Illinois Nutrient Loss Reduction Strategy

Nutrient Monitoring Council

9th Meeting, September 6, 2017, Springfield, IL

Welcome/Housekeeping/Updates

- Important Stuff – bathroom, lunch, other
- IWRC Update – Eliana Brown
- Notetaker Volunteer? – Please, pretty please?
- NMC Member Loss and Replacement
- NMC Member Updates to Share
  - Exciting news?
  - Boring news

Nutrient Monitoring Council Members (9/6/17)

Illinois EPA
Gregg Good, Rick Cobb

Illinois State Water Survey
Laura Keefer

Aqua Illinois
Kevin Culver

~~**Illinois Natural History Survey**~~
~~Andrew Casper~~ (Need Replacement!)

Illinois Dept. of Natural Resources
Ann Holtrop

University of Illinois
Paul Davidson

Sierra Club
Cindy Skrukrud

MWRDGC
~~Justin Vick~~ **Nick Kollias on 9/6/17**

Illinois Corn Growers Association
Laura Gentry

U.S. Army Corp of Engineers-Rock Island
Chuck Theiling

U.S. Geological Survey
Kelly Warner

National Center for Supercomputing Apps
Jong Lee

Today's Guests
- **Bill Morrow, USGS**
- **Jonathon Manual, Champaign Co. SWCD**
- **Greg McIsaac, U of I**
- **Trevor Sample, Illinois EPA**

March 14, 2017, NMC #8 Meeting

- Review of Meeting
- Minutes (review and approve)

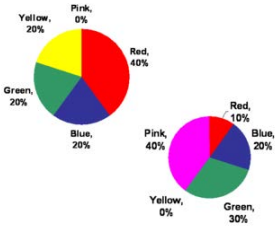
NMC Charges (Revised 10/26/15)

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 MONITORING COUNCIL (NMC)

Update for Nutrient Policy Working Group (2/7/17)

6th Meeting: 9/13/16
Springfield

7th Meeting: 12/6/16
Urbana

Overview

- Statewide Continuous Monitoring Nutrient Loadings Network – Super Gage Update
- **Where to go with the NMC Charge of Monitoring for "Local Water Quality Outcomes"**
- Next Meetings
- Above Stuff Discussed in NMC Biennial Report Submitted to IWRC on 1/27/17
- Q & A

Questions for You, the PWG!

- Lacking that $100,000,000 BMP implementation check, at this time, do you see the need to develop Priority Watershed Nutrient Monitoring Plans?
- Do we simply supplement existing monitoring activities in smaller watersheds where expanded BMP implementation is taking place (e.g., Lake Springfield, Evergreen Lake, Lake Bloomington, Fox River)?
- Is documenting nutrient load or chlorophyll *a* reductions good enough to tell a "local water quality outcomes" story? Or do we need to advocate for the extra time and resources necessary to tell that aquatic life *response* story as well?

Final Take Home Messages from PWG

- Job #1 right now is monitoring nutrient loads leaving priority watersheds and the state of Illinois.
- No need to develop multiple, large-scale Priority Watershed Nutrient Monitoring Plans at this time. KISS (Keep it Simple Stupid)!
- Coordinate supplemental monitoring activity at existing watershed implementation projects.

Nutrient Loss Reduction Strategy

- NLRS Biennial Report Development, Announcement, and Distribution
- Nov. 28-30 NLRS Workshop in Springfield

Next NMC Meetings

- *Nov. 29-30, 2017?*
- *First half of Dec.?*
- *March/April 2018?*

Nitrate Monitoring in Groundwater near Havana, Illinois

William Morrow
Illinois Water Science Center
Urbana, Illinois

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continuous groundwater monitoring location

Mason Tazewell Drainage Ditch

(Quiver Creek)

Mason State Tree Nursery

Well

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Data Collection Since March 2017

- Nitratax meter
  - Nitrate
- In-situ Aquatroll
  - pH
  - Specific Conductivity
  - Water temperature
  - Dissolved oxygen
  - Water level


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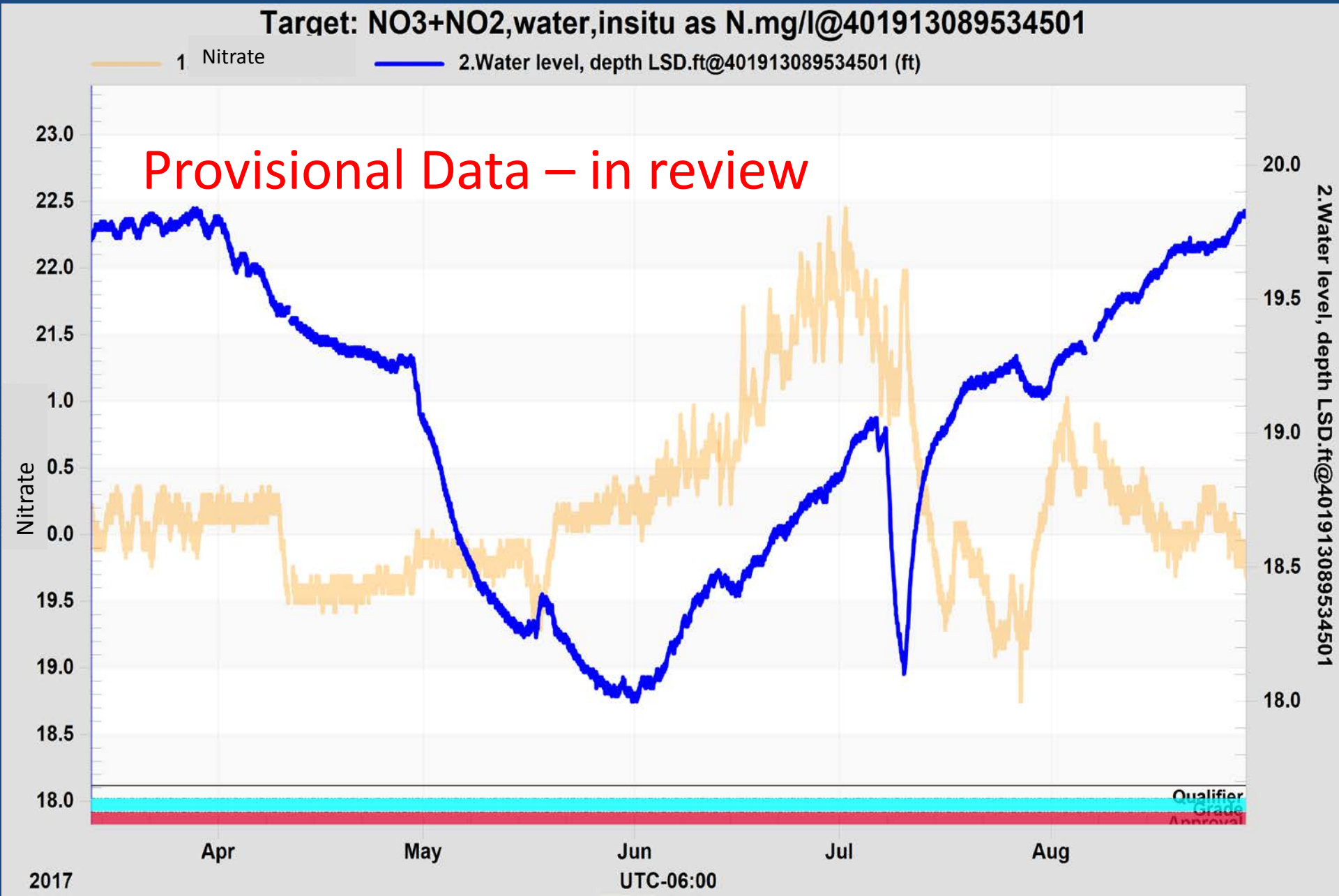
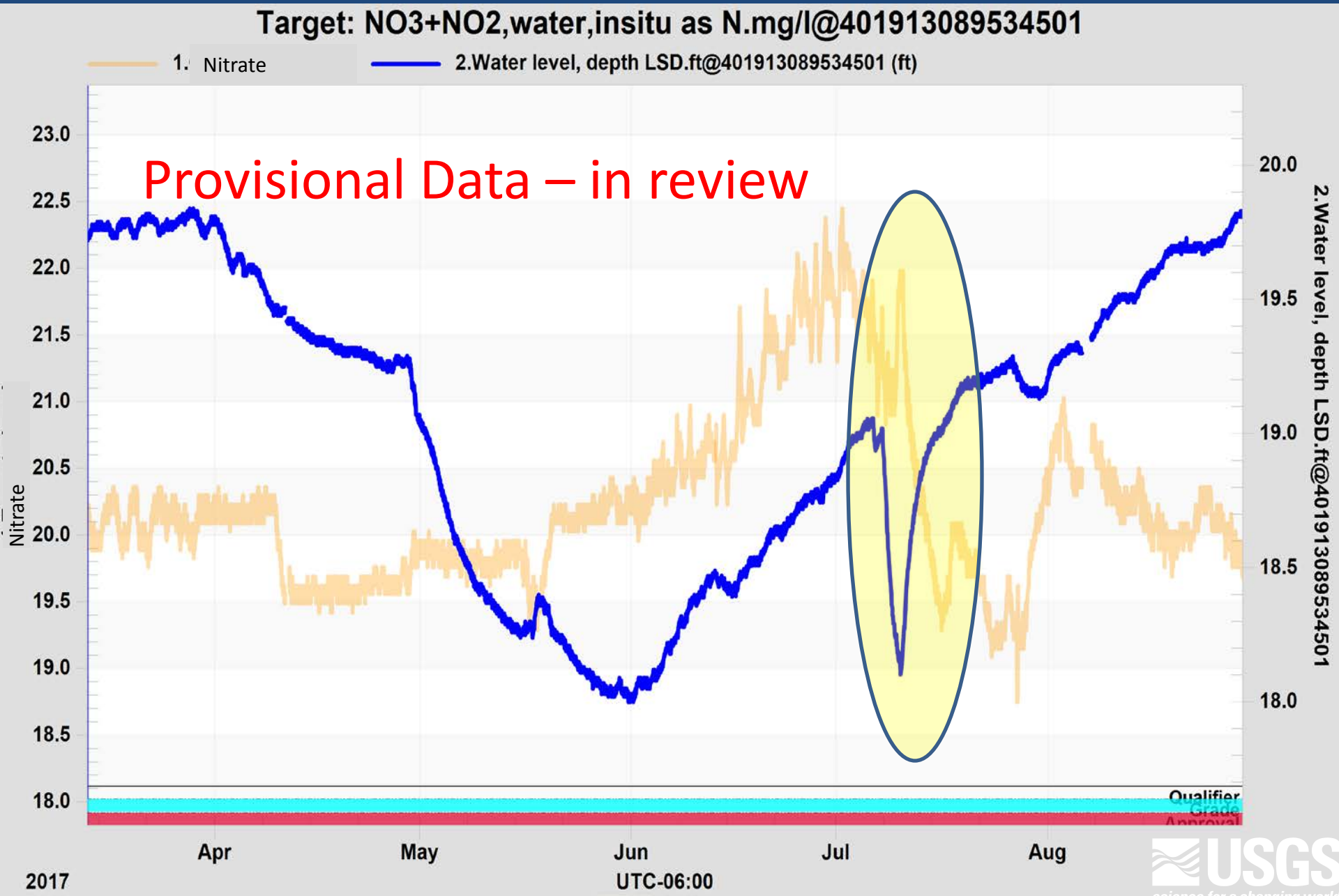
Preliminary Results

- Nitrate in groundwater ranging from 19-22 mg/L as N
- Nitrate in Quiver Creek ranging from ~ 1-5 mg/L, decreasing with monthly readings
- Nitrogen isotopes put source area as fertilizer and have low (2-4) isotope % ratios. Little denitrification (oxic conditions)

Depth to water and nitrate – March thru August



Depth to water and nitrate – March thru August



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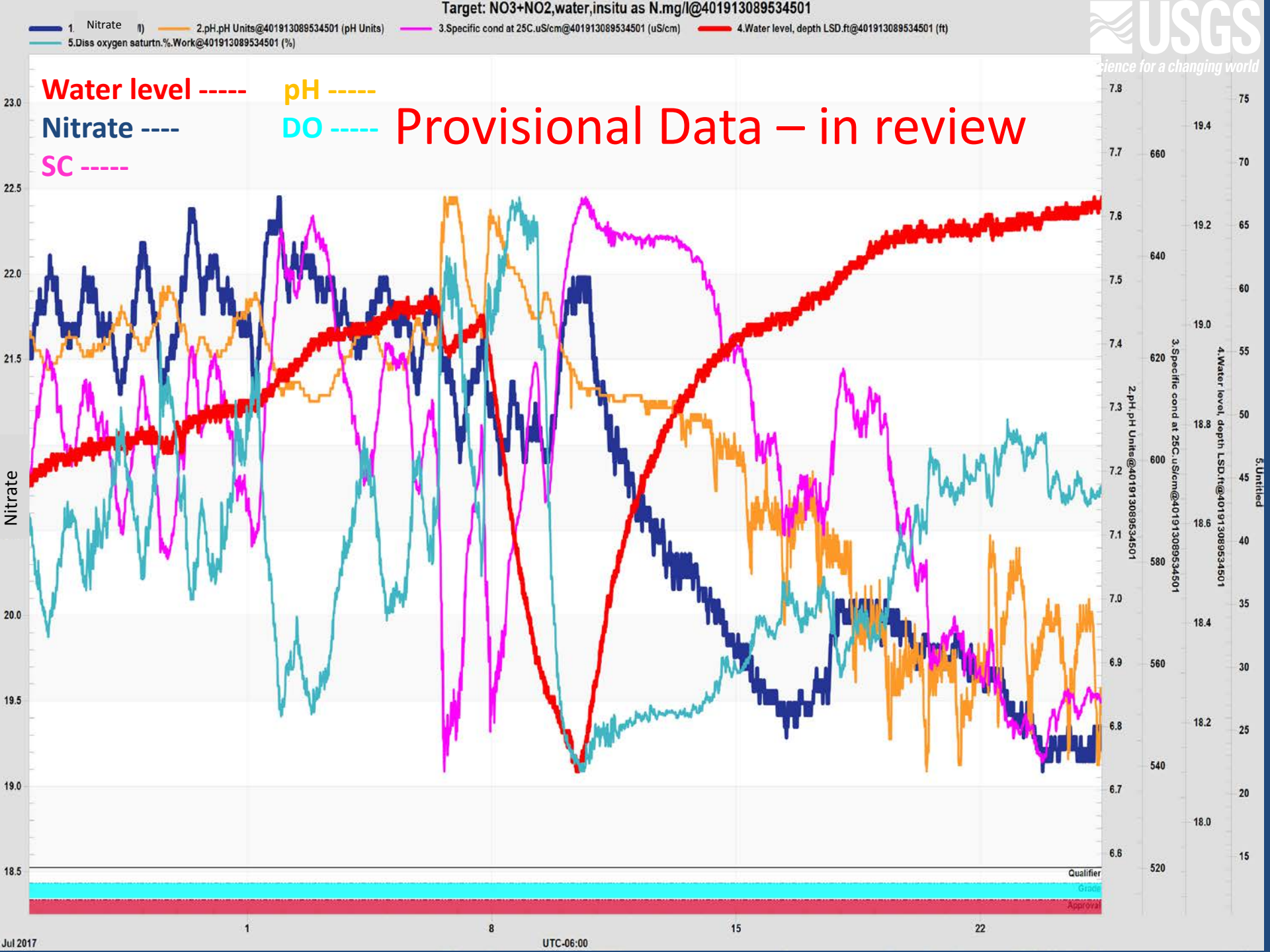
Target: NO3+NO2,water,insitu as N.mg/l@401913089534501
1. Nitrate
2.pH.pH Units@401913089534501 (pH Units)
3.Specific cond at 25C.uS/cm@401913089534501 (uS/cm)
4.Water level, depth LSD.ft@401913089534501 (ft)
5.Diss oxygen saturtn.%.Work@401913089534501 (%)
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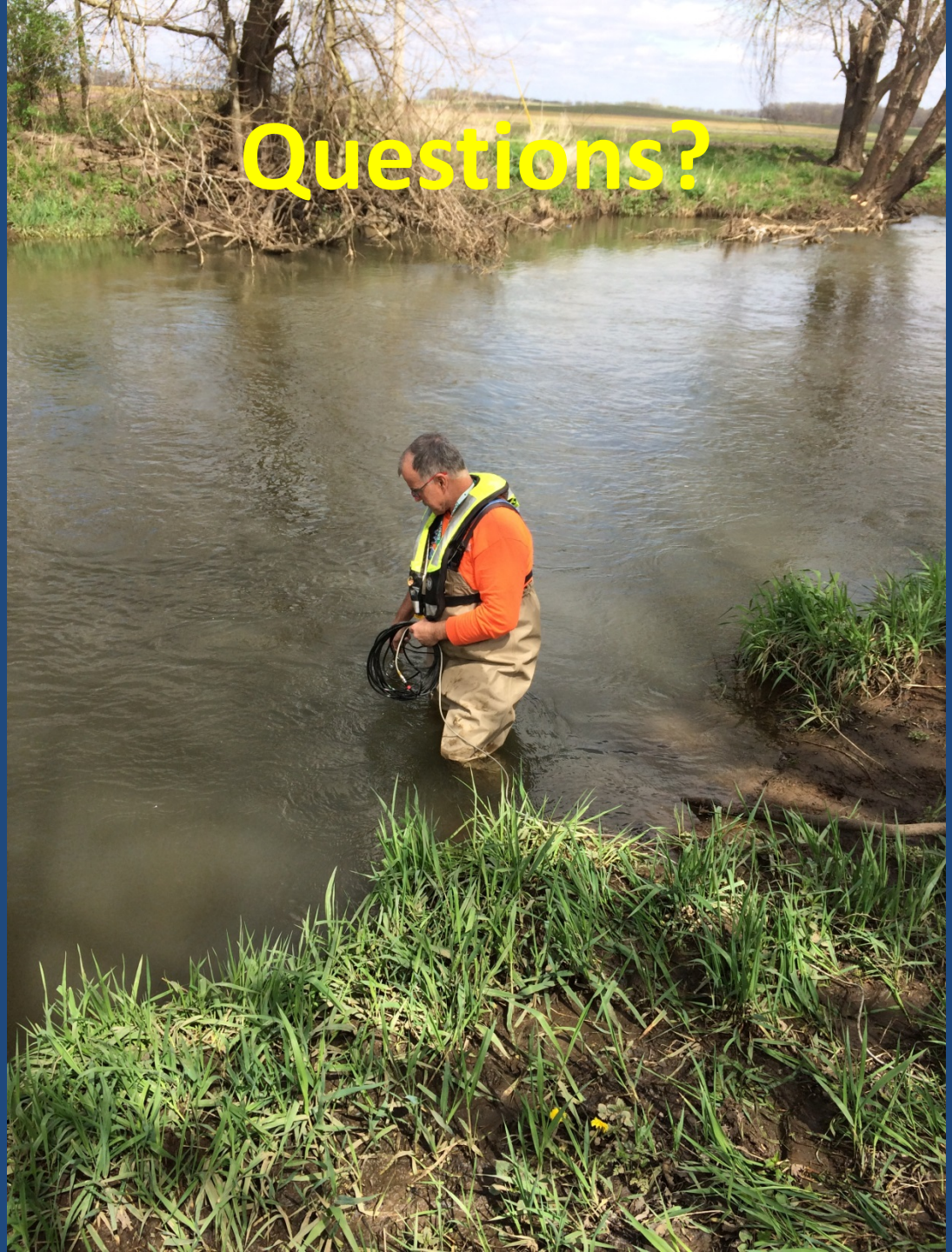
Water level -----
pH -----
Nitrate ----
DO -----
SC -----
Provisional Data – in review
Nitrate
2.pH.pH Units@401913089534501
3.Specific cond at 25C.uS/cm@401913089534501
4.Water level, depth LSD.ft@401913089534501
5.Untitled
Qualifier
Grade
Approval
Jul 2017
UTC-06:00

Preliminary Conclusions

- Nitrate is correlated with pH, SC, and DO
- Except when it's not…
- Possible factors affecting correlation
  - Nitrate application timing – current/residual
  - Nitrate in root zone or groundwater
  - Precipitation and/or irrigation

Full year of data needed to tease out possible causes/factors



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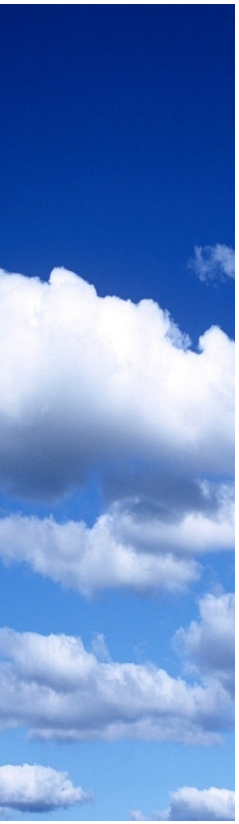


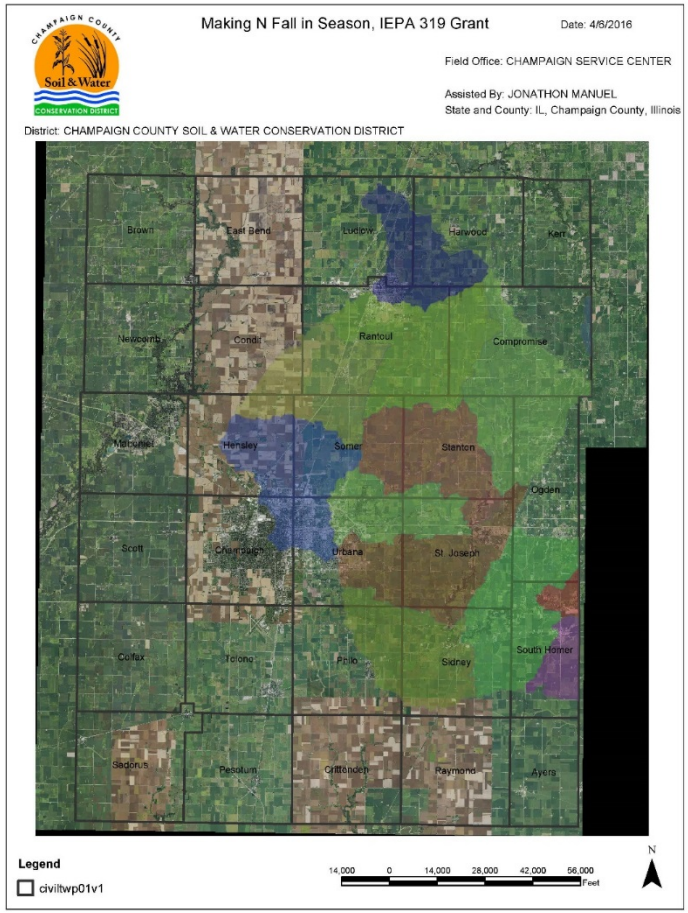
Implementing the Nutrient Loss Reduction Strategy in Champaign County

Presented to Nutrient monitoring Council (NMC)
September 6th, 2017

- A local unit of government established on April 12, 1943
- Led by a 5 member board of directors, elected by the landowners, and occupiers of Champaign County
- Operation Funds come from the Illinois Department of Agriculture, the Champaign County Board, Grants and our many partners
  - Mission:
    - Provide leadership and coordinate programs to help people conserve, improve, and sustain our natural resources

"Making the Nitrogen Fall In Season" 319 Grant

July 2015 the Illinois EPA awarded the Champaign County SWCD a 319 Grant to work on water quality in the Salt Fork Water Shed.



With the help of this grant we have been able to get 13 more side dress bars in the watershed. The bars allow the farmer to move nitrogen application from fall, in to the growing season. One bar has even been modified to variable rate the nitrogen application as it moves thru the field.

The grant has also assisted with cover crops and the completion of thousands of acres of nutrient management plans.

We have also been able to help with Strip-Till applications.

Is your field a STAR candidate?

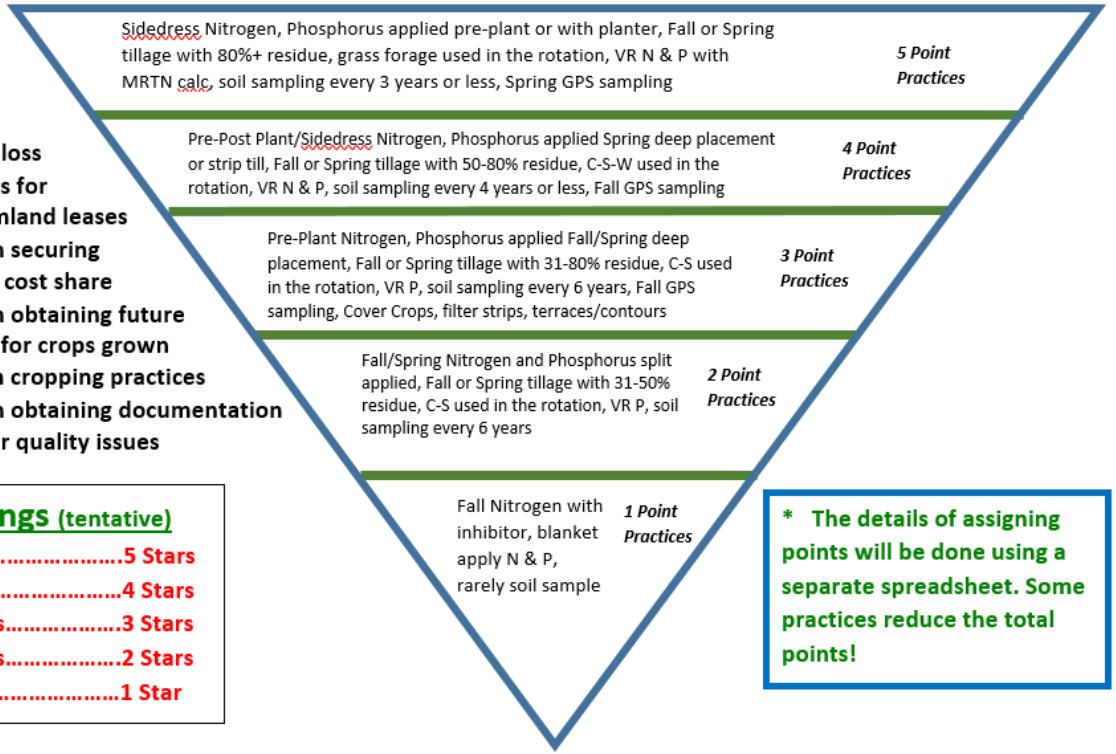
This program allows farmers to self-evaluate their conservation and nutrient loss management practices. For more info., contact info@ccswcd.com or call 217.352.3536 Ext. 3

SAVING TOMORROW'S AGRICULTURE RESOURCES (STAR)

The CCSWCD Stewardship Committee has developed a tool to assist farmer/operators to evaluate their own nutrient loss management practices and to promote best management practices on individual fields. The STAR (Saving Tomorrow's Agriculture Resources) evaluation system assigns points for each cropping, tillage, nutrient application and soil conservation activity used on individual fields. The total points will then be used in a scale to determine a rating of 1 to 5 Stars for each individual field based on the management practices. A farmer/operator may want to determine a total score for the entire farm operation.

Benefit

- **Increase net farm income**
- **Decrease nutrient loss**
- **Promote producers for potential new farmland leases**
- **Assist producers in securing local conservation cost share**
- **Assist producers in obtaining future market premiums for crops grown using conservation cropping practices**
- **Assist producers in obtaining documentation in support of water quality issues**



Field Ratings (tentative)

51-61 points……..5 Stars
40 -50 points……..4 Stars
28 – 39 points……..3 Stars
16 – 27 points……..2 Stars
0 – 15 points……..1 Star

*** The details of assigning points will be done using a separate spreadsheet. Some practices reduce the total points!**

Nutrient Loss Reduction Strategy Survey 2016

Fall Cover Crop Practice

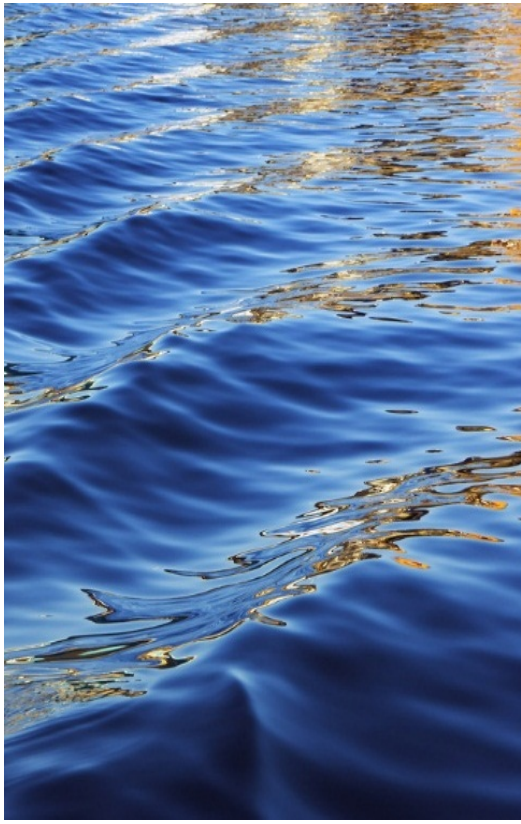
- ✓ 116 farmers and landowners responded to the survey representing 82,563 acres
- ✓ 41% of those surveyed indicated usage of no-till practices on corn and or soybeans
- ✓ 10% indicated strip-tillage was part of their tillage practices
- ✓ 34% indicated the usage of nitrogen applied as split pre-plant and in-season applications on corn
- ✓ 17% utilize side-dress only of nitrogen application on corn
- ✓ 58% apply phosphorus used variable rate technology (VRT)
- ✓ 30 farmers planted cover crops on 5,623 acres in Champaign County

The goal of this survey is to gather information concerning farming practices found in Champaign County Illinois. This survey will help in identifying best management practices in response to the Nutrient Loss Reduction Strategy plan from the Illinois Department of Agriculture and the Illinois Environmental Protection Agency.

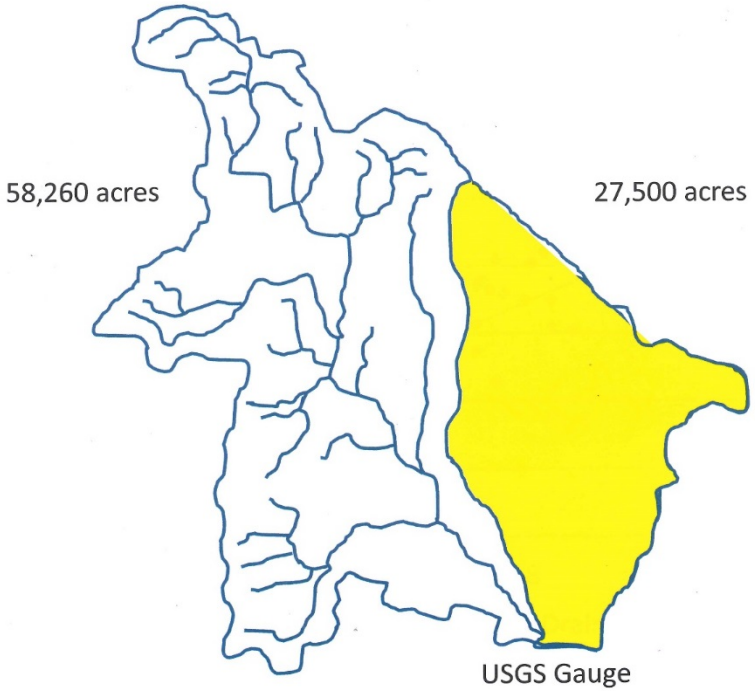
Nutrient Loss Reduction Strategy Survey 2017

- 246 farmers and landowners responded to the survey representing 185,557 acres
  - There is approximately 540,000 harvestable acres in Champaign County
- The raw data at the moment shows an increase in split applied Nitrogen
- The raw data also shows that the percentage of cover crops being used has decreased from 27% to only 12%

Thinking towards the future!!

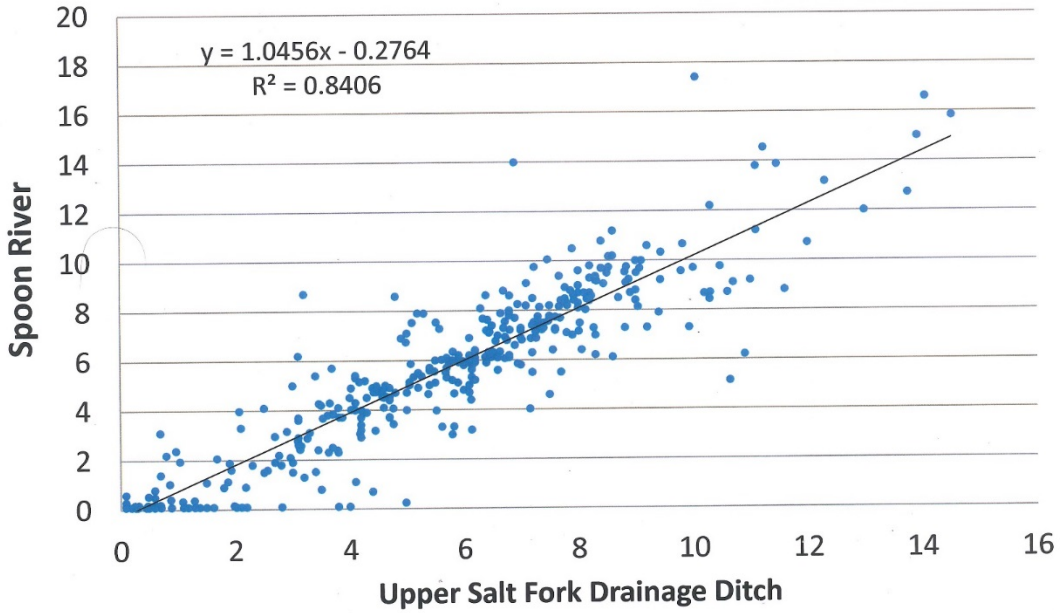


Upper Salt Fork Watershed at St. Joseph, IL



Regression of Stream Nitrate Concentration:

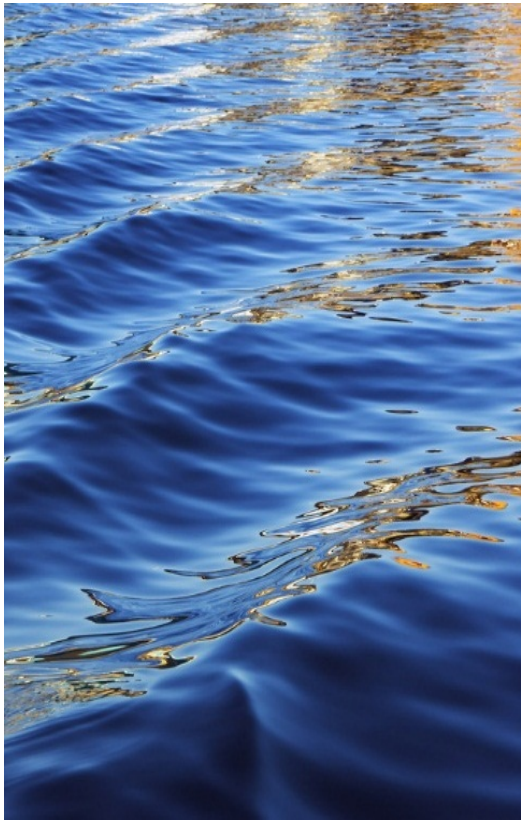
Spoon River vs. Salt Fork Ditch
(6 years of baseline data)



Can we get enough farmers to plant cereal rye after corn in the Spoon River watershed to show improvement in water quality??

13,000 acres of cereal rye!

Past Efforts



Past Efforts

- Filter Strip push when CRP first came out.
- Resulting in over 70% of Champaign Counties Streams being protected

Past Efforts

- 319 Grant, to bring Strip-Till Equipment into the County
- Results showed a saving in P application
- The Results also showed that the farmer has to own the Strip-Till unit for the system to really work.

Past Efforts

- American Farmland Trust
  - Cover Crop Program
  - Side Dress bar lease program

Questions?

Jonathon Manuel CPESC-IT

2110 W. Park Court, Suite C

Champaign, IL 61821

217/352-3536 Ext. 3

Jonathon.Manuel@il.nacdnet.net


Out to
LUNCH!

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USGS Super Gage Network Updates– IEPA and MWRDGC

Kelly Warner, USGS

- IEPA Super Gage Stations #1-8
  - Overall Operation
  - Phosphate Analyzer Issues and Interim Remedies
- MWRDGC Super Gage #9 (at Joliet)

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

Basins cover almost 75% of the land area in the State

Stream Name	Location	Station Drainage Area in Illinois only, in mi^2	Mean Nitrate-nitrite mg/l
Rock River	Joslin	3,973	3.6
Green River	Geneseo	1,000	4.1
Illinois River	Florence	22,651	4.3
Kaskaskia River	New Athens	5,189	0.89
Big Muddy River	Murphysboro	2,168	0.35
Vermilion River	Danville	1,199	6.9
Embarras River	Lawrenceville	2,348	4.6
Little Wabash River	Carmi	3,102	0.9

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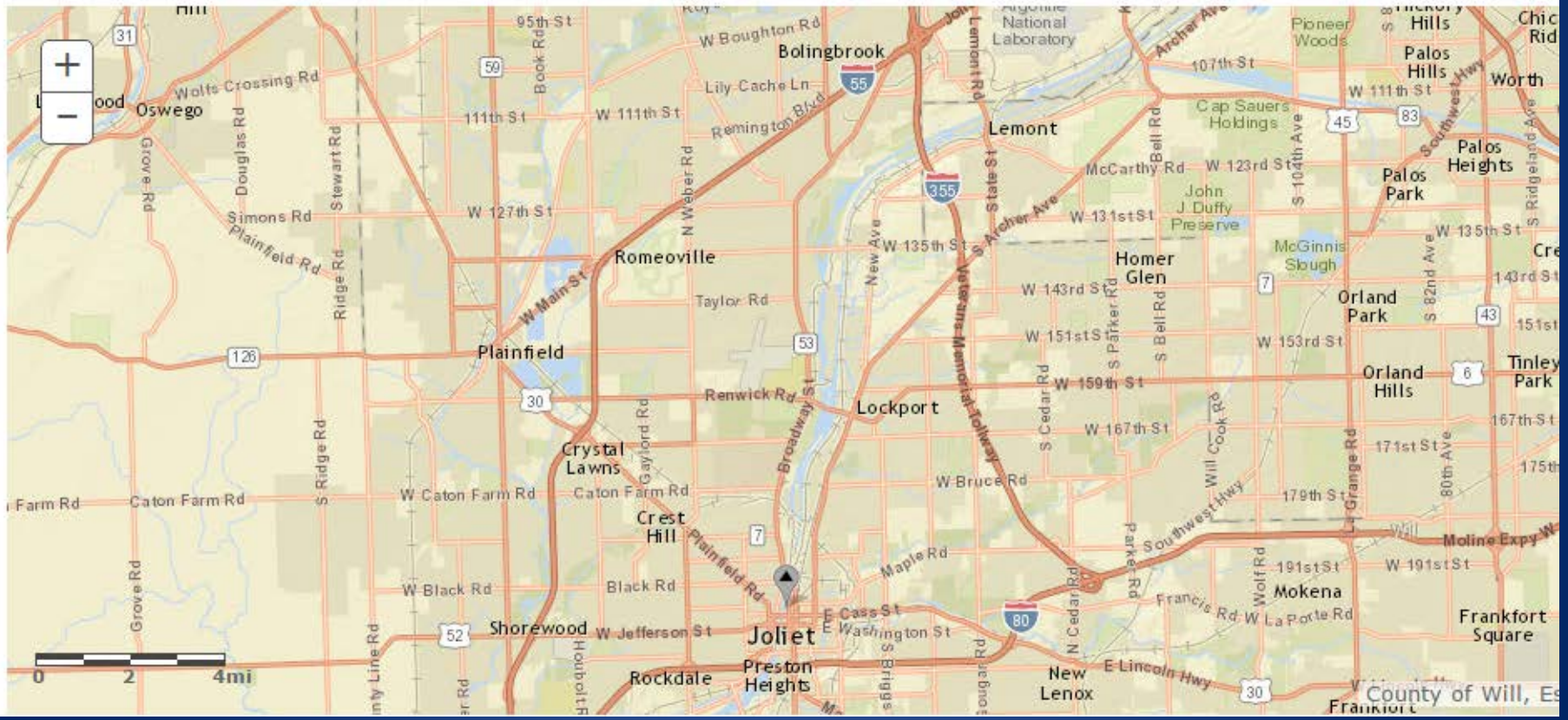
USGS 05537980 DES PLAINES RIVER AT ROUTE 53 AT JOLIET, IL

Available data for this site Location map

Will County, Illinois
Hydrologic Unit Code 07120004
Latitude 41°32'11", Longitude 88°04'57" NAD83
Drainage area 1,502 square miles
Gage datum 0.00 feet above NGVD29

Location of the site in Illinois



Settlement Agreement

- Environmental Orgs., MWRDGC, & Illinois EPA
- Continuous Monitoring at:
  - Joliet, Rte. 53, "Super Gage" on the Des Plaines River
    - *MWRD funded for D.O, Chlorophyll, and Nutrients*
  - Marseilles, Starved Rock, and Peoria Pools on the Illinois River
    - *Illinois EPA funded for D.O. and Chlorophyll*

SITENO	SITENAME	Drainage area	Begin date Nitrate	Begin Date Phosphate	Max Nitrate	Date	Max Phosphate	Date	Instantaneous High flow peak	Date	Instantaneous Low flow	Date
3339000	VERMILION RIVER NEAR DANVILLE, IL	1290	12/18/2014	12/13/2014	25.1	5/29/2017	0.562	4/1/15	37600	12/29/15	62	8/16/17
5446500	ROCK RIVER NEAR JOSLIN, IL	9549	6/26/2015	6/26/2015	14.5	7/22/2017	0.200	6/27/15	43800	7/25/17	3060	8/28/15
5447500	GREEN RIVER NEAR GENESEO, IL	1003	6/26/2015	8/21/2015	13.7	5/15/2016	0.356*	8/16/16	8030	8/30/16	180	9/7/15
5586300	ILLINOIS RIVER AT FLORENCE, IL	26870	6/2/2012	4/26/2013	8.53	4/16/2013	0.724	3/17/15	110000	7/2/15	2860	10/12/12
3346500	EMBARRAS RIVER AT LAWRENCEVILLE, IL	2333	9/11/2015	11/5/2015	14.1	6/10/2016	0.777	10/22/16	37600	5/8/17	55	10/26/15
3381495	LITTLE WABASH RIVER NEAR CARMI, IL	3088	9/12/2015	4/30/2016	5.7	6/24/2017	0.612	9/6/16	31700	5/8/17	28	10/22/15
5595000	KASKASKIA RIVER AT NEW ATHENS, IL	5189	9/22/2015	11/9/2015	5.3	2/24/2016	0.617	11/6/16	49400	1/1/16	1170	8/13/17
5599490	BIG MUDDY RIVER AT MURPHYSBORO, IL	2159	10/22/2015	10/23/2015	4.79	12/27/2015	0.378	11/18/15	25800	5/4/17	-79.8	11/16/16

NUTRIENT AND SEDIMENT EXPORT FROM ILLINOIS–QUANTIFICATION THROUGH A CONTINUOUS LOADINGS NETWORK TO SUPPORT THE ILLINOIS STATEWIDE NUTRIENT LOSS REDUCTION STRATEGY; PROVISIONAL RESULTS

Preliminary Results After Approximately One Year of Monitoring

Paul Terrio,
U.S. Geological Survey

September 6, 2017

USGS

SUMMARY REPORT SUBMITTED TO ILLINOIS EPA MARCH 2017

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Nutrient and Sediment Export from Illinois–Quantification through a Continuous Loadings Network (PROVISIONAL RESULTS)

3

Prepared for
Illinois Environmental Protection Agency

by
U.S. Geological Survey
Illinois-Iowa Water Science Center
405 North Goodwin Avenue
Urbana, Illinois 61801
(217) 328-8747

PROVISIONAL RESULTS, SUBJECT TO REVISION revised 8/31/2017

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ILLINOIS NUTRIENT MONITORING STATIONS

Stream name	Station drainage area in Illinois, only, in mi^2	Percent of Station Drainage Area in Illinois	Percent of Illinois covered by Station Drainage Area
Big Muddy River at Murphysboro	2,168	100	3.8
Embarras River at Lawrenceville	2,348	100	4.2
Green River near Geneseo[1]	1,000	100	1.8
Illinois River at Florence/Valley City[2]	22,651	84	40.2
Kaskaskia River at New Athens	5,189	100	9.2
Little Wabash River (Main St) at Carmi[3]	3,102	100	5.5
Rock River near Joslin	3,973	42	7.1
Vermilion River near Danville	1,199	93	2.1

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METHODOLOGY

- **Continuous data collection:**
  - ✓ Nitrate concentration (NO_3)
  - ✓ Orthophosphorus concentration (PO_4)
  - ✓ Turbidity concentration
  - ✓ Stream discharge
  - ✓ Physiochemical parameters

- **Regression equation modeling using above data to determine:**
  - Total phosphorus concentration (TP)* = 0.0575 + 0.9668 (PO_4) concentration + 0.0011 (turbidity)
  - Suspended sediment concentration* = 0.8531 (turbidity) concentration

- **Nutrient Load Calculations:**
  - Nitrate Load = NO_3 concentration x Discharge x Unit conversion
  - TP Load = Modeled TP concentration x Discharge x Unit conversion

- * *Example equations only*

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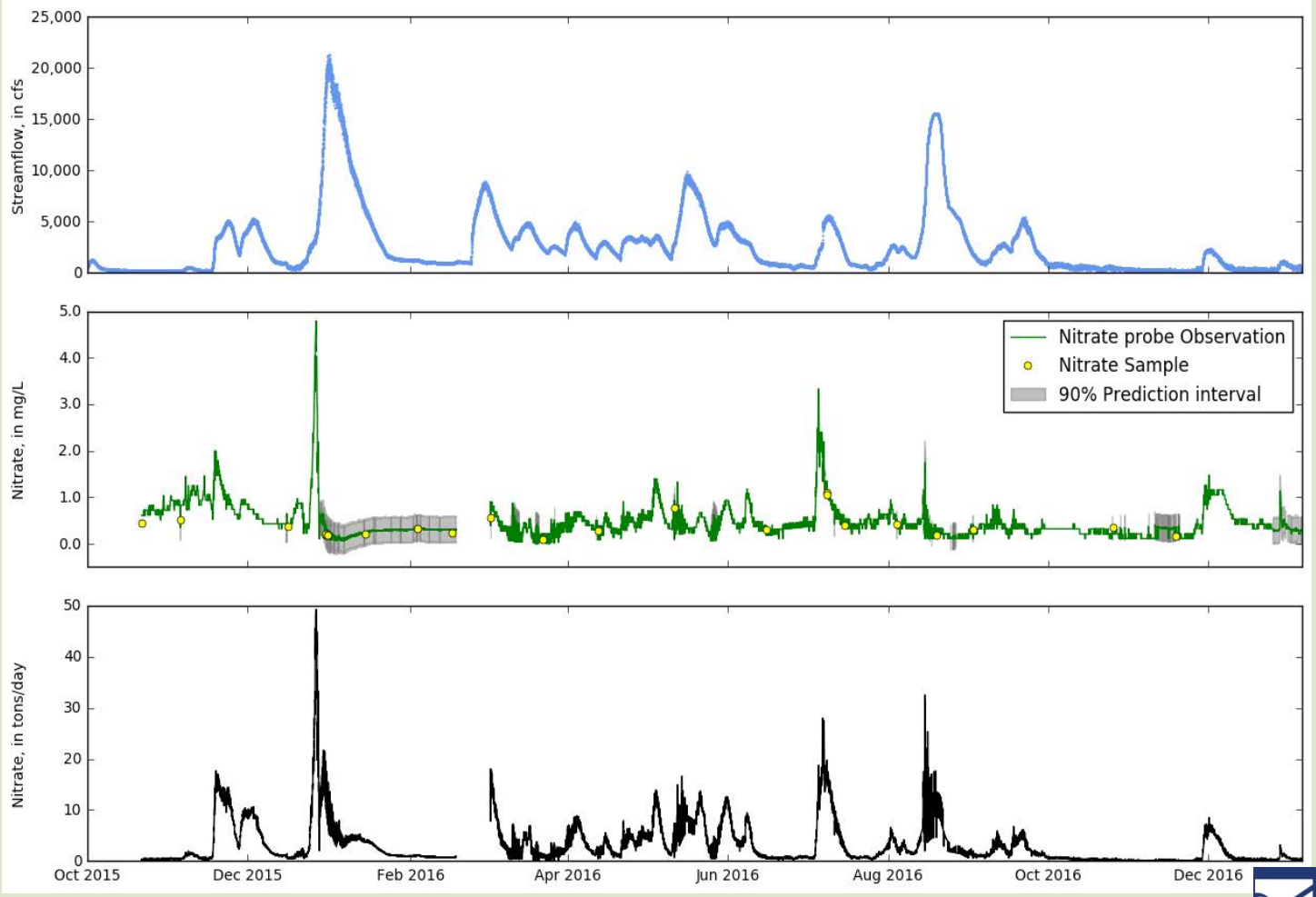
BIG MUDDY RIVER AT MURPHYSBORO, IL (05599490)

Nitrate



BIG MUDDY RIVER AT MURPHYSBORO, IL (05599490)

Total Phosphorus

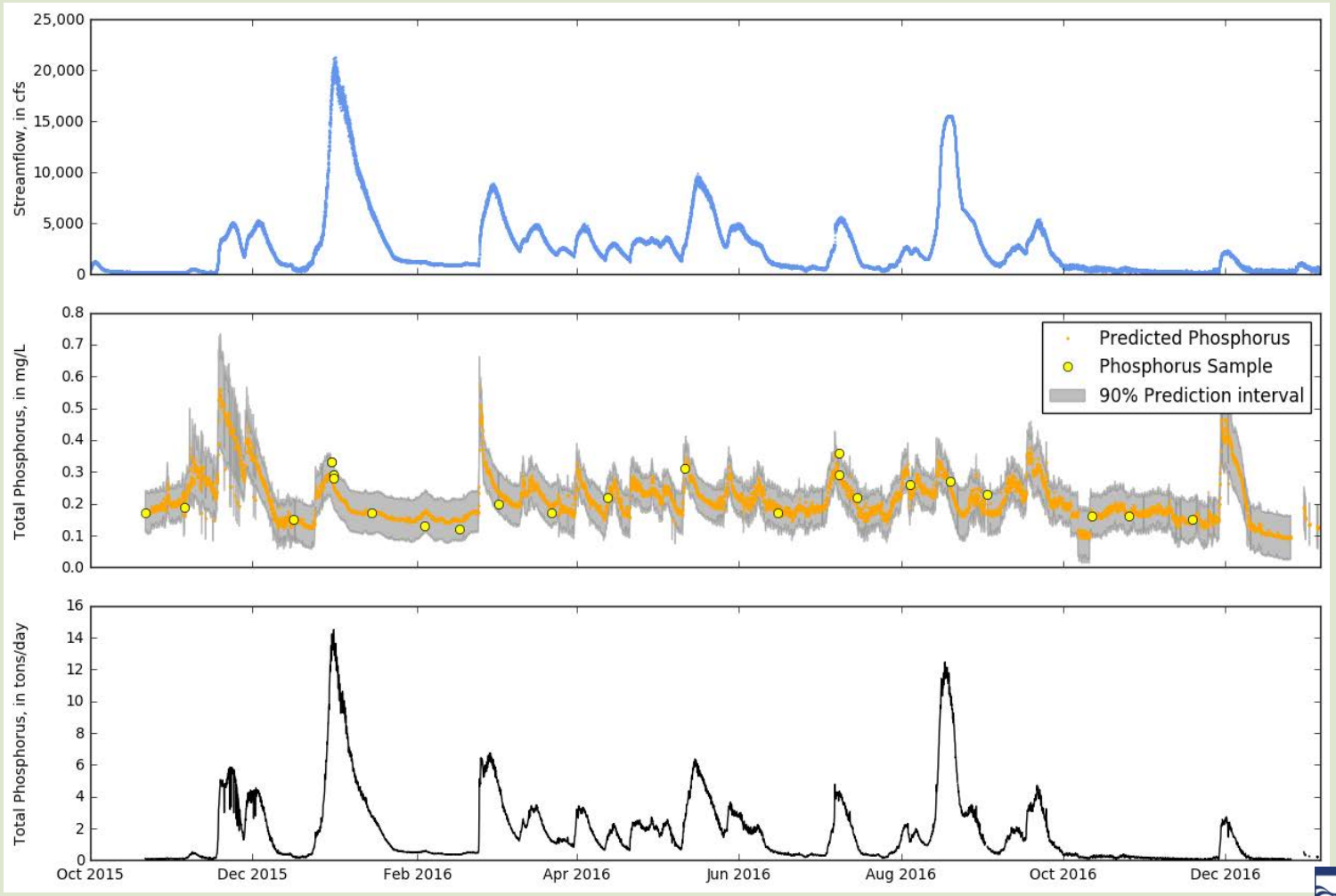


Table 2. Provisional annual load for nitrate, total phosphorus, and suspended sediment for each site that the data and (or) regression equations were provisionally adequate.

These loads will change as more data becomes available and the regression equations are refined.

	Nitrate		Total Phosphorus		Suspended Sediment	
Stream name	Annual load (lb)	Annual yield (lb/acre)	Annual load (lb)	Annual yield (lb/acre)	Annual load (ton)	Annual yield (ton/acre)
Illinois River at Florence/Valley City	215,220,950	12.5	21,020,287	1.2	4,340,965	0.3
Embarras River at Lawrenceville	17,427,920	11.7	1,961,336	1.3	809,448	0.5
Big Muddy River at Murphysboro	2,339,032	1.7	1,310,602	0.9	279,837	0.2
Green River near Geneseo	11,614,829	18.1	338,962	0.5	162,462	0.3
Rock River near Joslin	83,426,545	13.7	TBD	TBD	TBD	TBD
Little Wabash River (Main St) at Carmi	TBD	TBD	2,571,015	1.3	730,403	0.4
Kaskaskia River at New Athens	12,957,382	3.9	TBD	TBD	758,746	0.2
Vermilion River near Danville	TBD	TBD	TBD	TBD	TBD	TBD

Indicates highest yield

Indicates lowest yield

USGS

NOTES

- Vermilion River at Danville, IL
  - Problematic due to infrastructure constraints, sand and silt, and phosphorus concentrations
  - Gage has been rebuilt as a pumping system (Summer 2017)
  - Plans to install a different orthophosphorus analyzer (October 2017)

ACTIONS AND PLANS

- Additional data required to develop regression models
- Emphasis put on high-flow / high-turbidity events (to define the upper end of the regression equation for total phosphorus)
- Phosphate analyzers have proven to be problematic.
  - ✓Water body characteristics (turbidity, phosphorus concentrations)
  - ✓Instrument performance (staining, microfluidics, filters, materials)
  - ✓Manufacturer support - continuing effort
    - Ongoing conversations
    - Letter of problem acknowledgments to customers (continuing)
  - ✓USGS remains committed to the effort
    - Working with the manufacturer and examining other options
    - Collecting manual samples in effort to maintain data record

USGS

PRELIMINARY SUMMARY

- Initial loading regressions equations developed (by and large).
- Continuous data largely agree with laboratory analyses, or exhibit generally consistent offsets.
- Even initial data is beginning to provide insight into seasonality and flow-related transport of nutrients.

USGS

Monitoring of Nitrate-N Loads in the Illinois River at Valley City and Florence

How do Different Estimation Methods Compare?

Greg McIsaac, U of I

USGS Monitoring of Nitrate-N Load in the Illinois River at Valley City and Florence, IL
How do different methods compare?

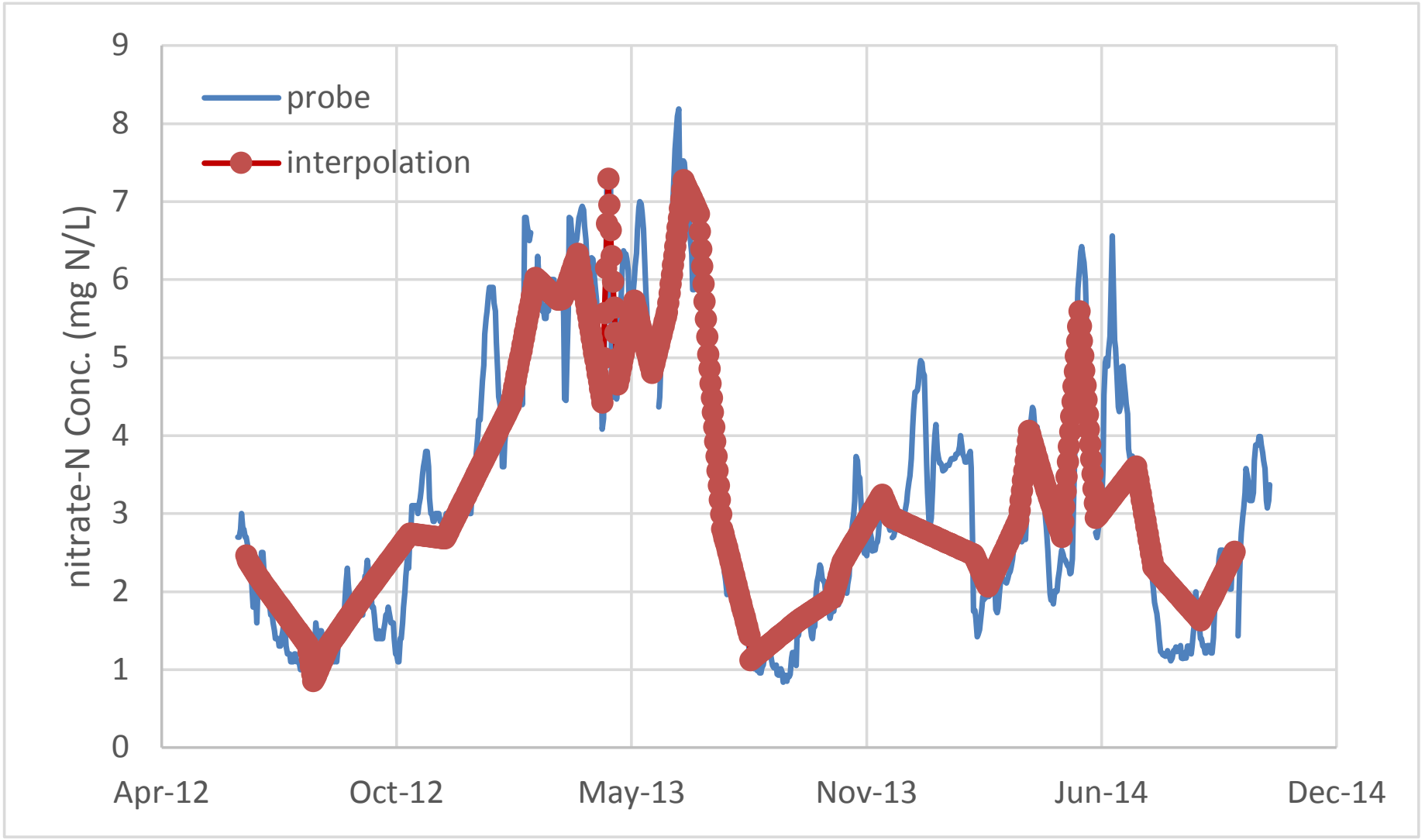
Linear Interpolation of Nitrate Concentration between Sampling events
Continuous Ultraviolet in stream probe
USGS LoadEst Adjusted Maximum Likelihood Estimation (AMLE)
5 year average vs 17 year average loads

Valley City
Discharge measured since 1939
Width and depth integrated water samples collected about 12 times per year 1975-2012
NLRS Load estimates for the 1980-96 baseline period were based on linear interpolation of concentrations
USGS Reports annual and monthly loads estimated with LoadEst AMLE
http://toxics.usgs.gov/hypoxia/mississippi/flux_ests/sub_basins/ILL-VALL.html

Florence (about 5 miles downstream from Valley City)
Discharge not measured
Width and depth water samples collected about 17 times per year since summer 2012, but still identified as Valley City
Nitrate concentrations also measured in situ every 15 minutes when probe is functional
Additional point water samples collected to assess accuracy of the probe

Daily Load estimates in this presentation are based daily average concentration at Florence and daily flow at Valley City
Monthly and annual load estimates based on probe measured concentrations include interpolation to fill gaps

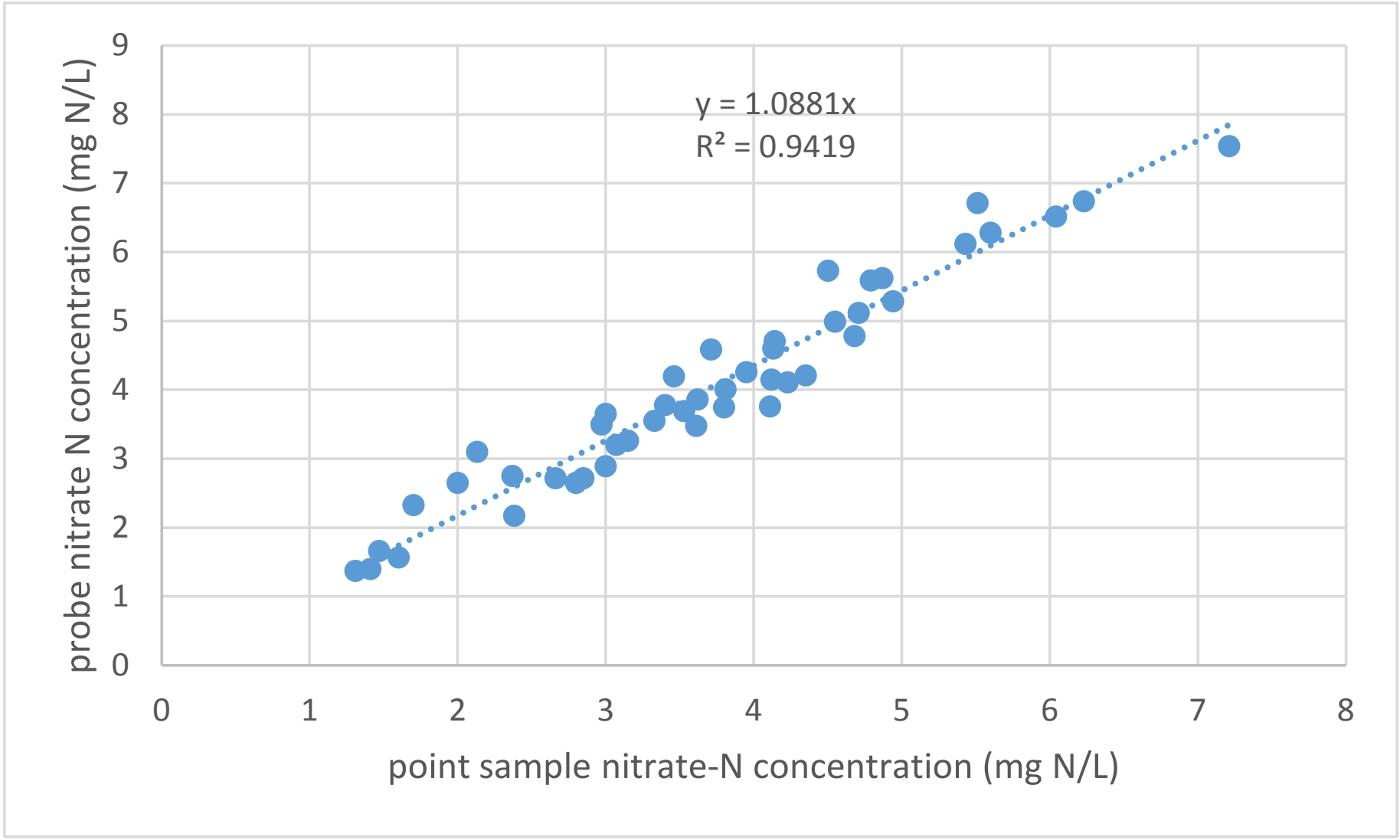
Daily Nitrate-N concentrations at Florence (probe) and interpolated values at Valley City



Nitrate-N concentrations at Florence 2012-2017

Probe measured concentrations averaged 8.9% larger than point sample (sample method code 82398=50)

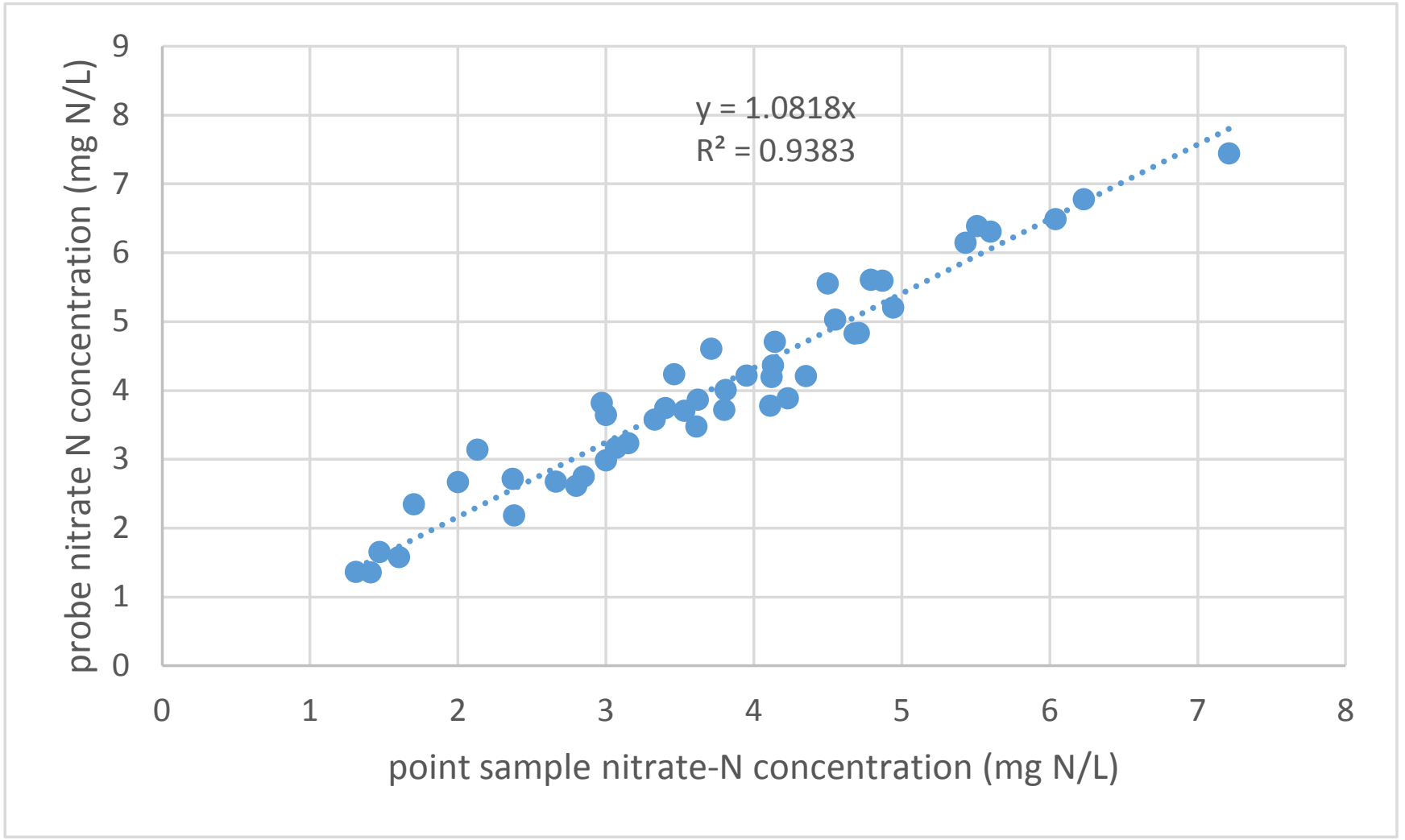
15 minute probe data matched to within 10 minutes of point sampling time



Nitrate concentrations at Florence 2012-2017

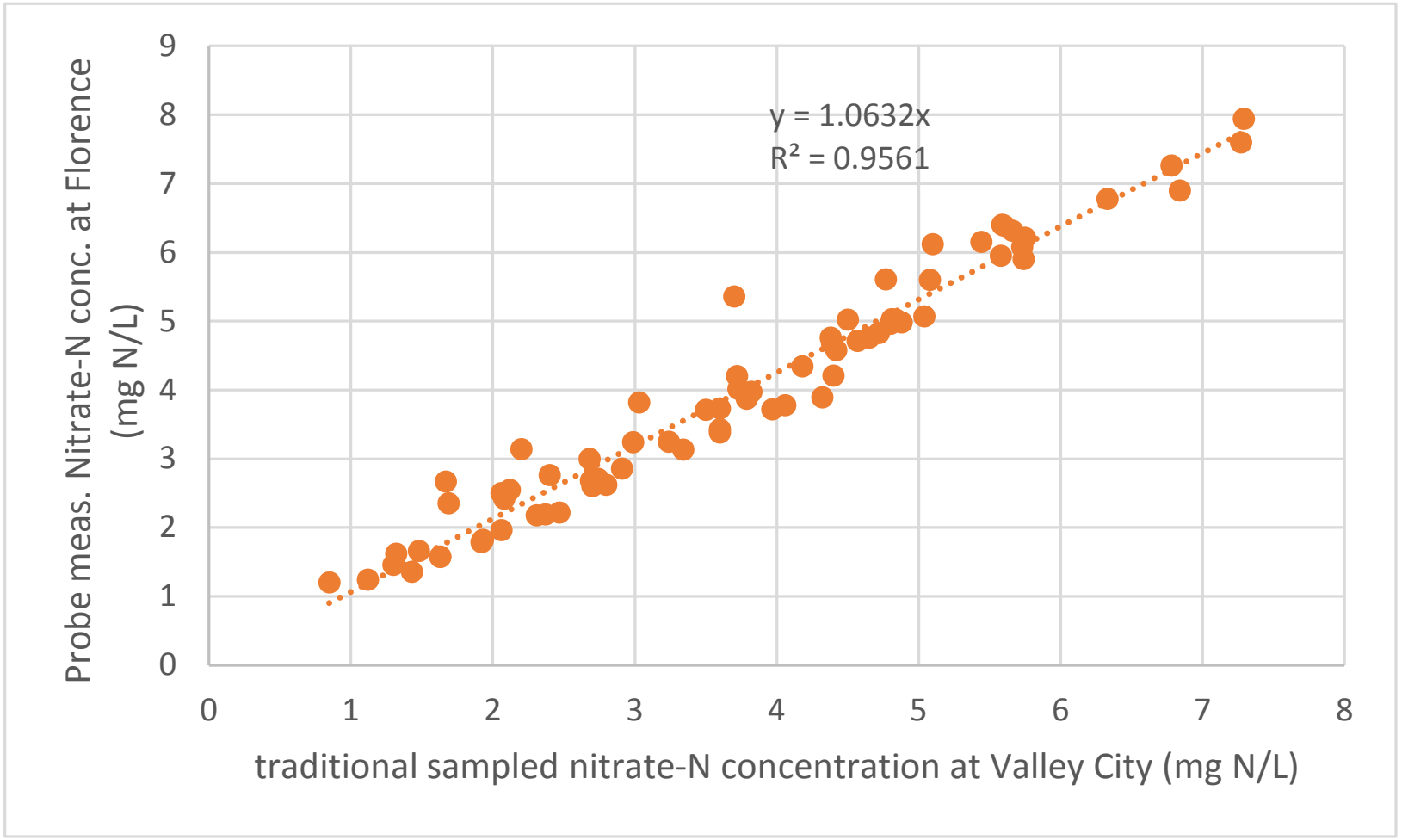
Probe measured concentrations averaged 8.2% larger than traditional sampling method

Daily average probe concentration matched to traditional sampling day

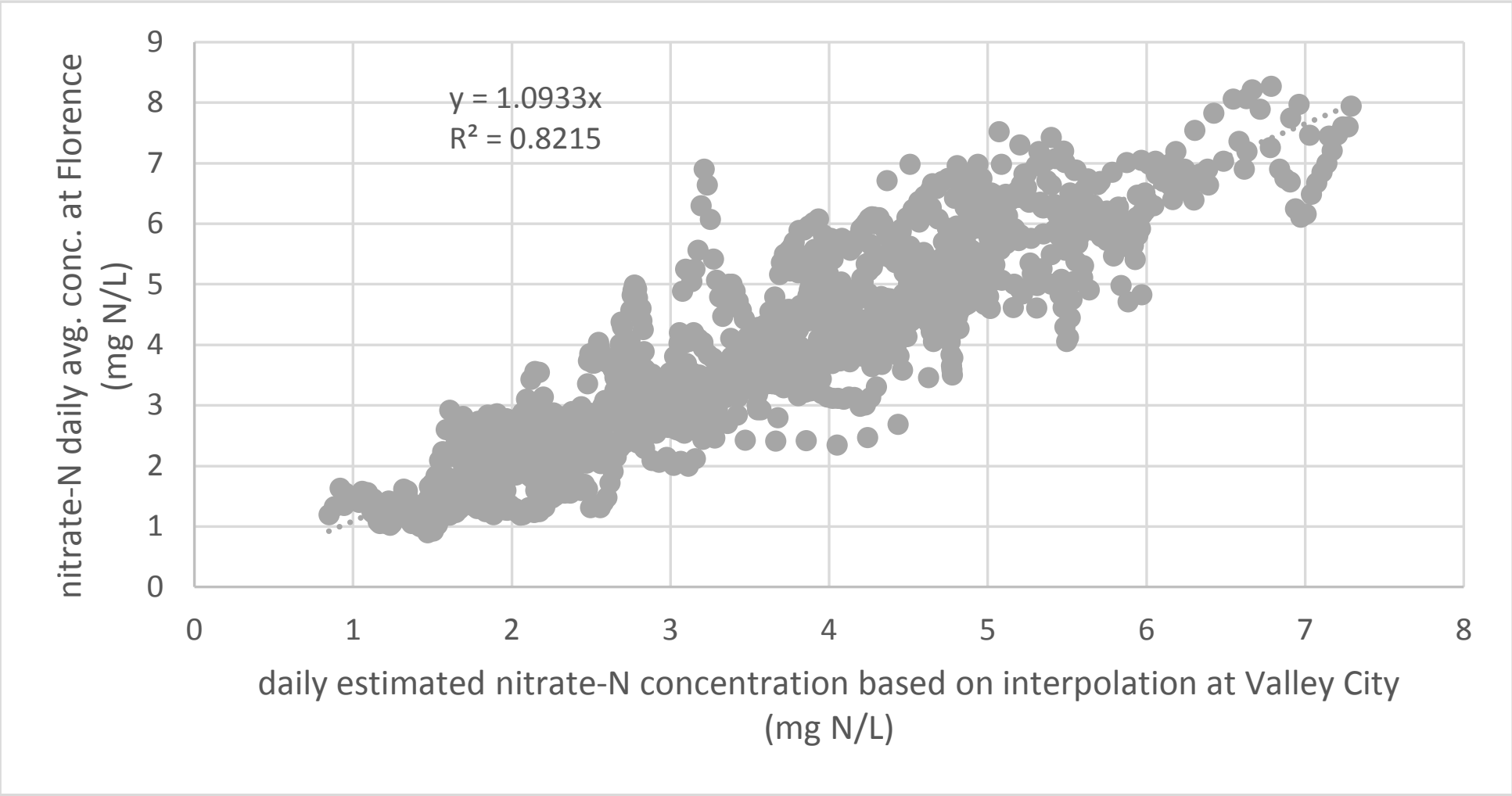


Are differences due to mis-calibration of the probe?

Probe measured Nitrate-N concentrations at Florence and
Compared to width and depth integrated sampling at “Valley City” 2012-2017
Probe measured concentrations averaged 6.3% larger than traditional sampling method
Daily average probe concentration matched to sampling date

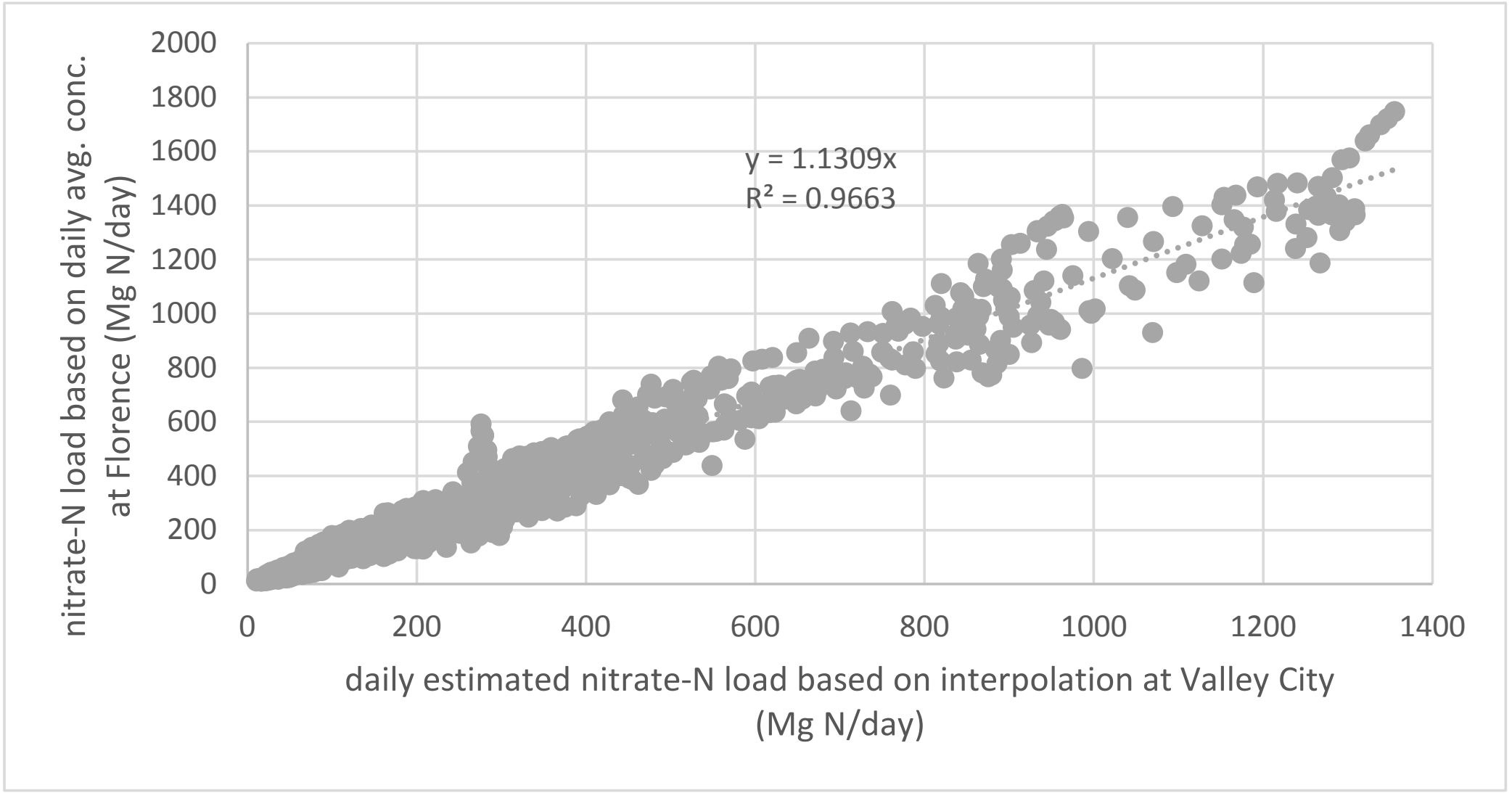


Daily average probe measured concentration at Florence (vertical axis) vs. daily interpolated concentrations at “Valley City” 2012-2017



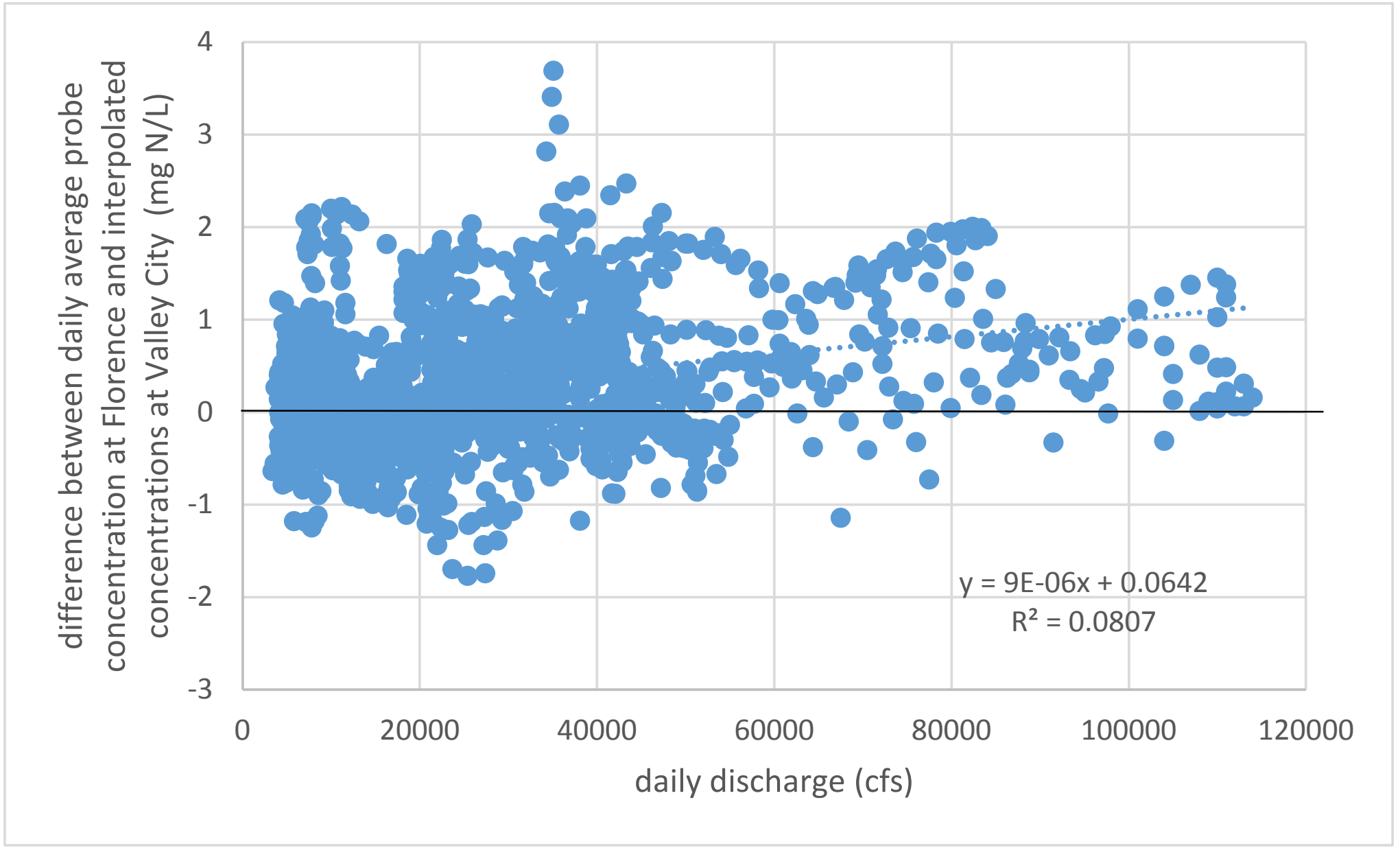
Monthly sampling at Valley City misses some peak concentrations resulting in reduced interpolated concentration and load estimates.

Daily nitrate-N loads calculated from daily average probe measured concentrations at Florence (vertical axis) vs. loads calculated from interpolated concentrations of traditional sampling at “Valley City” (horizontal axis)

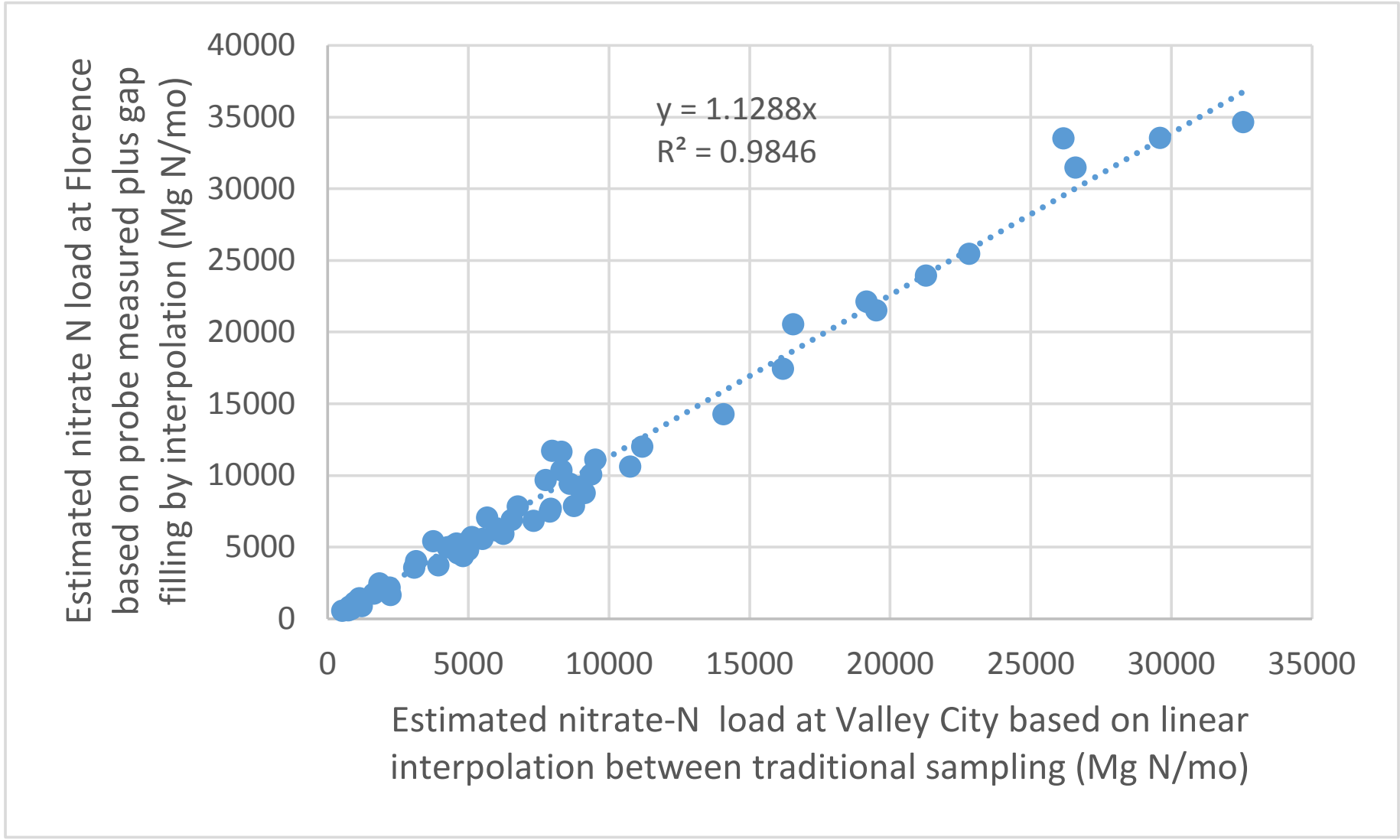


(No gap filling for Florence probe)

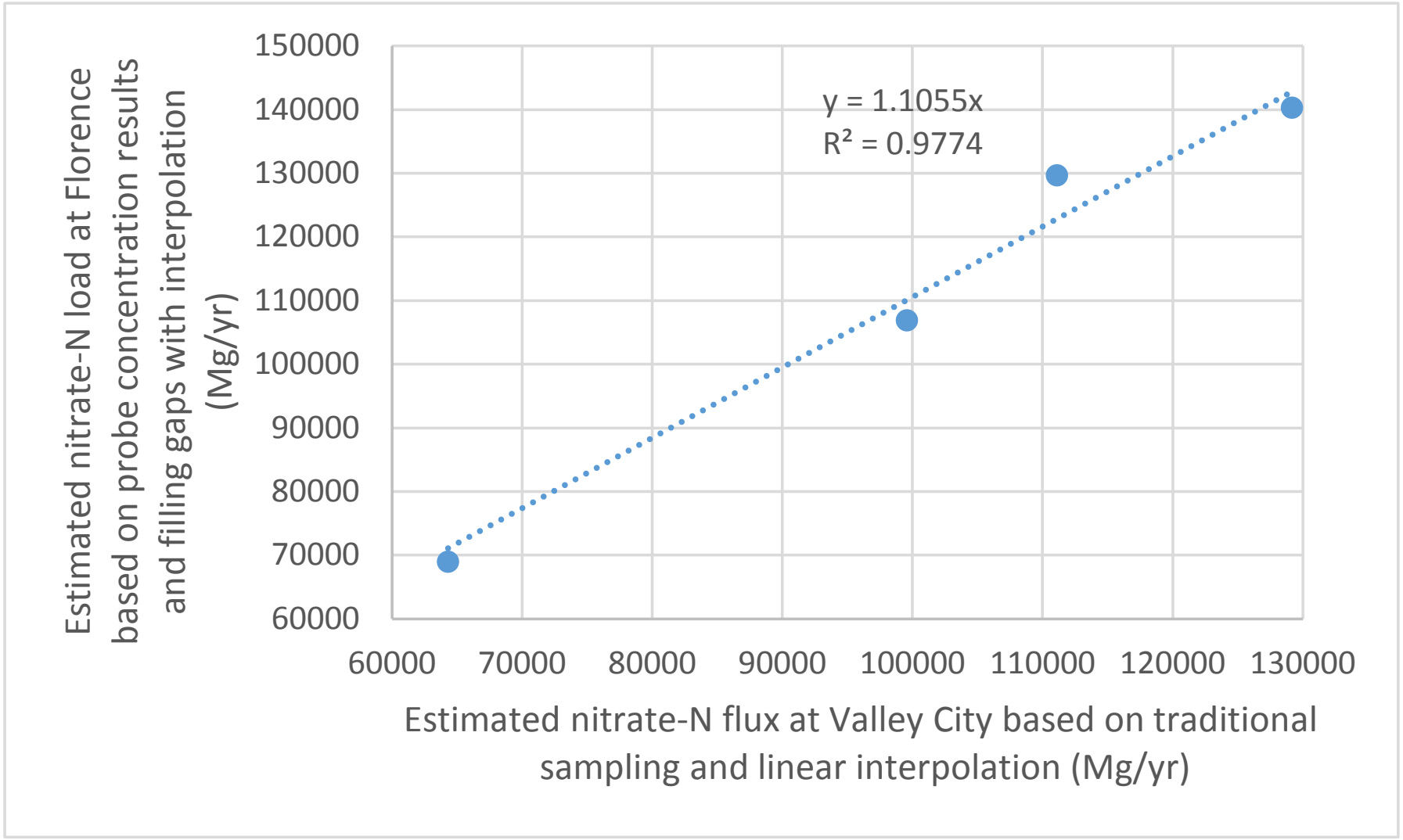
Difference between probe measured daily concentration and daily concentration estimated by interpolation plotted as a function of daily discharge.



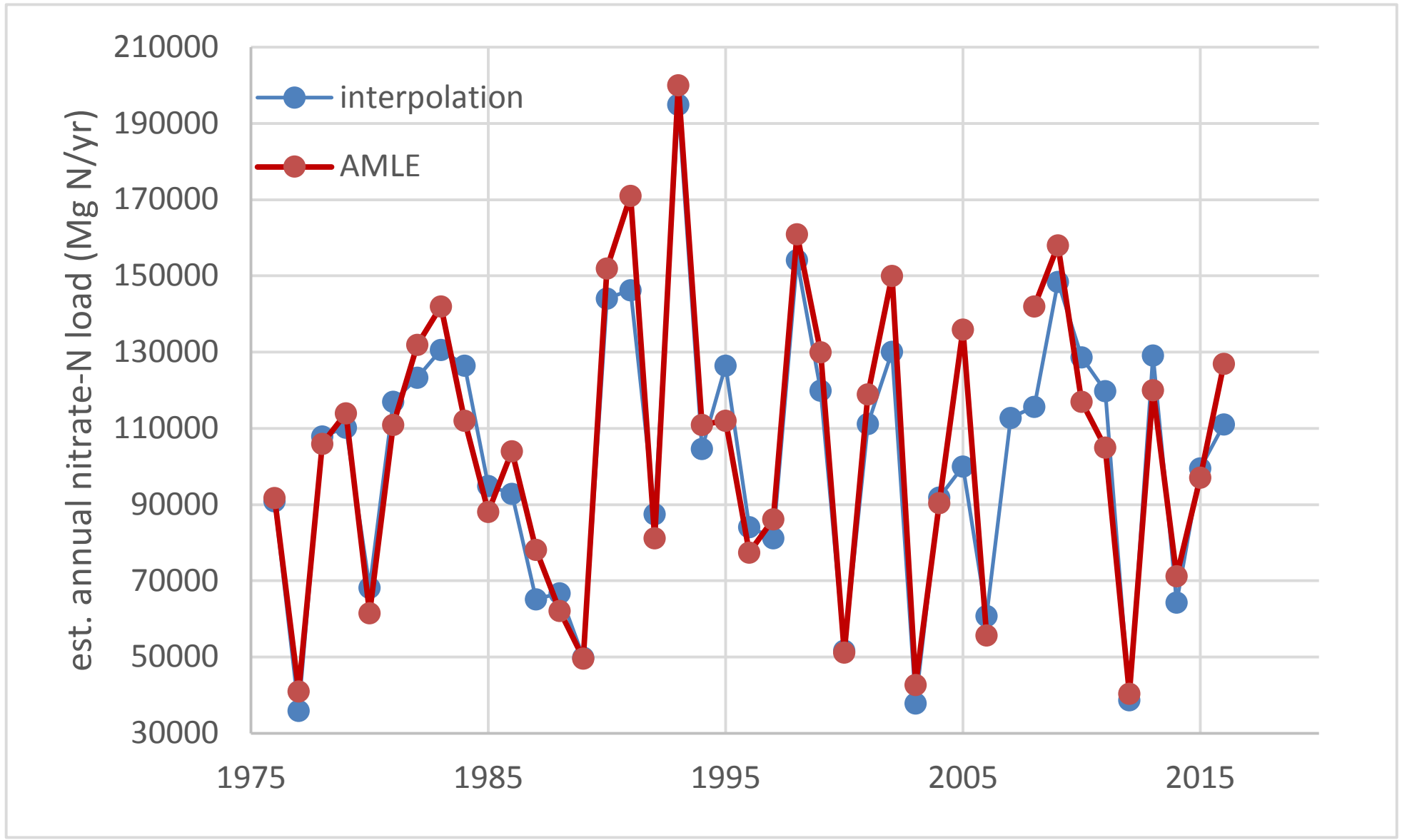
Monthly loads calculated from Florence probe plus gap filling (vertical) vs "Valley City" width and depth integrated sampling methods and linear interpolation (horizontal) July 2012 to May 2017



Estimated annual nitrate-N loads at “Valley City” and Florence 2013-2016



Estimated annual nitrate-N load at Valley City by linear interpolation of concentrations (blue) and by LoadEst Adjusted Maximum Likelihood Estimator (AMLE) (red)



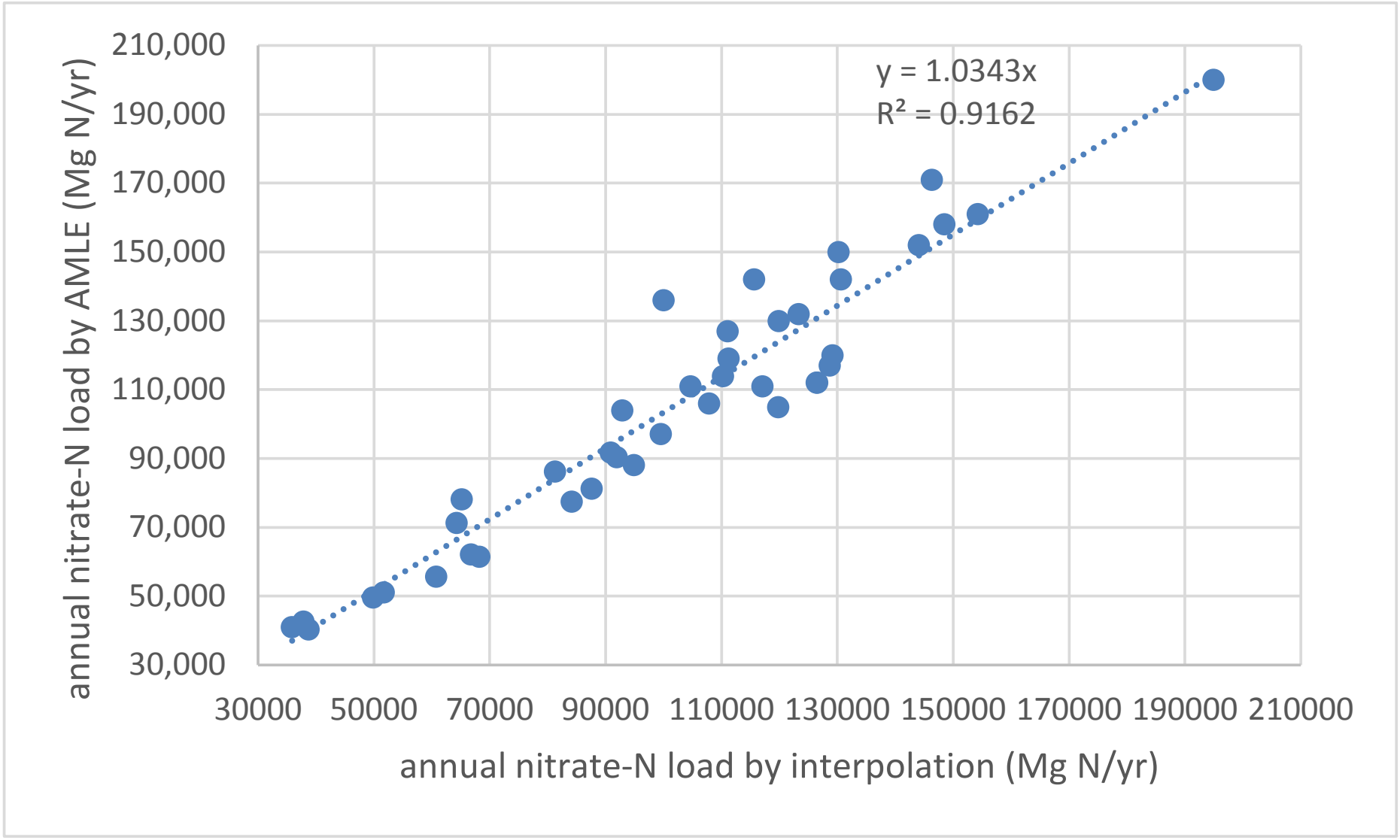
Interpolation
2012-16 avg
17% reduction

2000-2016 avg
10% reduction

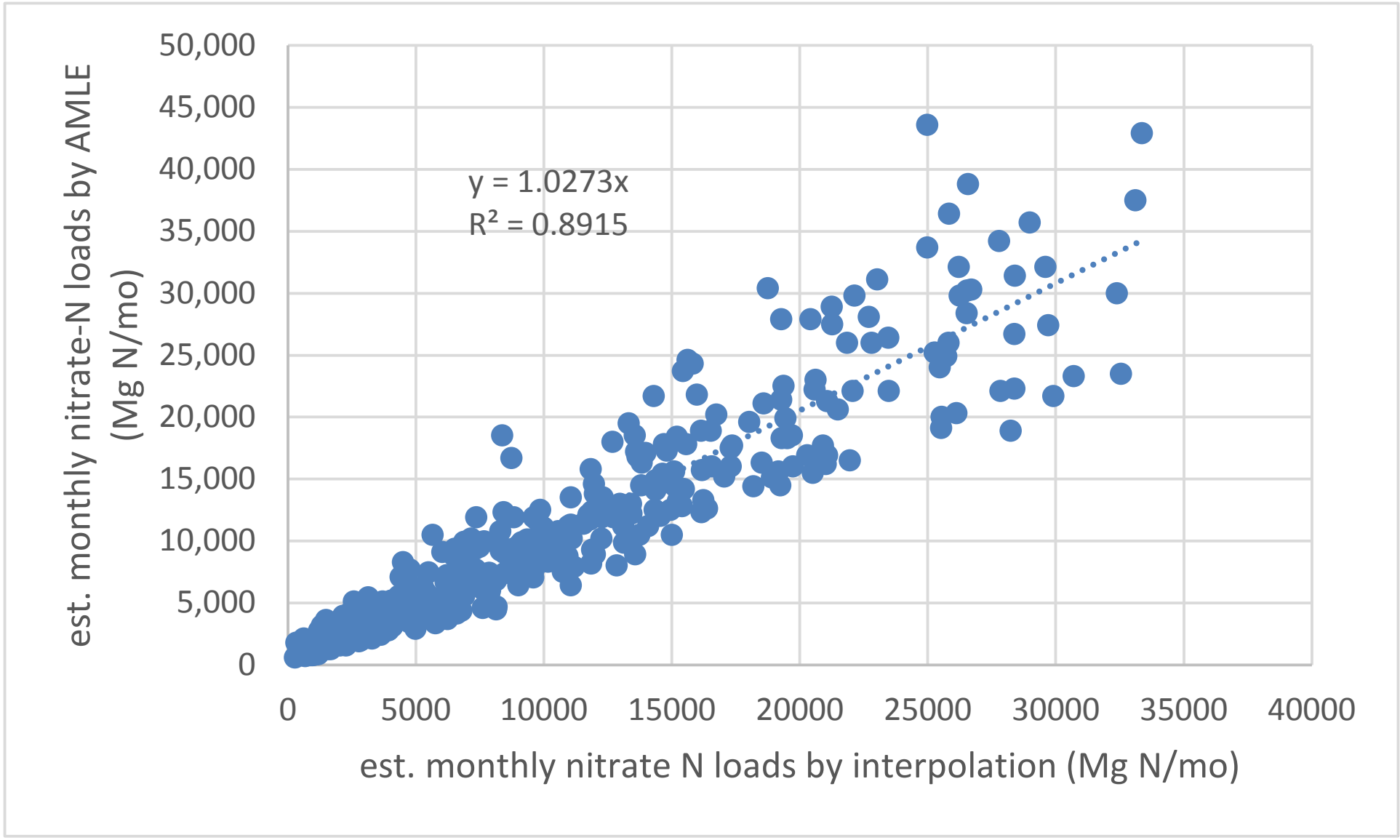
AMLE
2012-16 avg
16% reduction

2000-2017 avg
6.6% reduction

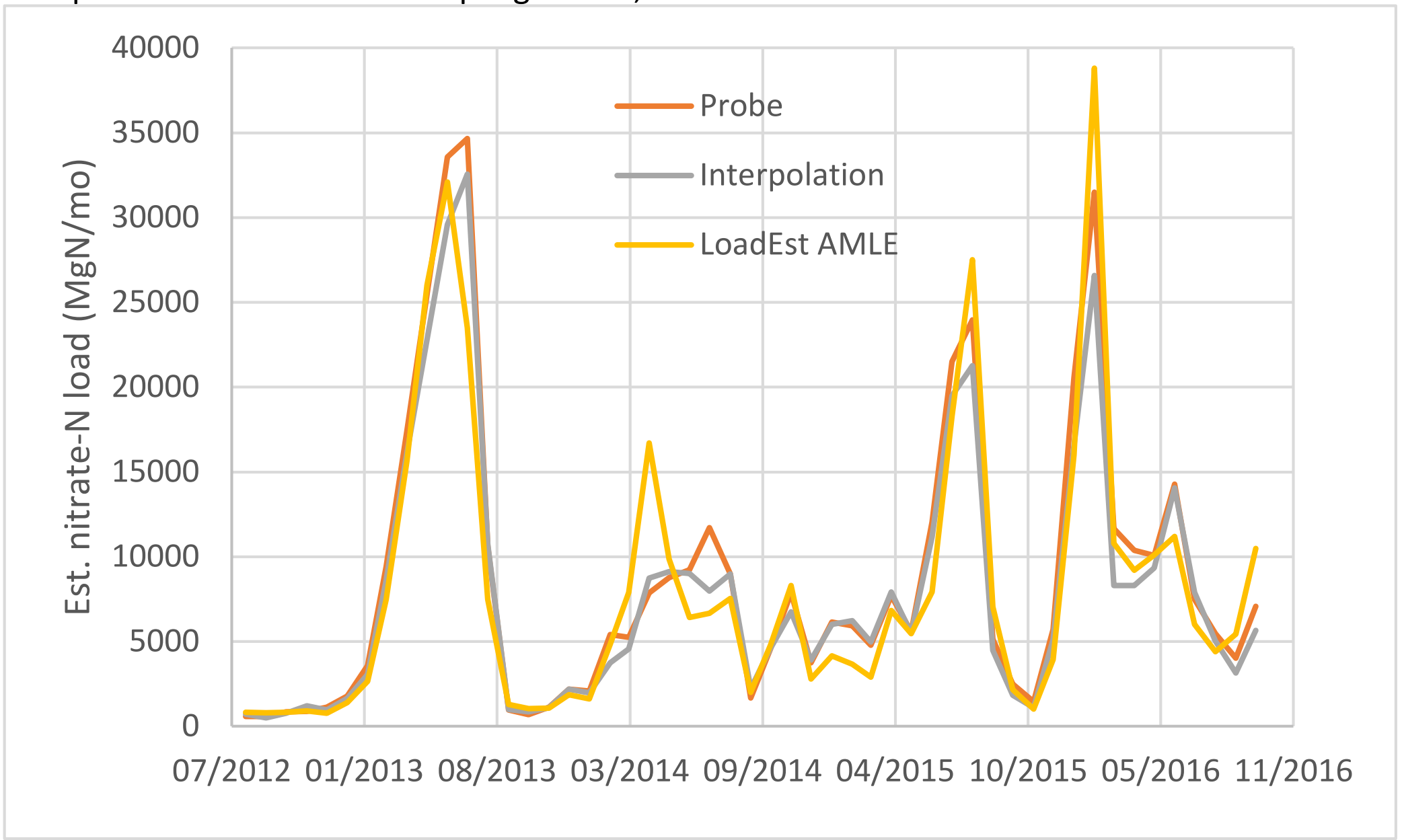
Estimated annual Nitrate-N load at Valley City by linear interpolation of concentration (horizontal) vs LoadEst Adjusted Maximum Likelihood Estimation (AMLE, vertical)
1976-2016 http://toxics.usgs.gov/hypoxia/mississippi/flux_ests/sub_basins/ILL-VALL.html



Monthly nitrate-N loads at Valley City estimated by linear interpolation of concentration(horizontal) vs LoadEst AMLE (vertical) (1976-2016)



Monthly estimated nitrate-N loads from instream probe concentration, linear interpolation of traditional sampling events, and LoadEst AMLE



Reporting nitrate-N load reduction progress

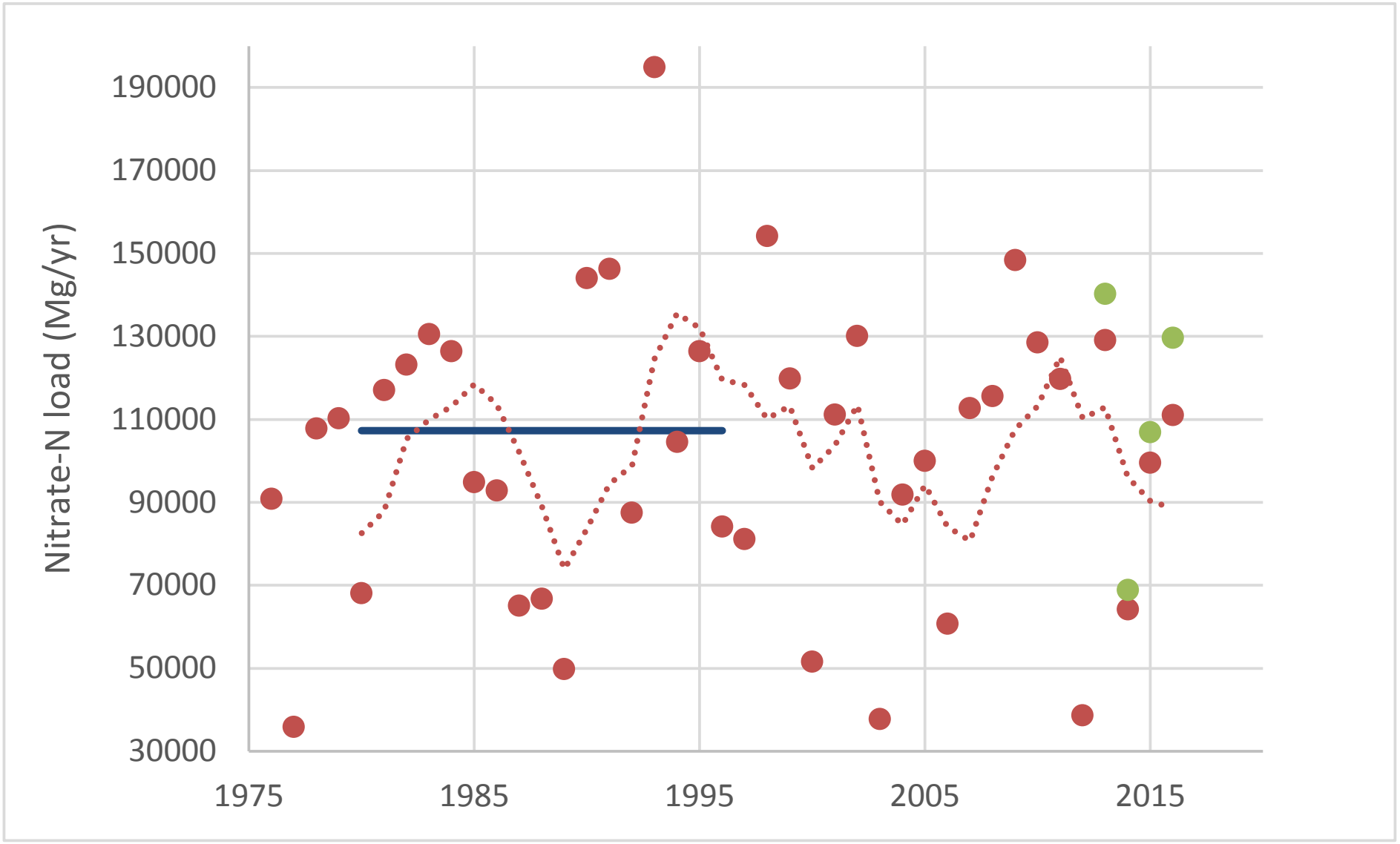
2010-14 estimated annual nitrate-N load at Valley city was 10% below baseline
while water discharge was 3% above baseline

Declining agricultural N excess provided evidence that the decline in riverine
nitrate load may have been caused by improved N fertilizer management
(but correlation does not prove causation)

2012-16 estimated annual nitrate-N load at Valley City was 17% below baseline
Water discharge was 3% below baseline, so a combination of improved fertilizer management and reduced flows may be causal.

Five year average loads need to be evaluated in the context of the five year average flow values

Estimated water year nitrate-N loads at Valley City (red circles) and Florence (green circles)
Five year moving average value at Valley City (dashed red line)
1980-96 baseline value (solid black line)

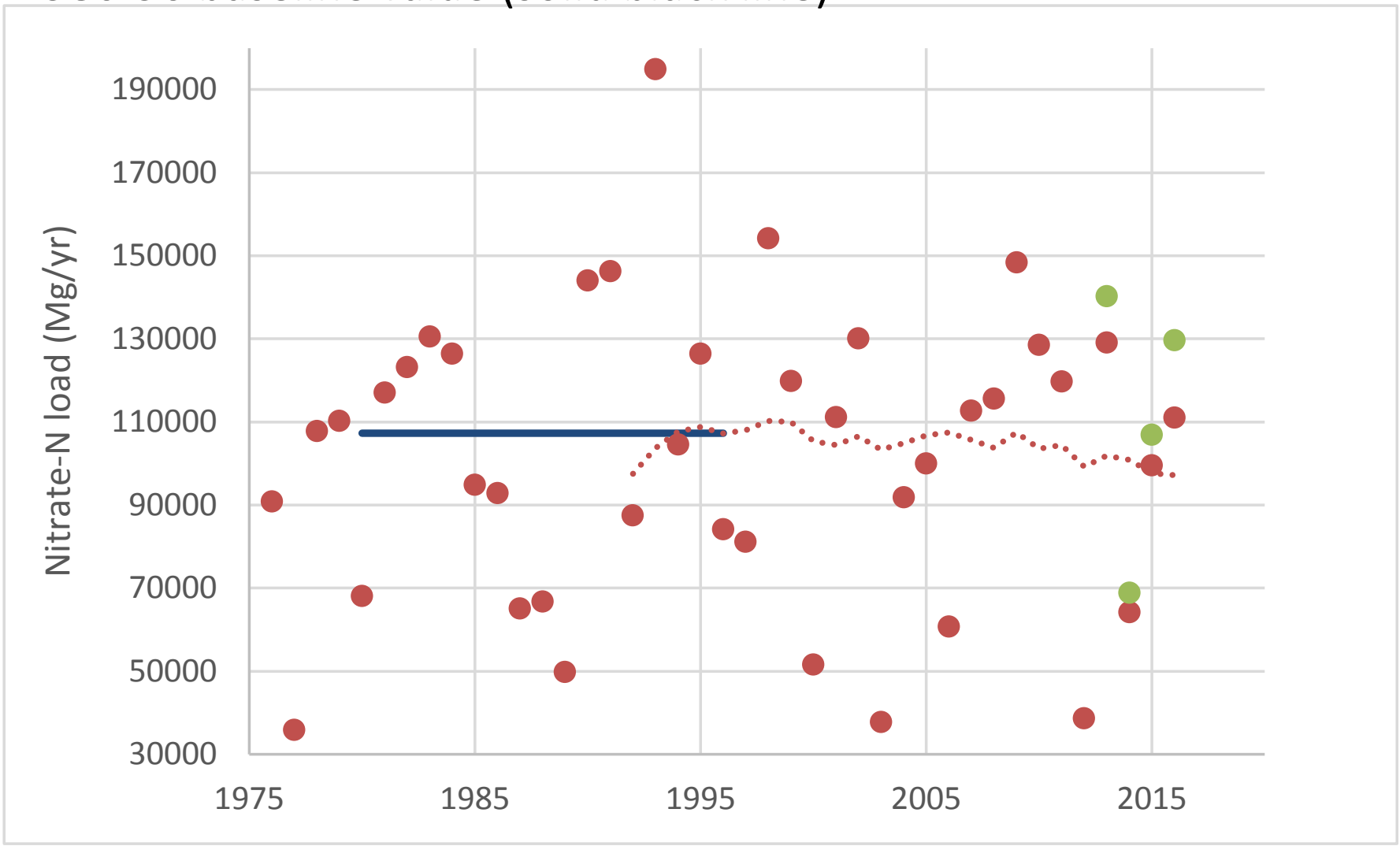


Five year average loads should be interpreted in light of the five year average flow values

1985-89 average load was 31% below baseline, while water flow was 23% below baseline
2003-07 average load was 25% below baseline while water flow was 24% below baseline

Longer term averages reduce hydrologic variability may provide a simpler metric

Estimated water year nitrate-N loads at Valley City (red circles) and Florence (green circles)
Seventeen year moving average value at Valley City (dashed red line)
1980-96 baseline value (solid black line)



2000-2016 avg. load
10% below baseline

Water flow 1.6% below baseline

Caveats

Reduction in annual water flow and changes in seasonality may have a causal influence on nitrate loads.

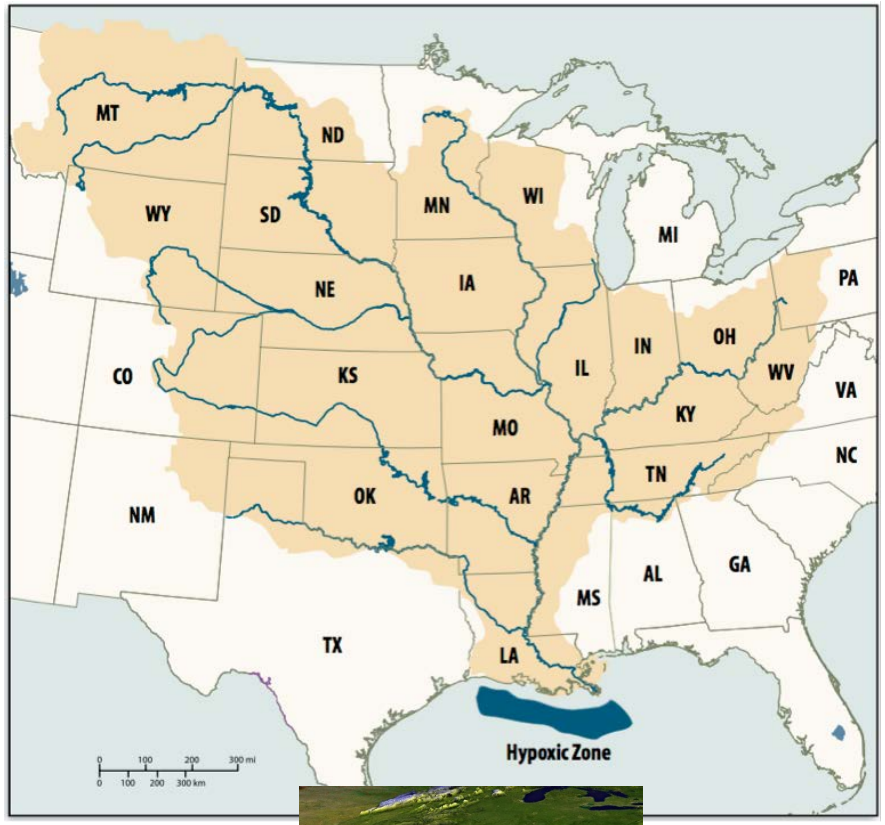
Higher corn yields with better alignment of fertilizer applications to corn uptake may be causal, and changes in point sources may be contributing in the Illinois River.

Documenting changes in nitrate loads in agricultural watersheds with less point source influences would help confirm or refute the role of improved uptake of agricultural N in reducing riverine N loads.

What does it all mean?

- Continuous probe measured Nitrate-N concentrations at Florence averaged 8 to 9% greater than point sampled concentrations at Florence. Is there a need for better calibration?
- Load estimates from daily average probe concentrations averaged 10% to 13% greater than estimates from linear interpolation between sampling events.
- The difference in load estimates may be due to 1) probe calibration problems; 2) the probe detecting high concentration episodes missed by less frequent sampling; 3) the difference between point measurement vs width and depth integrated sampling
- Need to “harmonize” the results of methods used in the baseline period (1980-96) with the newer methods.
- 17 year average loads may be easier to explain than 5 year average loads, which are more likely to vary due to rainfall and flow variations.

Gulf Hypoxia Update



Cindy Skrukrud and Gregg Good

Nutrient Science Advisory Committee Charge and 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

Serious

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


Zoe Zaloudek, Water Is Photo Contest

ter resources with
innovation

NUTRIENT SCIENCE ADVISORY COMMITTEE (NSAC)

Nutrient Monitoring Council update September 2017

NSAC

- Convened November 2015
- Monthly teleconferences; ~ 12 to date
- Quarterly face-to-face meetings; 6 to date (one this month).
- Anticipating concluding work late 2018
- Summary of activities and meetings available on the NLRS website.

NSAC - WORKPLAN

Based upon Environmental Risk Assessment (Stressor/Response) principles

1. Planning / Problem Formulation
   - ✓Develop conceptual model(s) of biological response to potential stressors – model development and refinement in process
2. Analysis
   - ✓Identified and evaluated potential data sets to use in updated stressor-response analysis. (solicited suggestions and contributions)
   - ✓Determined Illinois EPA, USEPA, and USGS data sets (2006-15) were most appropriate for the most comprehensive analyses.
   - ✓Many questions / clarifications / implications of data set characteristics have been and continue to be evaluated.

NSAC - WORKPLAN

2. Analysis (continued)
   - ✓ US EPA has provided funding and a contract with Tetra Tech, Inc. to provide an updated analysis of Illinois EPA data. This is a considerable iterative and ongoing discussion and analysis effort.
   - ✓ New analyses will include determinations of relations between stressors (nutrients) and response indicators (DO, Chlorophyll, biology) and categorical qualitative measures of primary productivity.
   - ✓ 5 spatial scales and 4 stream order scales currently being evaluated for sites attaining fully-supporting fish and macroinvertebrate IBI scores.

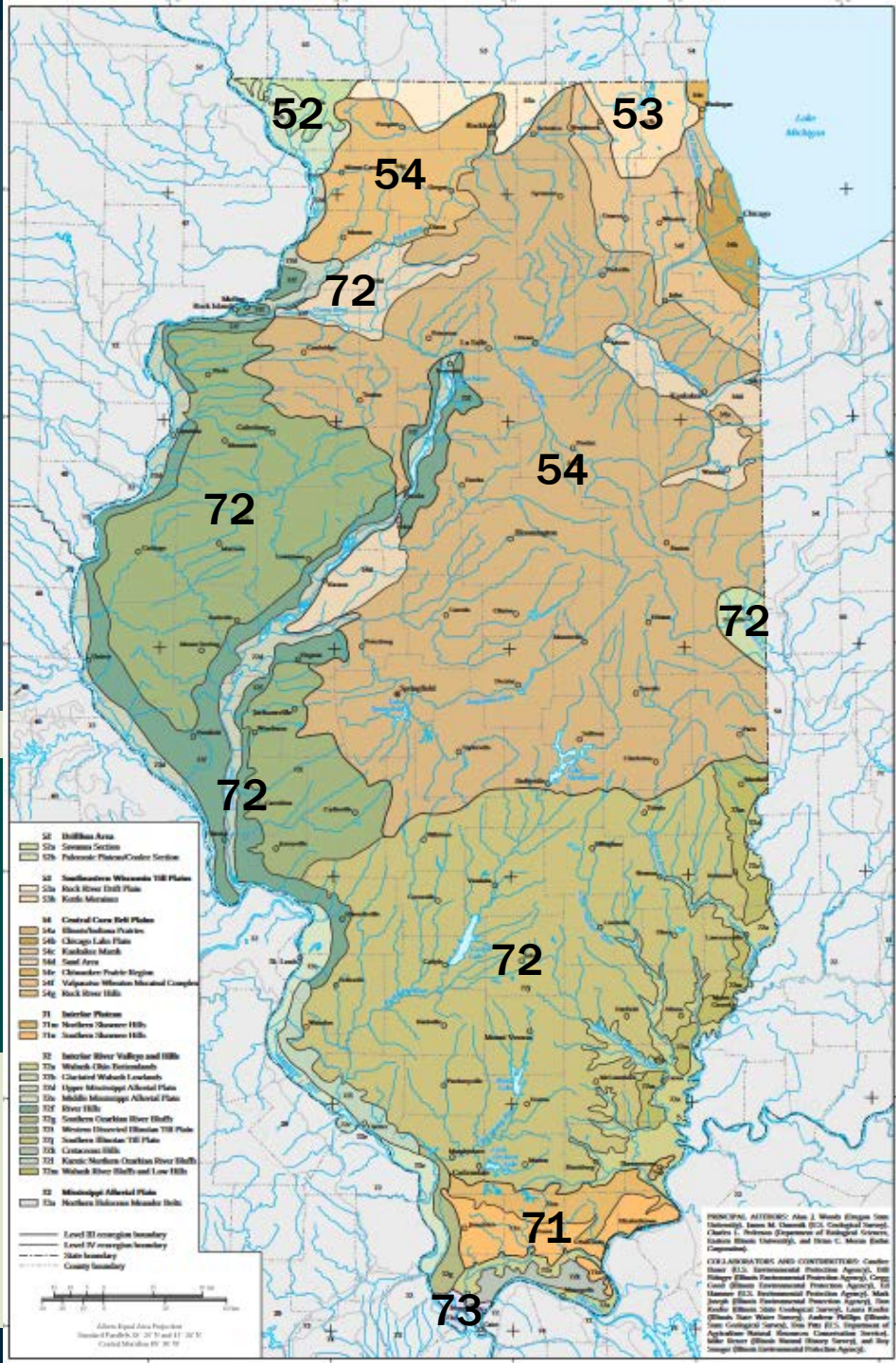
Spatial

1. Ecoregion 52 + 53
2. Ecoregion 54 + 20 sites from 72
3. Ecoregion 72 – 20 sites + Ecoregion 73
4. Ecoregion 71
5. Statewide

* Ecoregion 71 and 52 should be split out from Ecoregions 54 and 72. However, Ecoregion 52 is data-deficient, so it was added to Ecoregion 53.

Stream Order

- 1
- 2/3/4
- 5/6/7
- All



3. Synthesis / Characterization

- ✓ Refine and evaluate candidate criteria
- ✓ Evaluate uncertainties
- ✓ Consider combined criterion approaches (seasonal, response variables, multiple stressors)
- ✓ Ensure all uses are considered and consistent with the CWA and State regulations
- ✓ NSAC plans to recommend a combined criterion, unless analyses indicate it would not be appropriate
- ✓ Desire to use methodologies and approaches that have met USEPA acceptance in other states, if appropriate.

4. Report

- ✓ Candidate standards and supporting data, methodology, and analyses.
- ✓ Outside expert review prior to release.
- ✓ Hopeful for report completion in late 2018.

“Next Steps” Summary
(NMC September 6, 2017)

- Summarize today’s action items
  - A.
  - B.
  - C.
- Future topics for the next meeting (did we decide that?)
- Other (TBD)