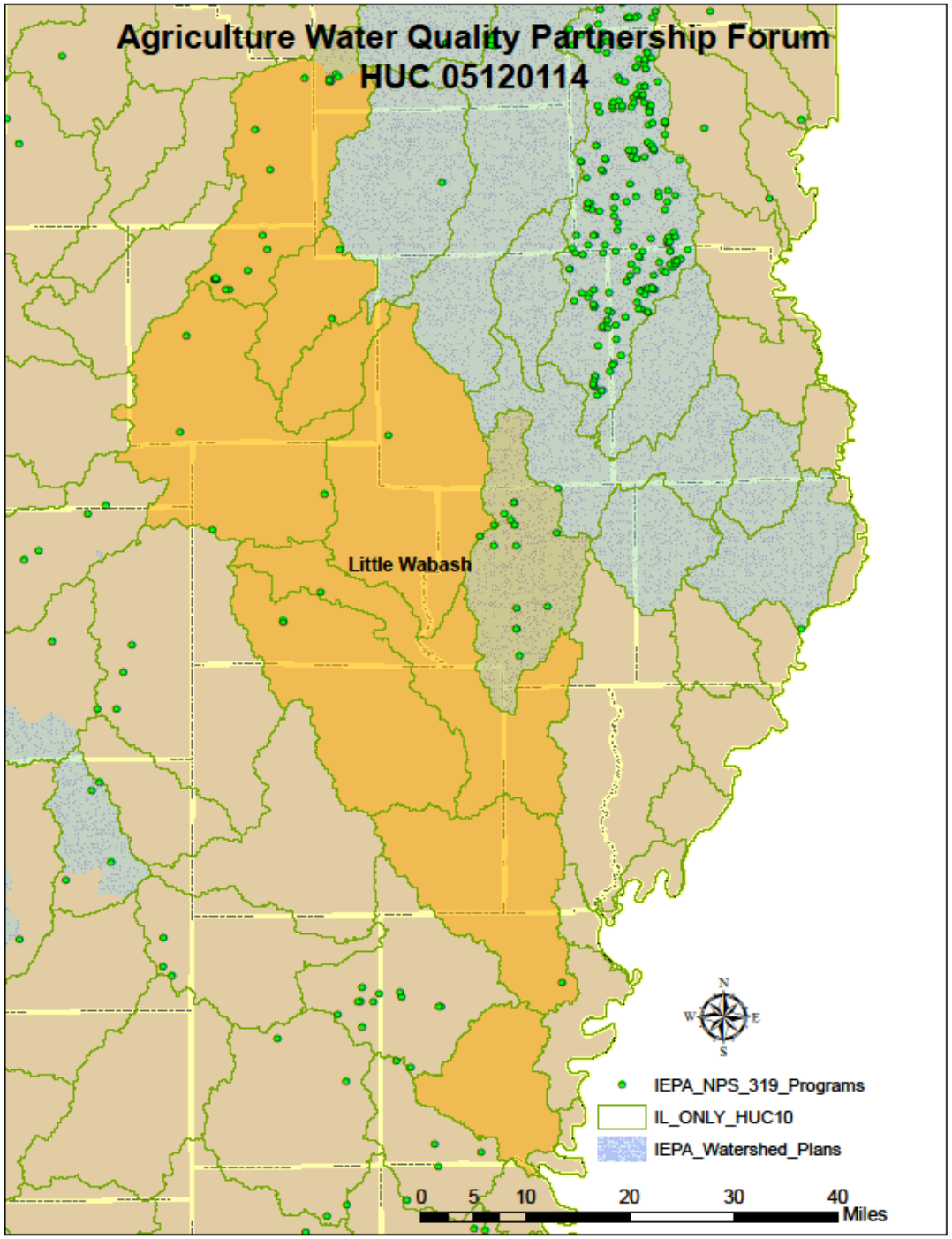
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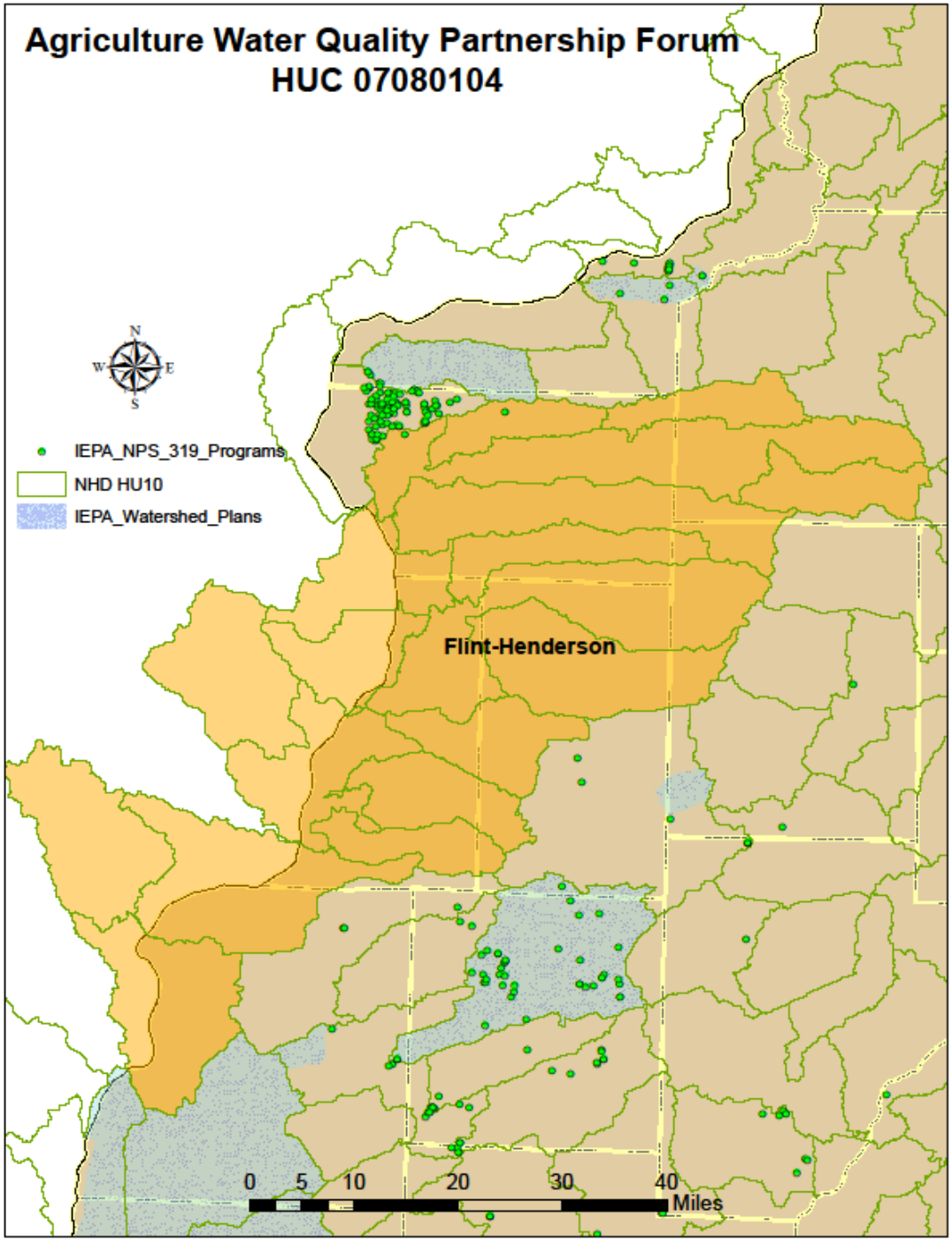
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Agriculture Water Quality Partnership Forum
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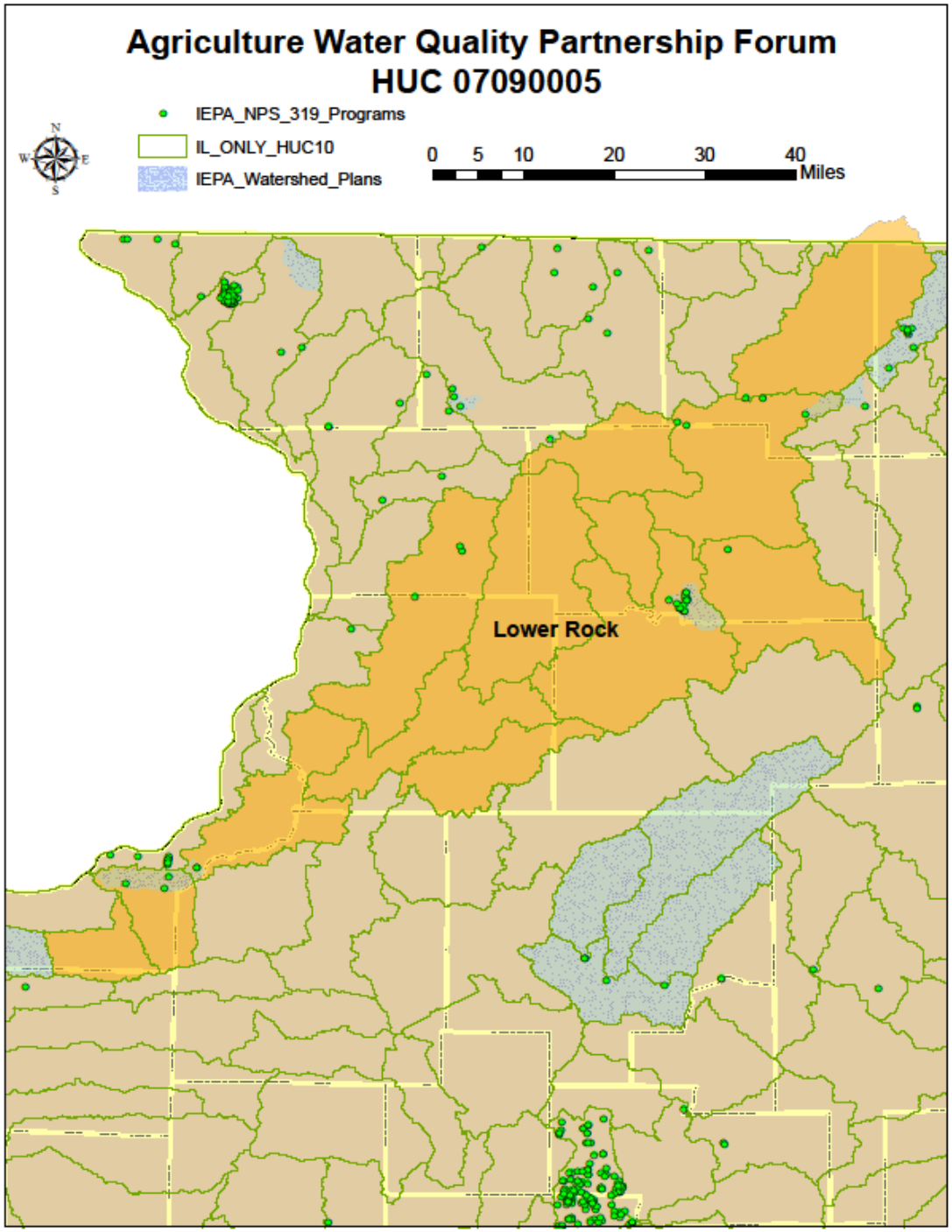

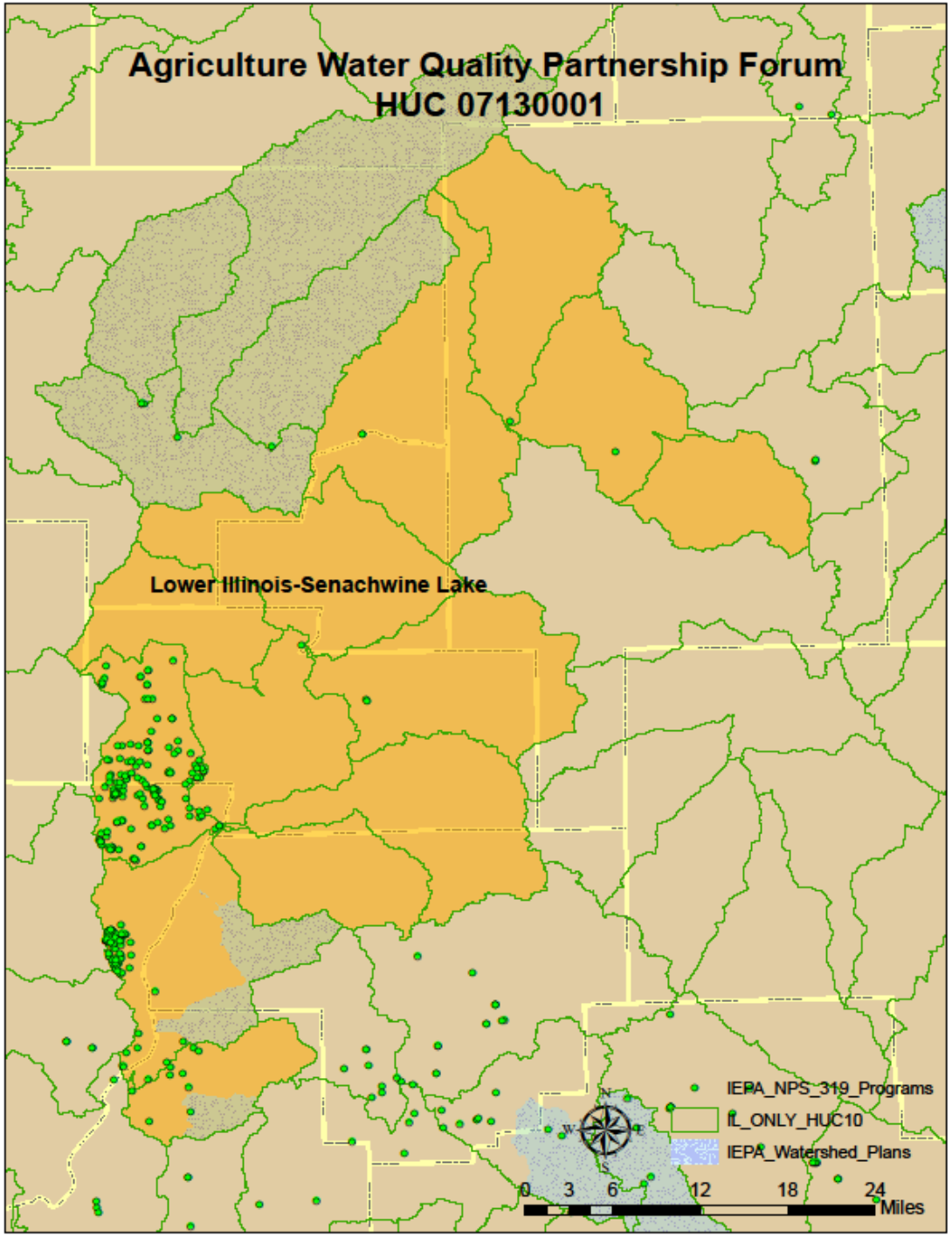

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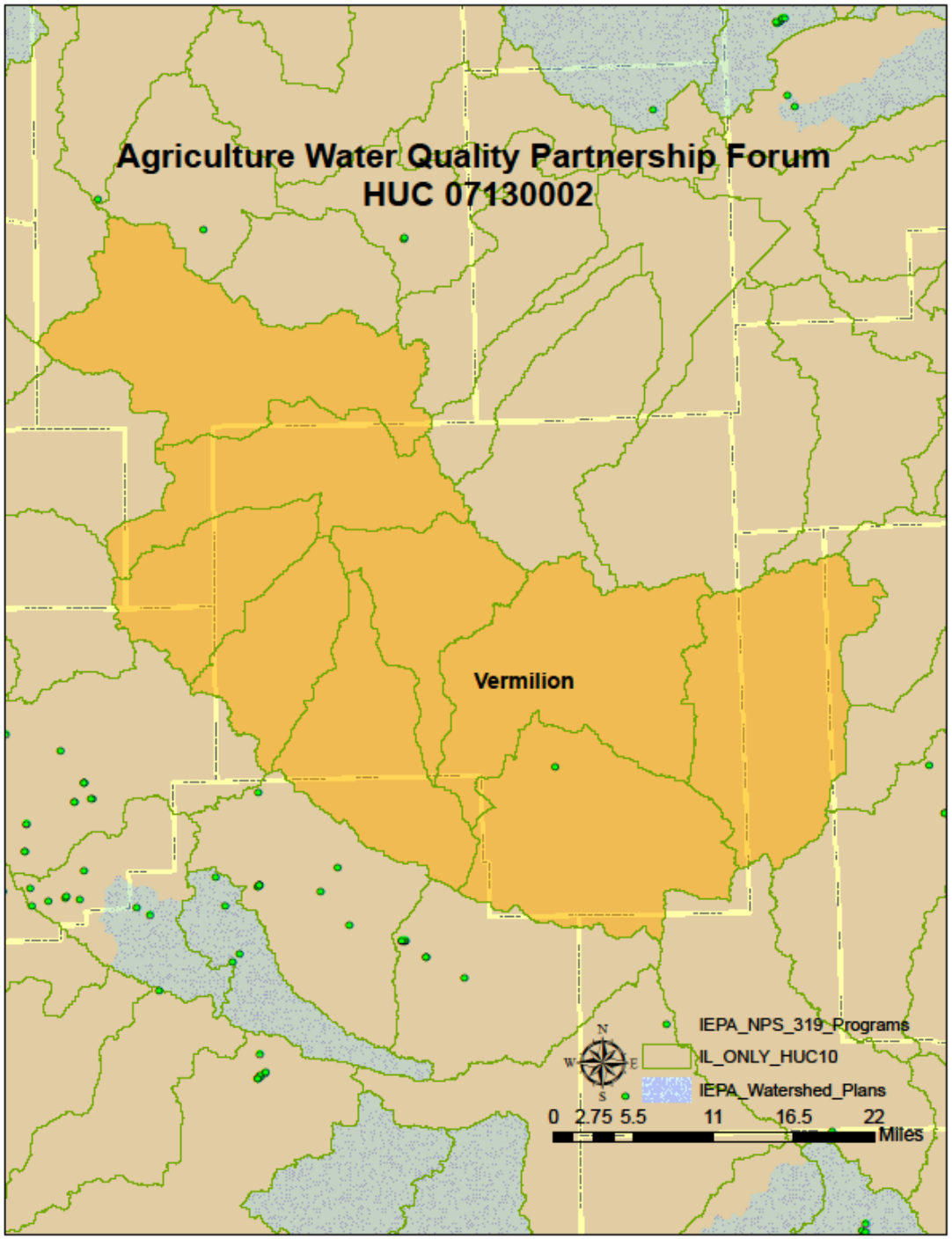
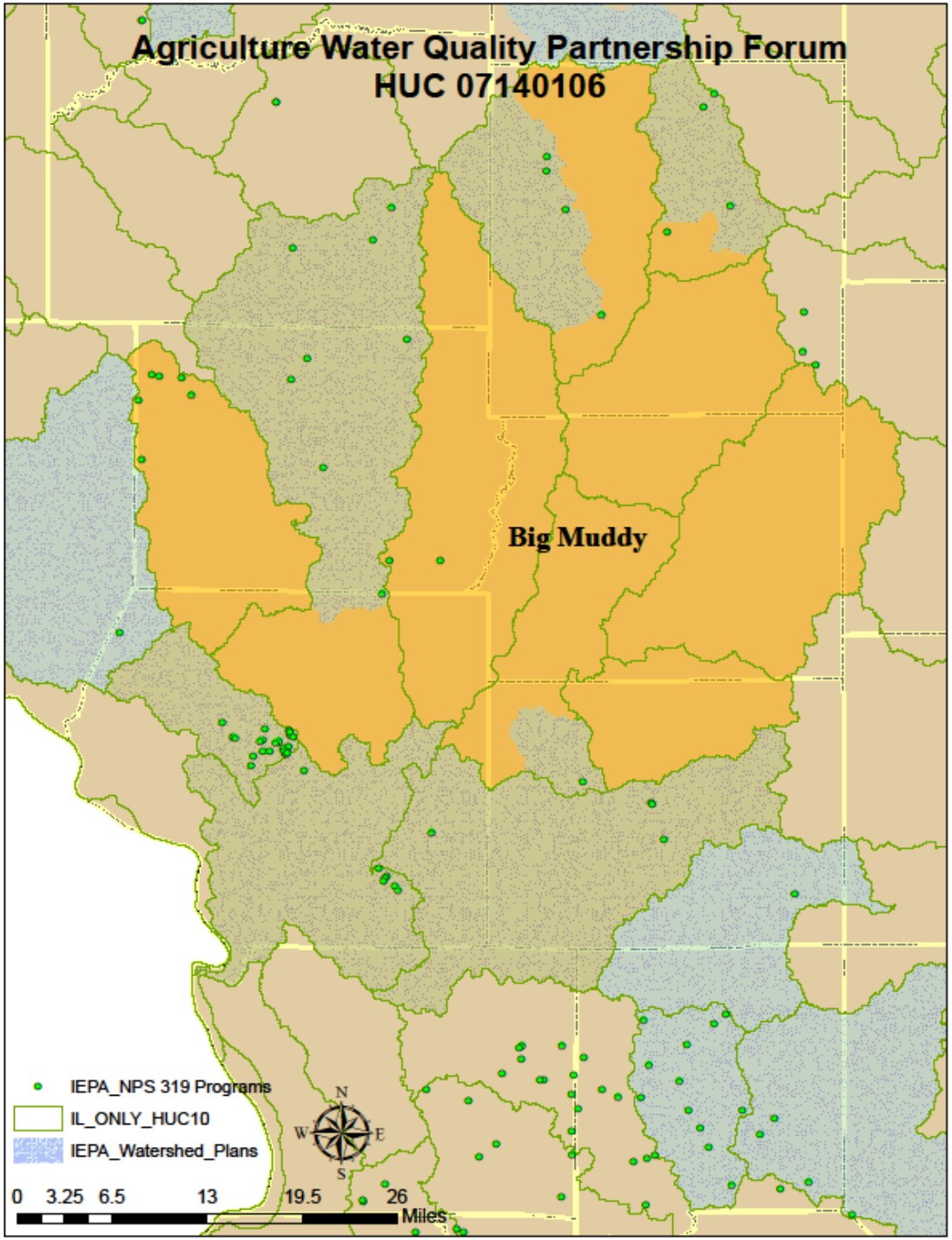


ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY | Improving our collaboration


Agriculture Water Quality Partnership Forum
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Big Muddy
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IL_ONLY_HUC10
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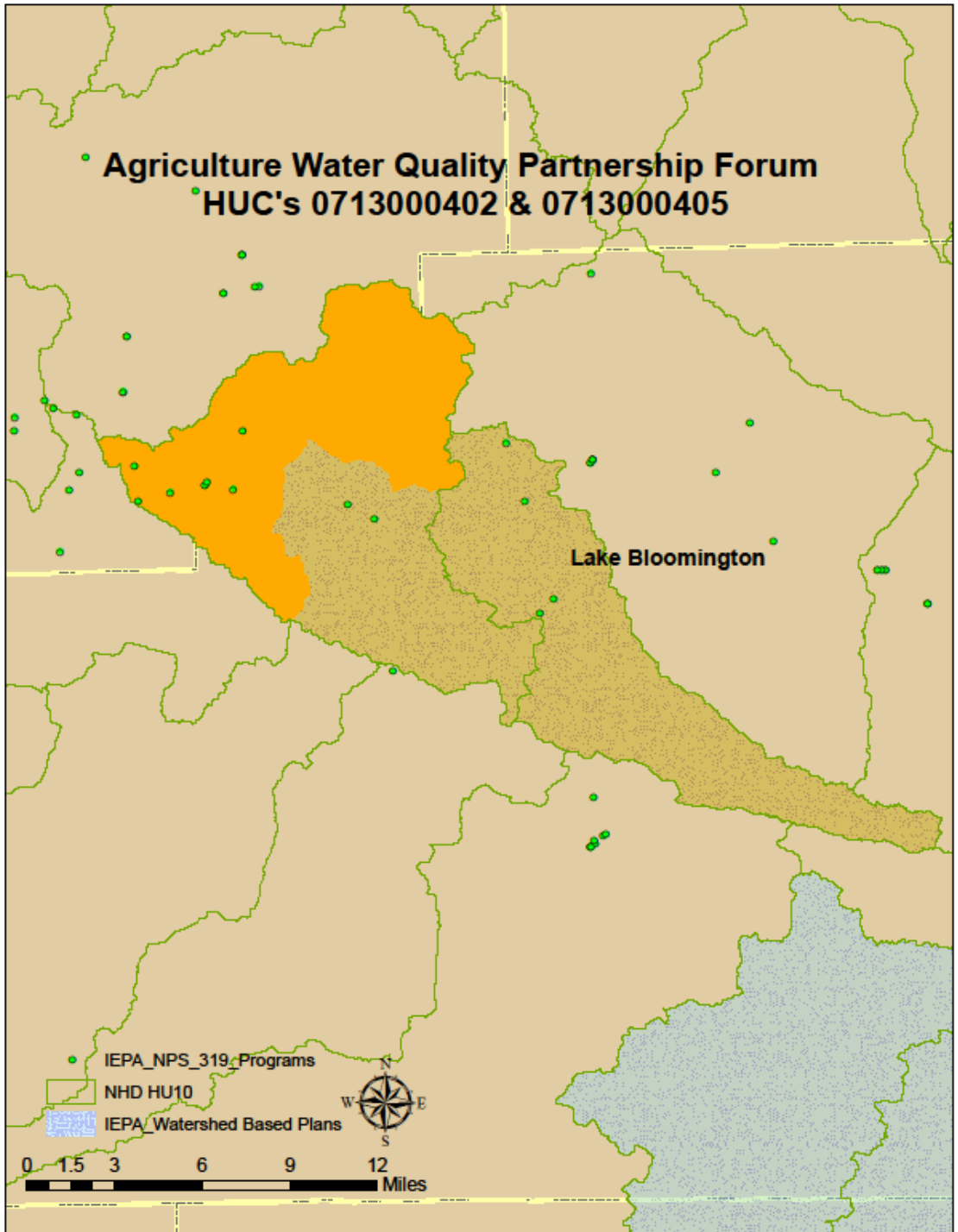
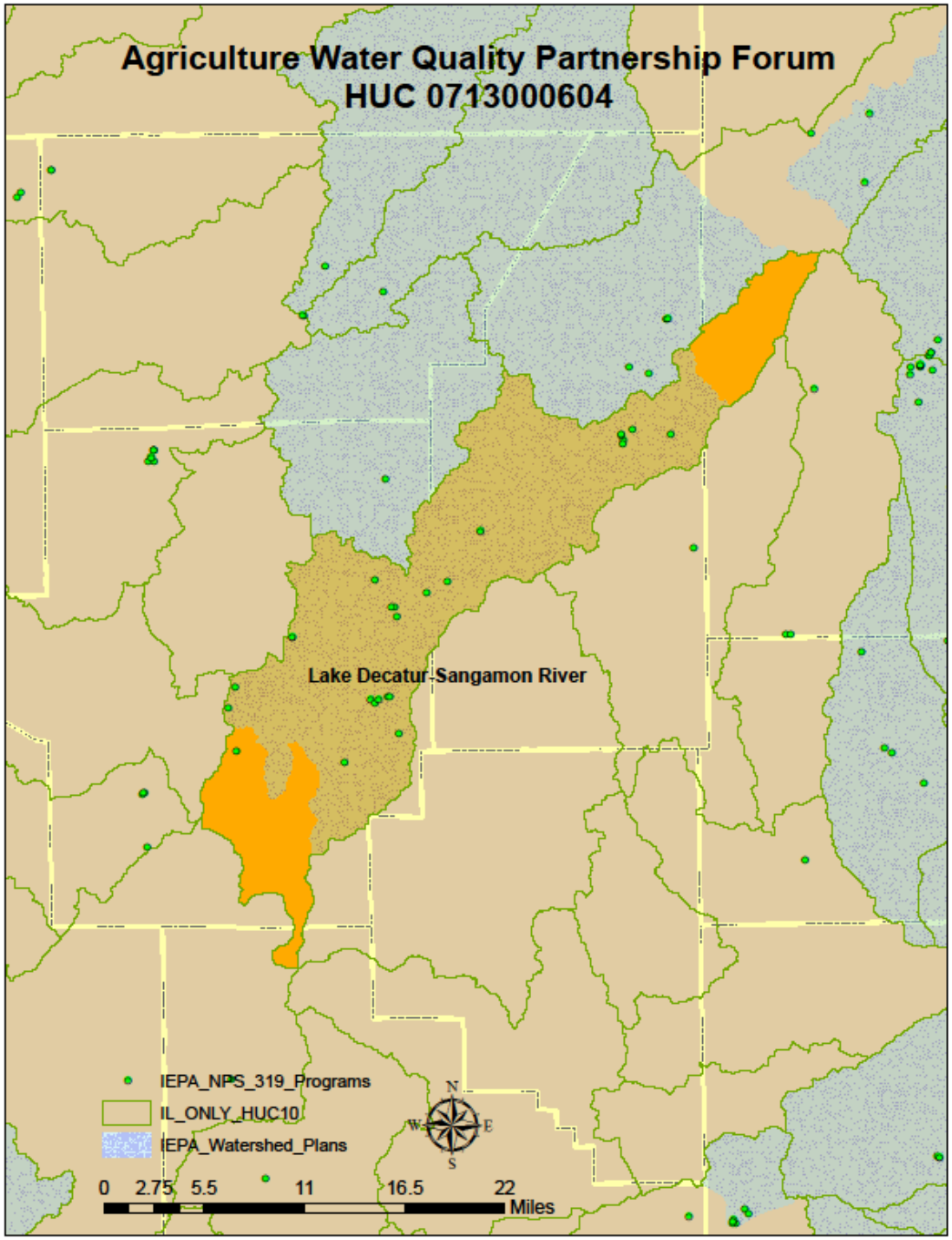
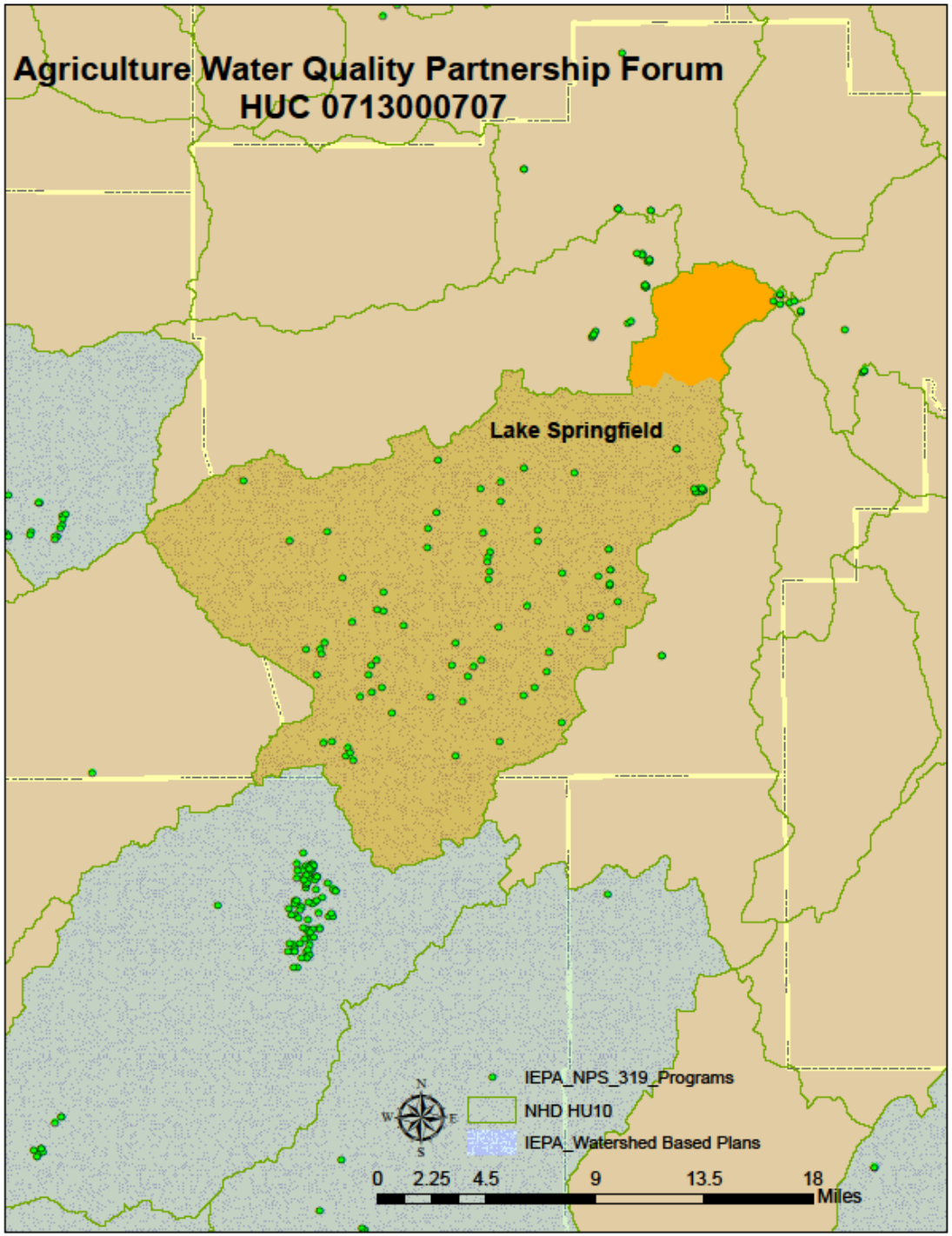


ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY | Improving ou collaboration



ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY | Improving ou collaboration


Agriculture Water Quality Partnership Forum
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Lake Springfield
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IEPA_NPS_319_Programs
NHD HU10
IEPA_Watershed Based Plans
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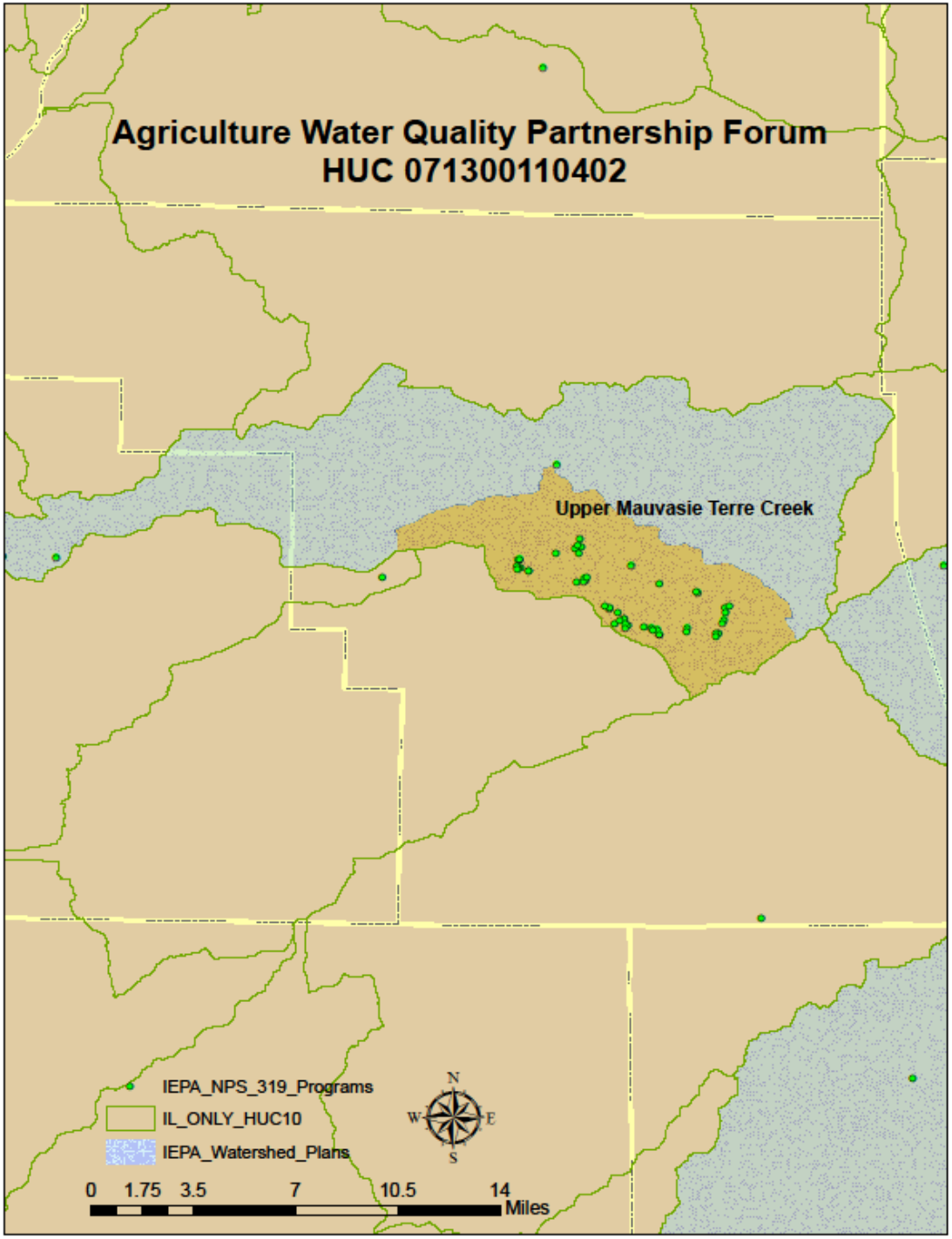
Miles


Agriculture Water Quality Partnership Forum
HUC 071300110402
Upper Mauvasie Terre Creek
IEPA_NPS_319_Programs
IL_ONLY_HUC10
IEPA_Watershed_Plans
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W
E
S
0 1.75 3.5 7 10.5 14
Miles

"Top ~~10~~ 6" NLRS Watersheds with Lots of Ongoing Monitoring

(NMC meeting 9/16/15)

- Lake Springfield
- Lake Decatur
- Rock River
- Chicago/Little Calumet
- Upper Salt Fork
- "Middle Fox" River

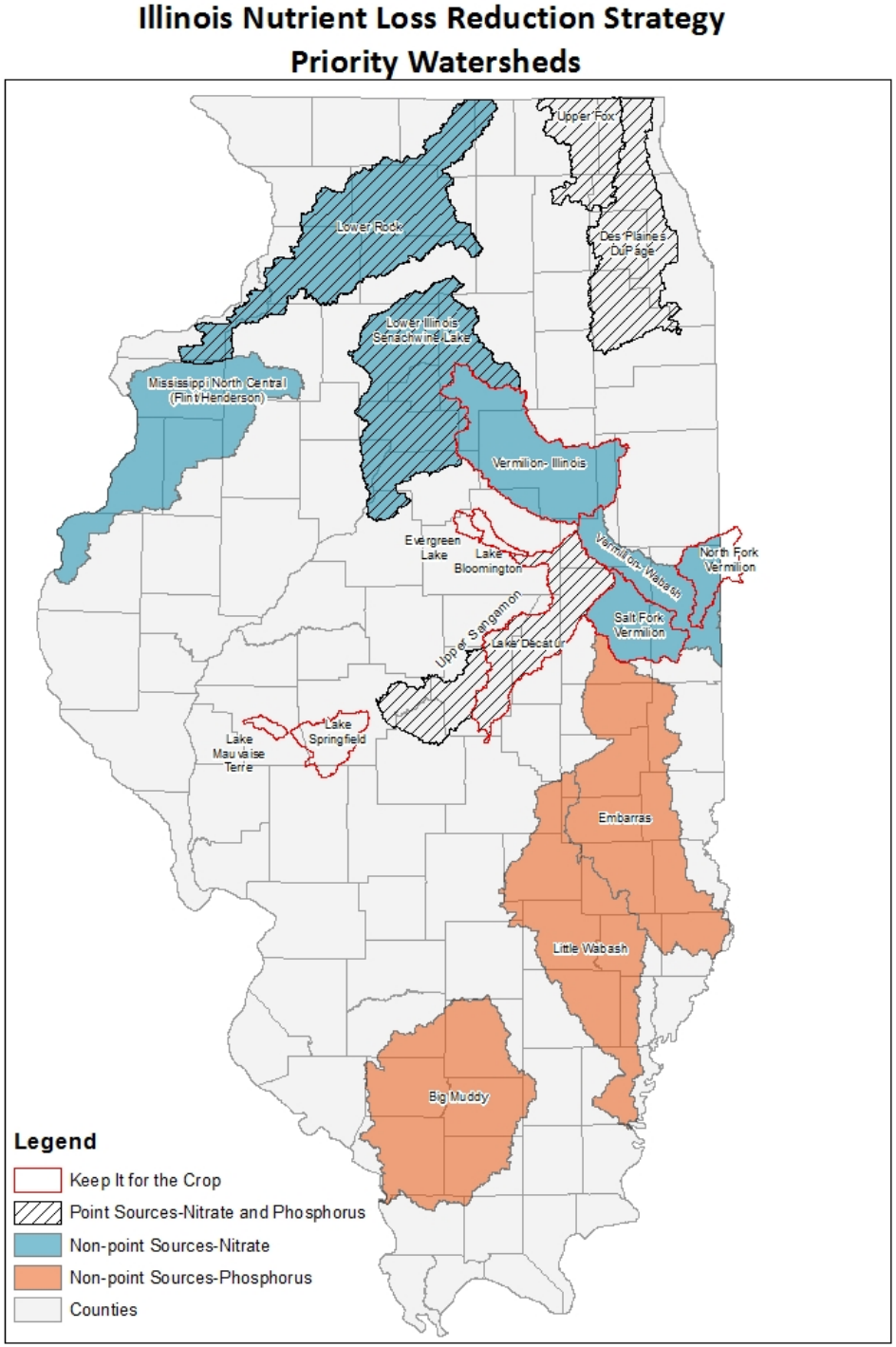
Discussion!

WHAT'S
for
LUNCH?

So is coordinating the development of individualized *Watershed Nutrient Monitoring Plans* where the NMC is going next?

But what about:

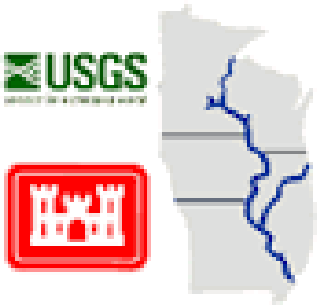
- generating loading estimates and loading trends for some or all 18 priority watersheds?
- trying to show local water quality improvements (outcomes)?



Individual Organization Monitoring Site Maps

USGS
science for a changing world

ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES

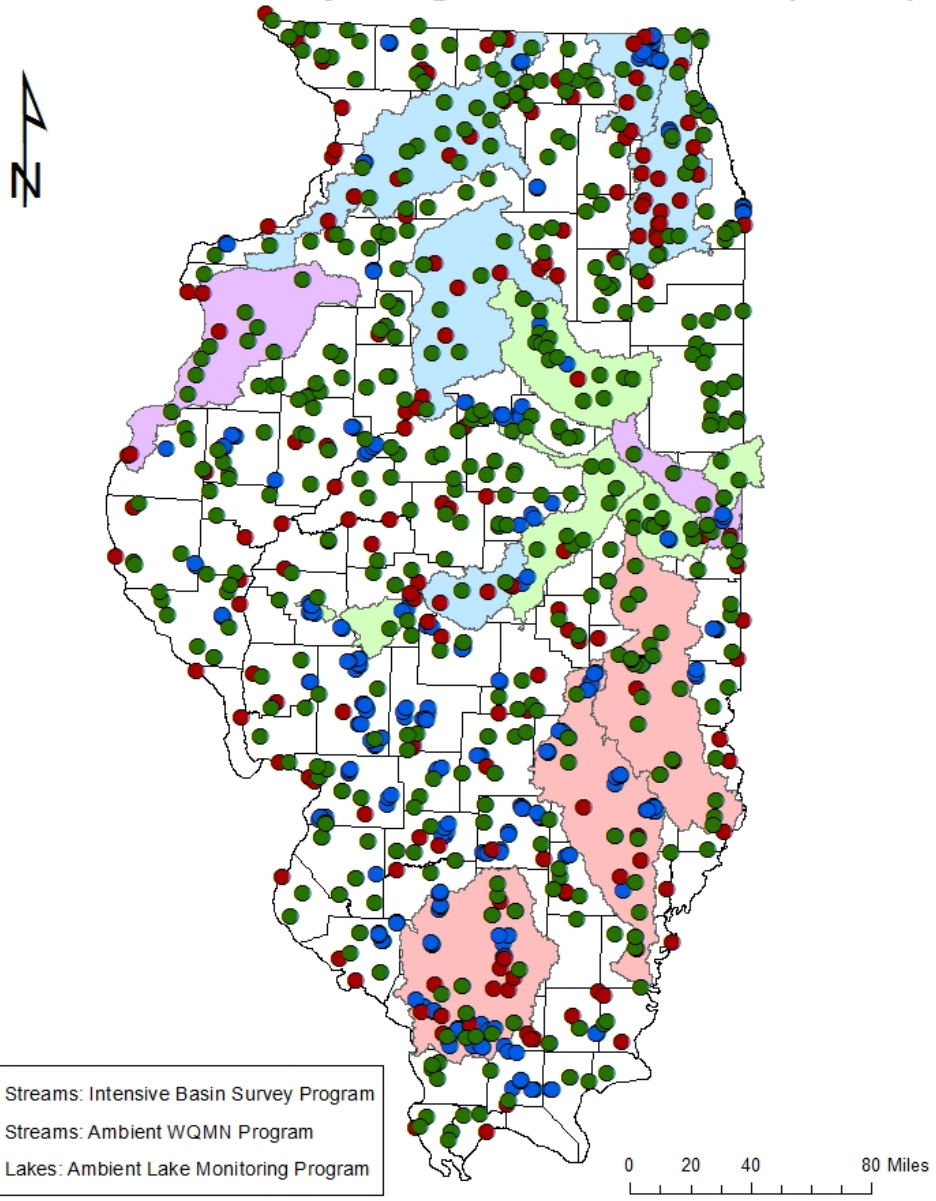


ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITU

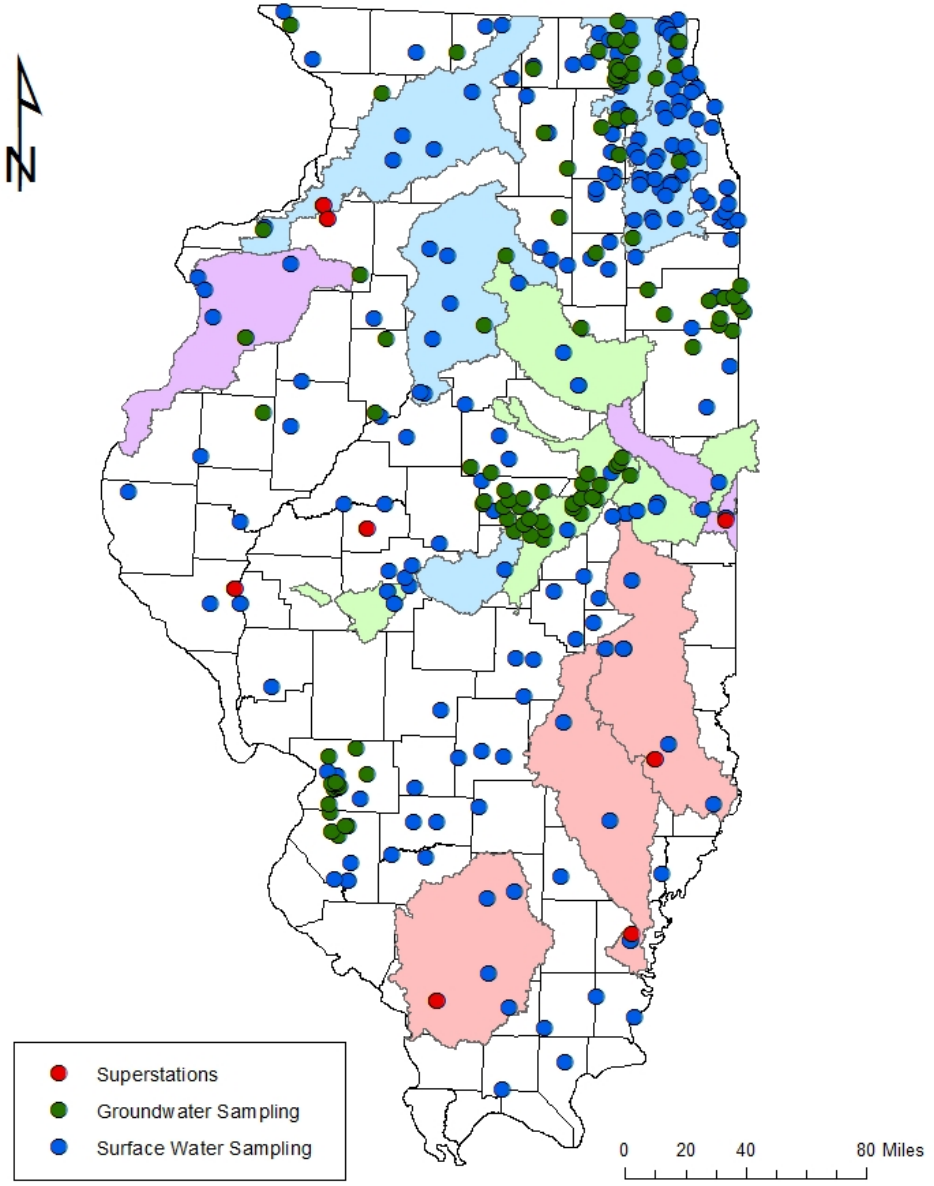
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

.....and others!

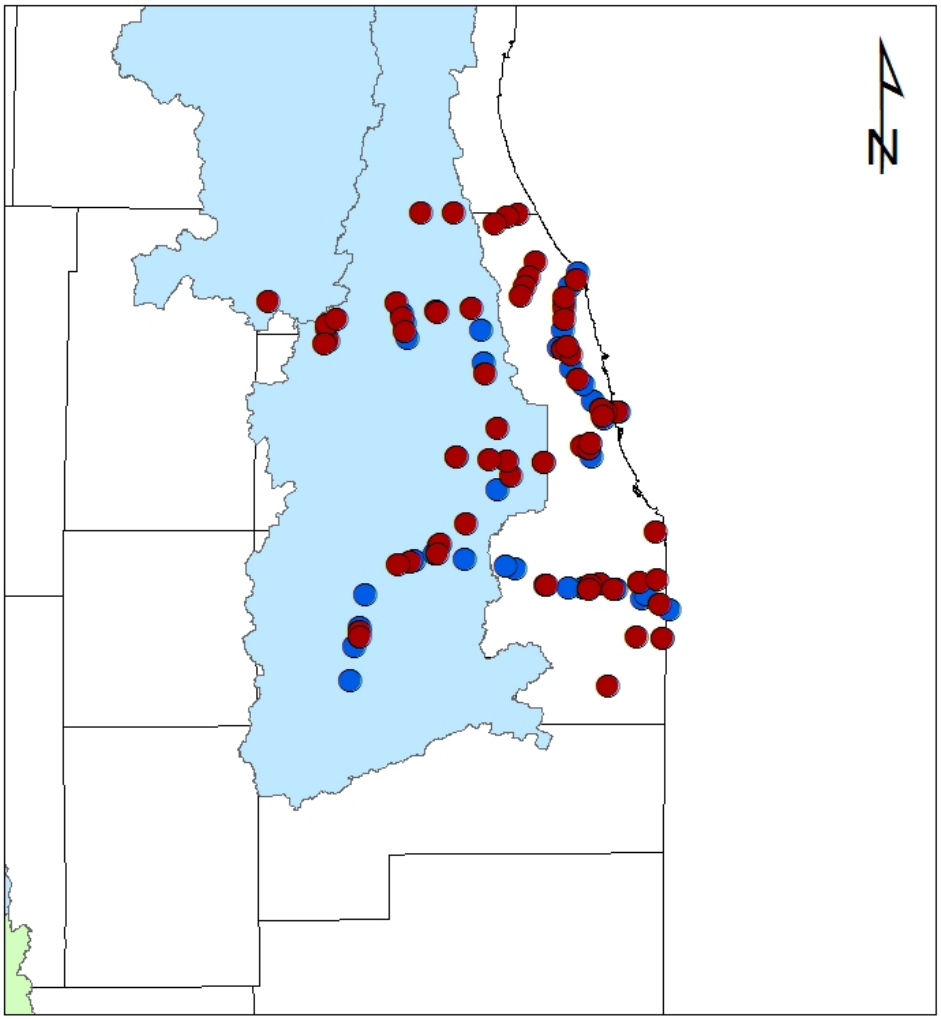
IEPA Sampling Locations (SW)



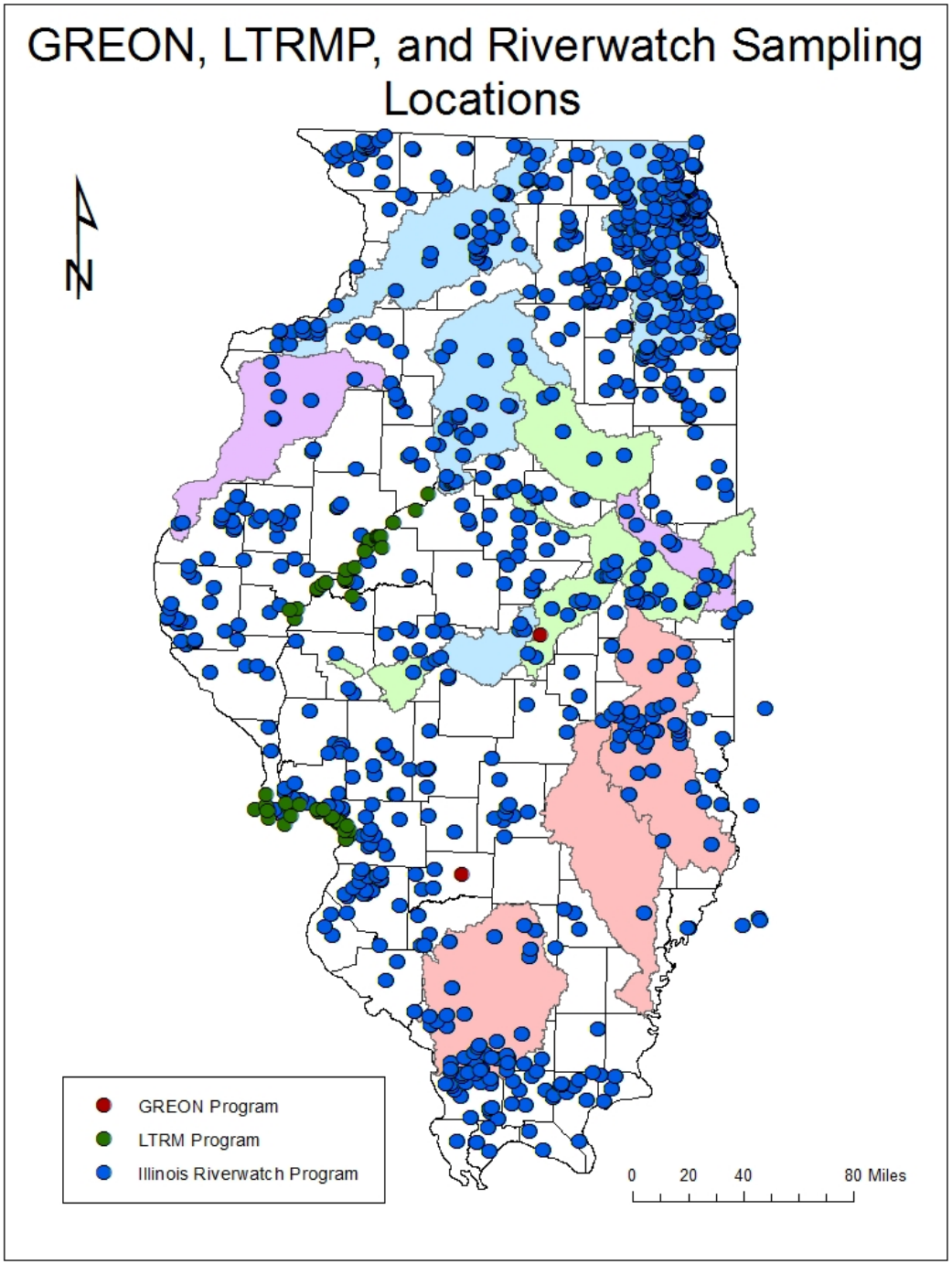
USGS Sampling Locations



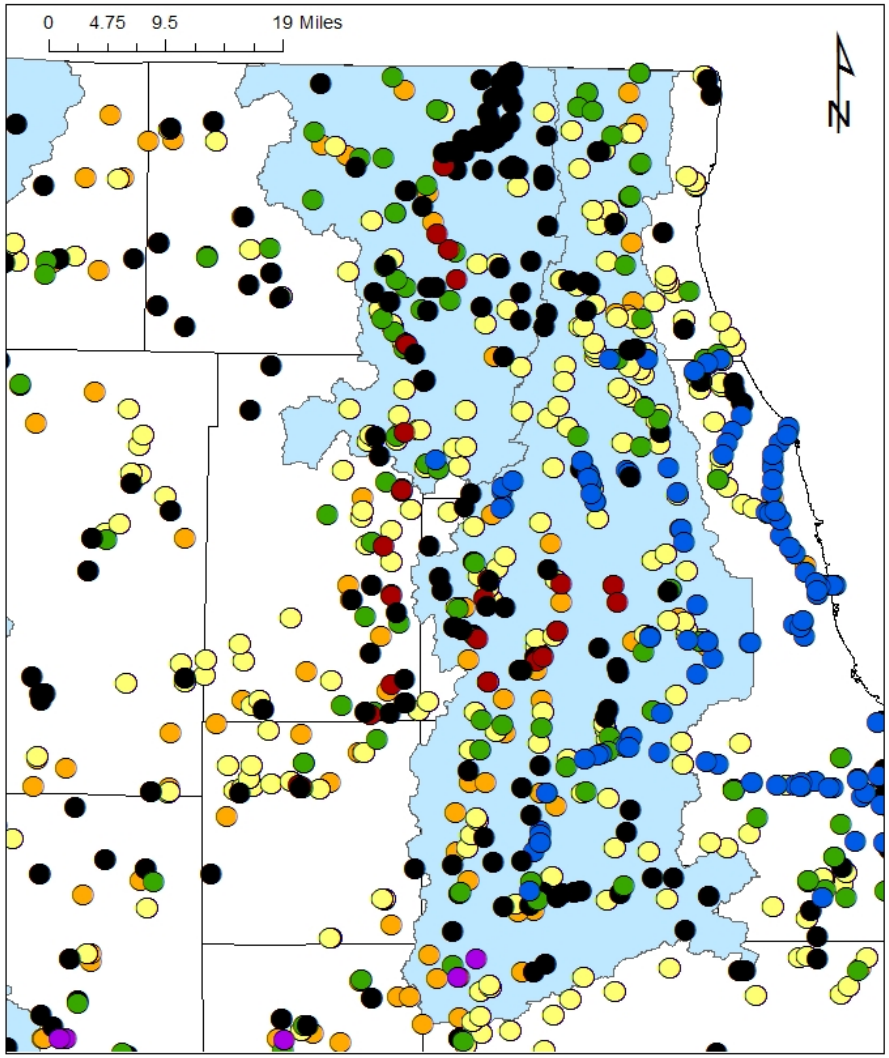
MWRDGC Sampling Locations



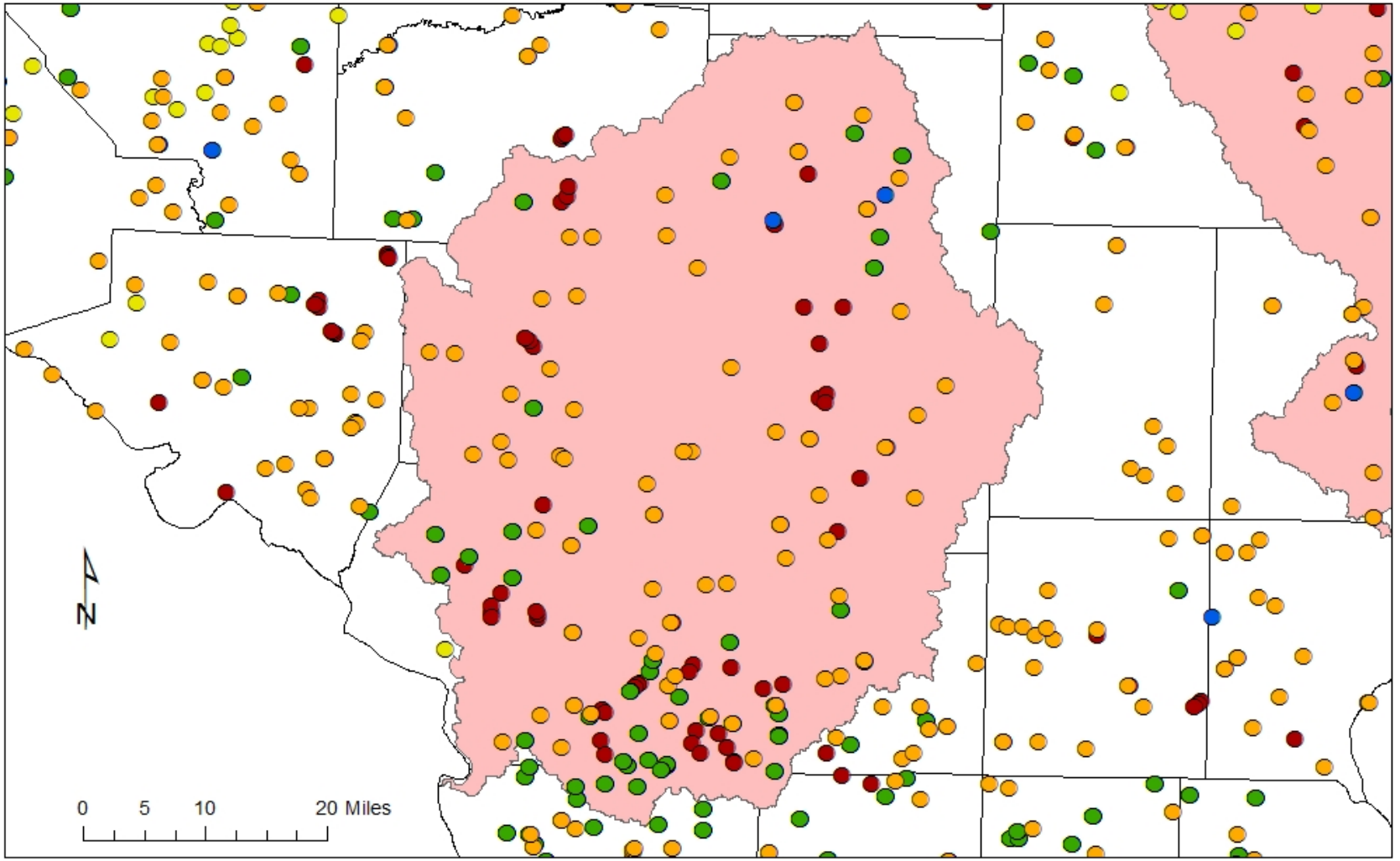
GREON, LTRMP, and Riverwatch Sampling Locations



Aggregated Organization Monitoring (Upper Fox/Des Plaines/DuPage)



Aggregated Organization Monitoring (Big Muddy)



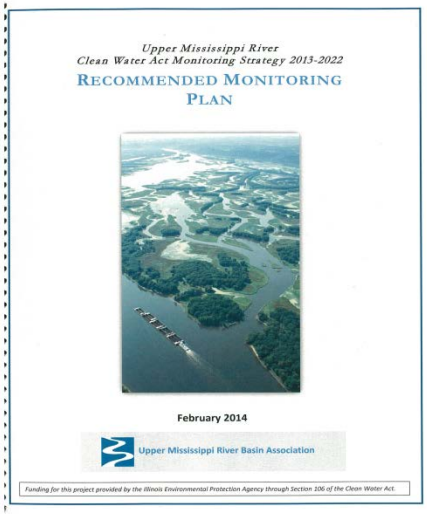
Watershed Nutrient Monitoring Plan

development in NLRS High Priority Watersheds

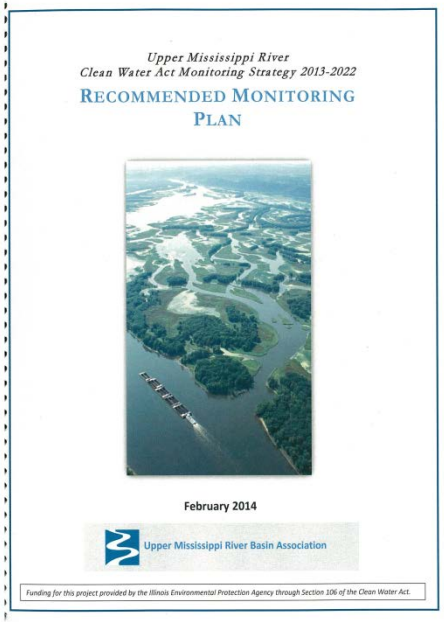
- Goal would be to develop detailed *Watershed Nutrient Monitoring Plans and Associated Costs* for ALL NLRS high priority watersheds that:
  - Estimate N and P Loads (1b)
  - Trends (1c)
  - Water Resource Quality Outcomes (2)

- But where do we start?

  (Previous priorities discussion)



What would a *Watershed Nutrient Monitoring Plan* look like?



- Background
- Overall Scope and Goals
- Monitoring Function (e.g., loads, trends, local WQ improvements)
- Monitoring Design (e.g., targeted, fixed, probabilistic, follow-up, ….chemical, physical, and biological indicators)
- Implementation (e.g., staffing-who?, timeline, costs, funding/in-kind resources, next steps)

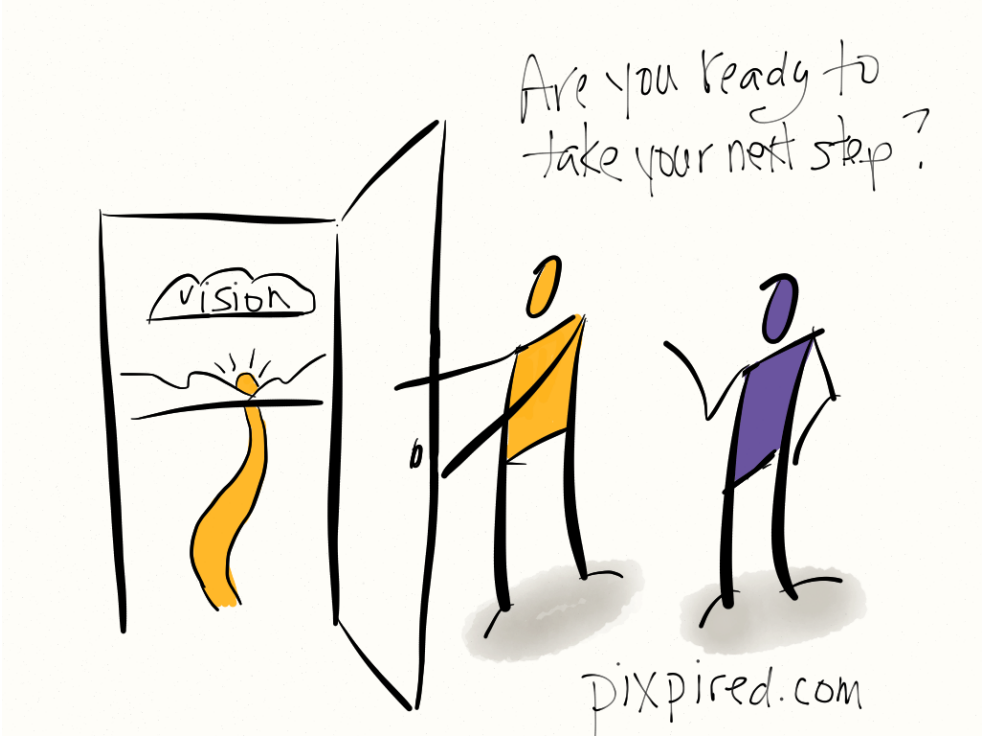
Developed *NLRS Priority Watershed Nutrient Monitoring Plans* allow us to be ready to rock n' roll when resources become available!

Watershed Nutrient Monitoring Plan

Questions for Discussion

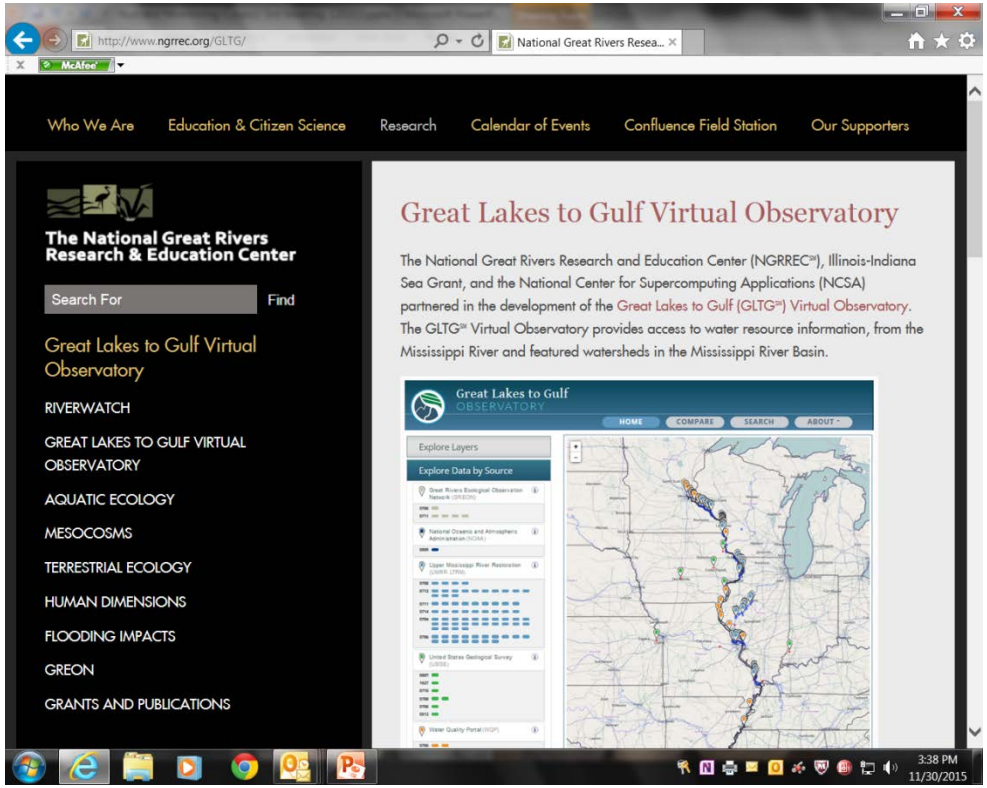
- Hoo Hoo develops each plan?
  - Are these "other duties as assigned?"
  - Will there be a budget for their development?
- How do we ultimately retrieve, aggregate, and display monitoring data collected by multiple organizations?
- How do we "assess" loadings, trends, and water resource quality improvements?
  - Assessment methodologies decided on will drive data needs.
  - Do we need a NMC-Assessment Methodologies Subcommittee?
- Lots of questions to explore!
- ***Who What When Where Why?***

Discussion: Where do we go from here?



Jong Lee, National Center for Supercomputing Applications (NCSA)

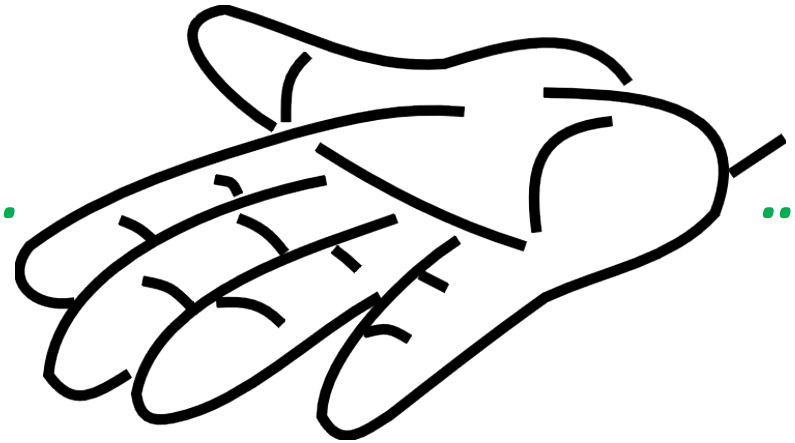
- Great Lakes to Gulf Observatory (GREON) Demonstration Using Fox River Data



Top Monitoring Data Parameters and Associated Information

- Laura Keefer (ISWS) and Kelly Warner (USGS)

I have a……



…..for you!

“Next Steps” Summary
(NMC April 5, 2016)

- Summarize today’s action items
  - A.
  - B.
  - C.
  - D.
- Future topics for the September 13, 2016 meeting?
- Other stuff (TBD).

Next NMC Meetings

- September 13, 2016
- December 6, 2016