Have you seen my nitrogen?

Caroline Wade, Nutrient Watershed Manager
Illinois Corn Growers Association

But I haven’t lost any, right?

My neighbor maybe…..

“We can’t change what we aren’t measuring”

Measures ambient concentration
of Nitrate and Ammonium

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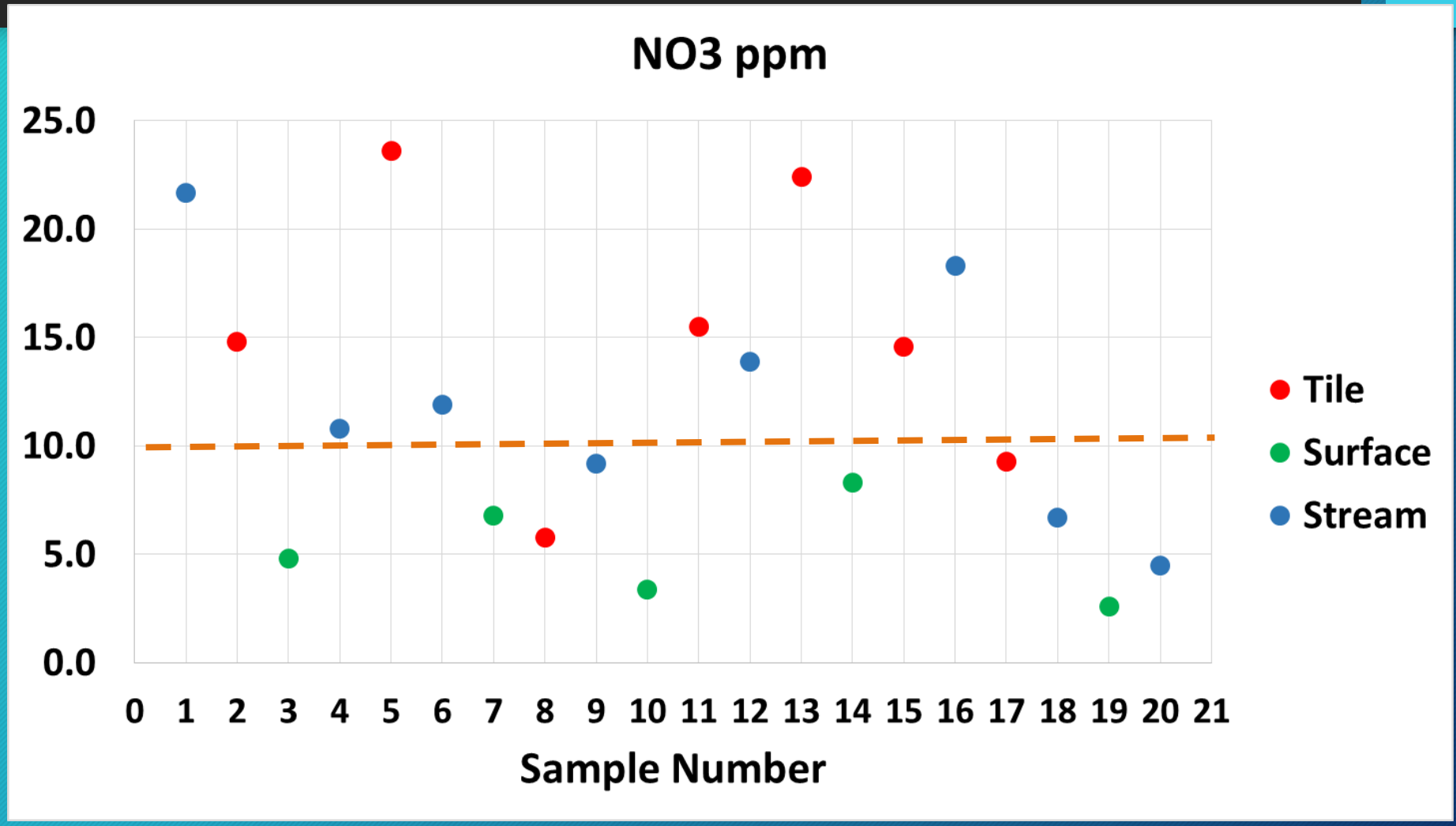
We can’t change what we aren’t measuring



Interpreting the numbers

PURDUE UNIVERSITY

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AY-318-W

Agronomy Guide

SOILS (TILLAGE)

Interpreting Nitrate Concentration in Tile Drainage Water

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EXPERT REVIEWED

NO_3-N Concentration (ppm)	Interpretation
≤ 5	Native grassland, CRP land, alfalfa, managed pastures
5 – 10	Row crop production on a mineral soil without N fertilizer Row crop production with N applied at 45 lbs./acre below the economically optimum N rate† Row crop production with successful winter crop to “trap” N
10 - 20	Row crop production with N applied at optimum N rate Soybeans
≥ 20	Row crop production where: • N applied exceeds crop need • N applied not synchronized with crop need • Environmental conditions limit crop production and N fertilizer use efficiency • Environmental conditions favor greater than normal mineralization of soil organic matter

How does that compare to other areas?

Non-agricultural water monitoring												
Date	Golf course West		Golf course East		Hidden Creek North		Hidden Creek South		Golf course creek		Urban site	
	NO3	NH4	NO3	NH4	NO3	NH4	NO3	NH4	NO3	NH4	NO3	NH4
4/24/2014	1.22		1.05		3.85		3.74		1.88		2.91	
4/28/2014	1.21		0.71		2.70		1.08		1.04		1.27	
5/1/2014	0.71	0.21	0.95	0.32	2.92	0.21	3.29	0.17	2.69	0.26	2.38	0.30
5/7/2014	0.69	0.33	0.85	0.46	2.77	0.33	2.68	0.40	2.46	0.34	2.40	0.49
5/12/2014	0.81	0.56	0.57	0.29	1.91	0.54	1.56	0.77	2.61	0.36	1.51	0.78
5/20/2014	0.39	0.50	0.47	0.72	3.22	0.59	2.87	0.66	1.20	1.62	2.36	0.89

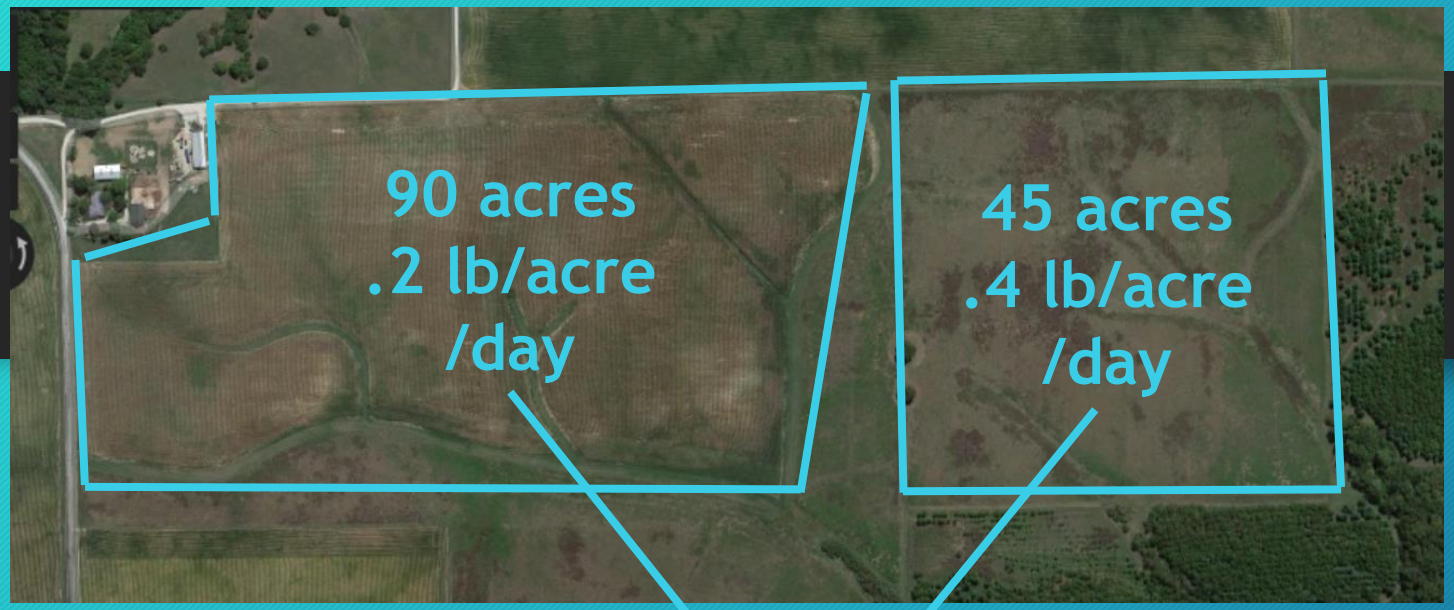
Have you seen my nitrogen?

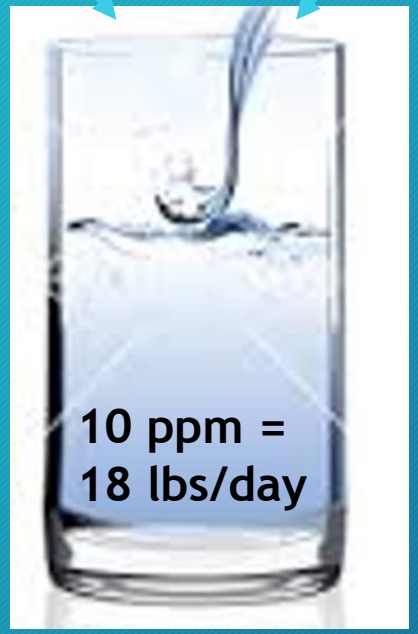
What does concentration really mean? How can this be useful for farmers?

How much nitrogen is being lost? concentration x flow = load

10ppm = 0.000083454 lb/gallon

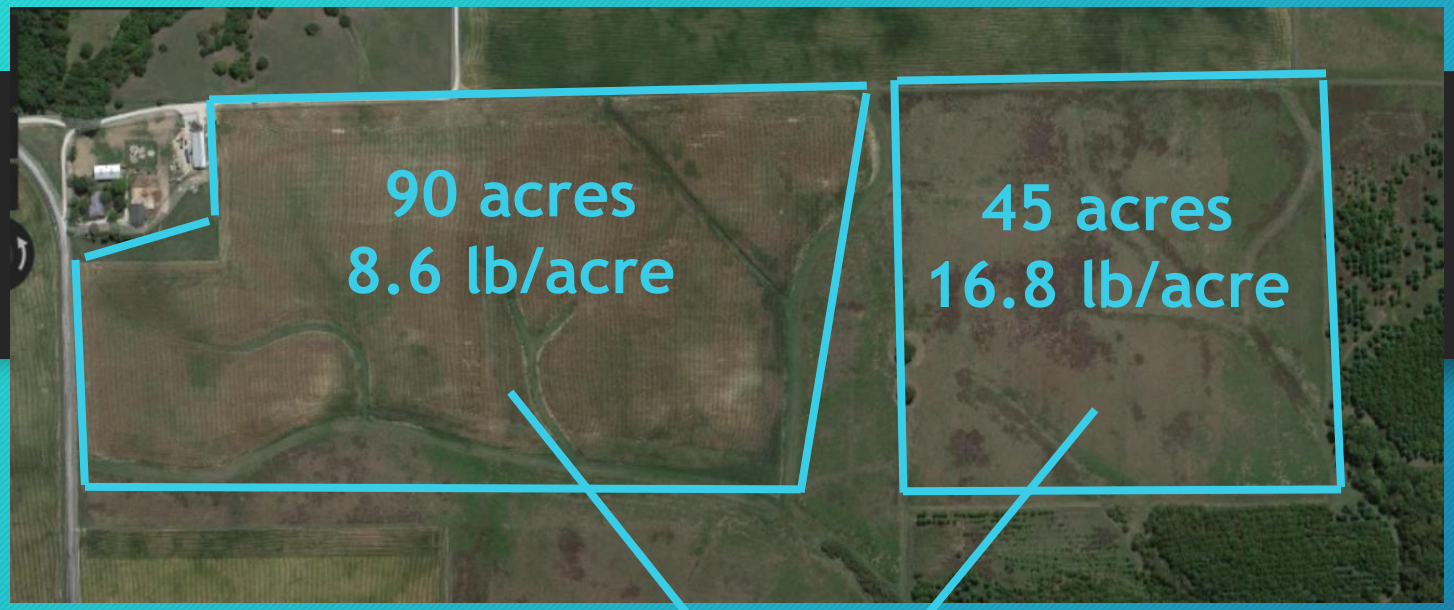
If you're filling up a 5 gallon bucket every 2 seconds, that's 18lbs lost every day!





- When we talk in terms of reducing nitrogen lost per acre, we may find some common ground for improvement

- Concentration times flow (load) divided by area = pounds of N per acre being lost



- Over 6 weeks of flow, that's 756 lbs

- Concentration times flow (load) divided by area = pounds of N per acre being lost

What can be done to reduce losses?

Crop Rotation	N Rate	N Time	Nitrate-N	
			4-Yr Avg. Conc.	4-Yr Total
	lb/A		ppm	lb/A
C-S-Corn	0		6.1	37.7
	60+40	SPL	7.8	44.8
	120	PP	8.2	52.1
S-C-Corn	0		4.6	34.0
	60+80	SPL	7.9	64.2
	160	PP	8.8	62.8
C-C-Soybeans	0		5.5	30.5
	0		8.4	40.9
	0		8.7	38.3

SPL – Split Applied, PP – Pre-Plant Application

Table 1. Four year nitrate-N loss from a corn-corn-soybean cropping system at Waseca from 2007 – 2010. Nitrate losses calculated for the crop underlined in the Crop Rotation column. (Randall and Vetsch, 2011)

On average, about 20 lb nitrate-N/acre were lost through drainage systems annually when the soil is kept bare. This represents the soil's contribution from soil organic matter.

Corn grown with no N fertilizer inputs still lost an average of about 10lb Nitrate-N/acre/year.

Changing rate and timing can reduce the residual nitrate-N in the soil profile that is subject to leaching.

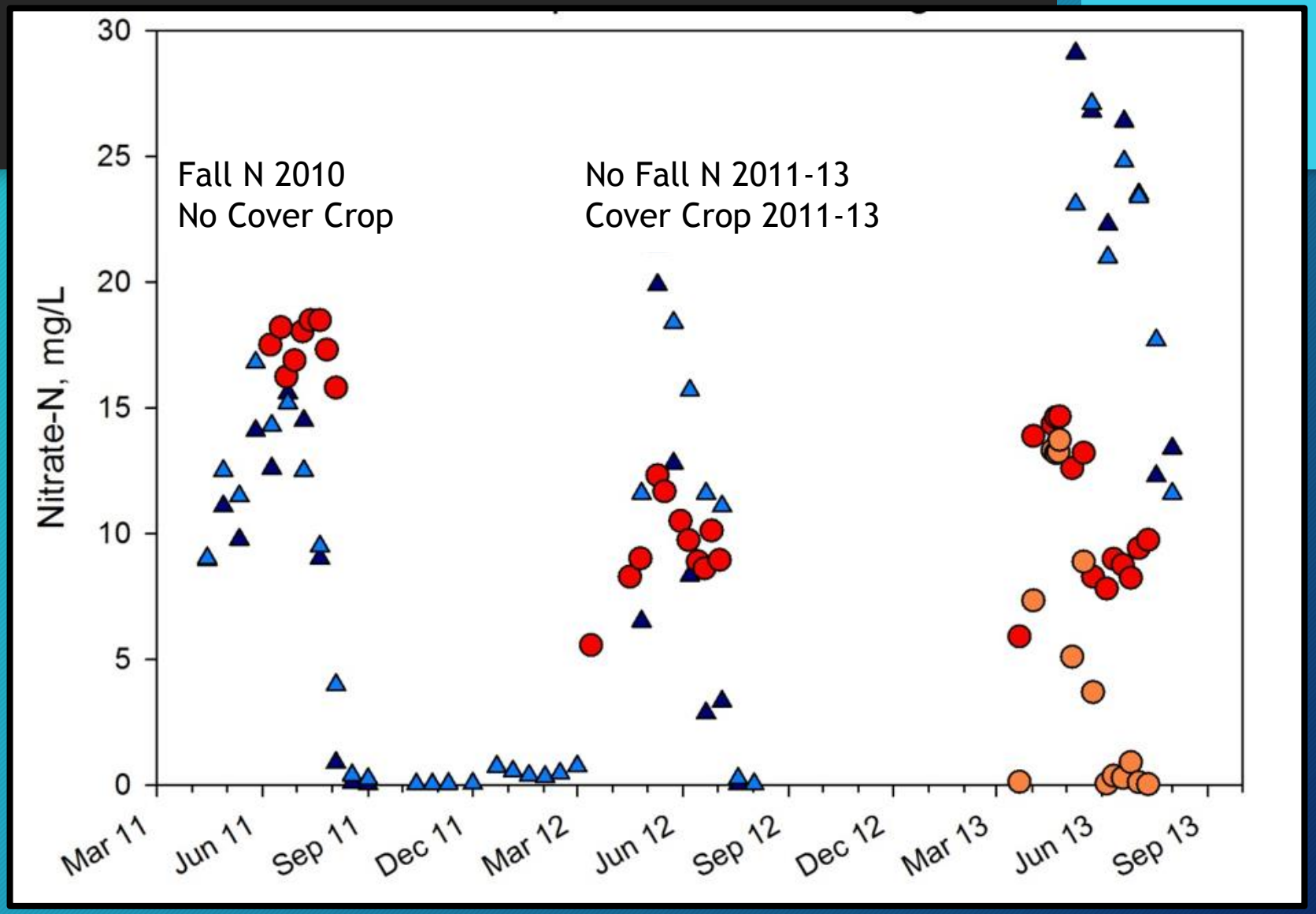
What can be done to reduce losses?

Cropping System	Total Discharge 4-Yr. Cumulative	Nitrate-N 4-Yr Avg. Conc.	4-Yr Total
	Inches	ppm	lb/A
Continuous corn	30.4	28	194
Corn – soybean	35.5	23	182
Soybean – corn	35.4	22	180
Alfalfa	16.4	1.6	6
CRP	25.2	0.7	4

Table 2. Effect of cropping system on cumulative drainage volume, nitrate-N concentration and N loss in subsurface tile drainage during a 4 – year period (1990 – 1993) at Lamberton. (Randall, et. al., 1997)

Perennial vegetation drastically reduces nitrate-N losses. **Cover crops** can provide partial year vegetative cover and some reductions in losses.

What can be done to reduce losses?



Nutrient Loss Reductions

Voluntary implementation

= <u>you</u> decide what, where and how

- University recommended Nitrogen rates
- Nitrification Inhibitors
- Split application of nitrogen
- Cover Crops
- Conservation tillage
- Bioreactors
- Wetlands
- Buffers

You are here!

Questions?

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