# Illinois Nutrient Loss Reduction Strategy Nutrient Monitoring Council

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





### 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 <u>leaving the state of Illinois</u> 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.

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### 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



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







### 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



Illinois Real-Time Nutrient and Sediment Surface-Water-Quality and Discharge Monitoring Stations (Super Gages) Operated by the USGS

EXPLANATION Mean Nitrate Concentration (No<sub>3</sub>) between 1980-1996 based on data from the IEPA Ambient Network

Less than 3 mg/l

3 to 6 mg/l

Greater than 6 mg/l

Active IEPA Ambient Sites 2013

- Superstations for IEPA Nutrient and Sediment Loading Network
- Superstations for Lake Springfield Nutrient and Sediment Loading Network
- Superstations for Asian Carp (no P and discharge)
- Superstation for Bloomington Restoration Site (no P)
- Continuous Nitrate sensors only and Flow

September 2015

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# 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

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



### **S**uccesses

Illinois River at Florence, IL (05586300)



Gage height, feet

Nitrate plus nitrite, water, in situ, milligrams per liter as nitrogen

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

### Kaskaskia River at New Athens (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 River at New Athens 05595000



Nov-16Dec-1Dec-16 Jan-1 Jan-16 Feb-1Feb-15Mar-1Mar-16 Apr-1 2015 2015 2015 2016 2016 2016 2016 2016 2016 2016

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



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







## 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! ③
- 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					
Vewsletters					
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



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### AWQPF Tech Subgroup Committee Charge

- 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		USDA-	Illinois			
	Units	NRCS	EPA	FSA	IDNR	NASS
ed. N rate from backgrnd to MRTN 10%	Cropland acres					NASS Survey
litrification inhibitor w/ all fall-applied ert on tile-drained corn	Cropland acres					NASS Survey
plit appl. 50% fall + 50% sp on tiled corn	Cropland acres					NASS Survey
pring-only appl. on tile-drained corn	Cropland acres					NASS Survey
plit appl. of 40% fall, 10% pre-plant, and 0% side dress	Cropland acres					NASS Survey
over crops on all corn/soybean tile ac	Cropland acres			To HUC8 level		NASS Survey
over crops corn/soybean non-tile ac	Cropland acres			To HUC8 level		NASS Survey
ioreactors on 50% of tile-drained land	# Acres treated	EQIP	319 Grant			NASS Survey
Vetlands on 25% of tile-drained land	Acres wetland/ # Acres treated		319 Grant	To HUC8 level	To HUC8 level	NASS Survey
uffers on all applicable crop land	Acres buffers		319 Grant	To HUC8 level	To HUC8 level	
erennial/energy = to pasture/hay ac	Cropland acres			To HUC8 level		NASS Survey
erennial/energy crops 10% tile-drained	Cropland acres			To HUC8 level		NASS Survey
Vater 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

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

#### What are we using to measure it?

























































"Top <del>10</del> 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!









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





#### **Illinois Nutrient Loss Reduction Strategy**

Priority Watersheds

### 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



























### Watershed Nutrient Monitoring Plan development in NLRS High Priority Watersheds

- Goal would be to develop detailed <u>Watershed Nutrient Monitoring</u>
   <u>Plans and Associated Costs</u> 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, followup, ....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!

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# 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





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### Top Monitoring Data Parameters and Associated Information

Laura Keefer (ISWS) and Kelly Warner (USGS)





### "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 (TRD)
- Other stuff (TBD).



### Next NMC Meetings

- > September 13, 2016
- December 6, 2016







