State of Wisconsin
Land and Water Conservation Board

PO Box 8911
Madison, WI 53708 - 8911
608 - 224 - 4650

Advisory Committee on Research
Agenda

January 7, 2025

The Advisory Committee on Research (Committee) to the Land and Water Conservation Board (LWCB) will meet on January 7, 2025 at 9:00 am via Microsoft Teams. To attend the meeting, join by telephone at 608-571-2209 with Conference ID 923 447 880# or click the following Teams hyperlink. The agenda for the meeting is shown below.

AGENDA ITEMS AND TENTATIVE SCHEDULE:

9:00 AM	1	Meeting Called to Order – **Ron Grasshoff, Committee Chair** a. Roll Call b. Open meeting notice c. Approval of meeting agenda d. Approval of September 9, 2024 meeting minutes
9:05 AM	2	Reflect on Previous Educational Opportunity (Chelsea Zegler's Presentation) **Ron Grasshoff, Committee Chair**
9:25 AM	3	Review Workplan and Discuss including the Board in a Process to Identify and Prioritize Future Presentation Topics **Ron Grasshoff, Committee Chair**
9:45 AM	4	Discuss 2025 Educational Opportunities (Farm Sustainability Rewards and other Topics) **Ron Grasshoff, Committee Chair**
10:10 AM	5	Member updates with possible discussion
10:20 AM	6	Planning for the next Advisory Committee Meeting **Ron Grasshoff, LWCB**
10:25 AM	7	Adjourn

Ron Grasshoff, Committee Chair;
Vice Chair - vacant;
Members: Monte Osterman, Tim Anderson and Brian McGraw;
Advisors: Dr. Francisco Arriaga and Amber Radatz

LWCB Advisory Committee on Research 2024 Workplan

Updated: 9/3/24

Committee Purpose:

The LWCB Advisory Committee on Research purpose shall be to create, implement and oversee the process for the State of Wisconsin Land & Water Conservation Board to advise the University of Wisconsin System on research and outreach needs relating to soil & water conservation. The Committee will provide oversight of a sustainable, lasting process which involves all Board members and advisor organizations as part of the normal agenda of the Board.

Topic	Goal	Action	Timeline	Person(s) Assigned	Status	Notes
Frequency and Distribution of Survey	Develop and use survey to receive input from stakeholders to understand gaps in L&W resource management to advise UW System	1. Baseline Survey of Needs	1. Survey completed in June 2023		1. Completed and distributed	
		2. distribution of survey report and survey to establish contacts within UW System	2. Distribution Survey Feb-March 2024	Kirsten Biefeld, Ron Grasshoff, Amber Radatz	2. Reached out to 20-30 contacts, have had 13 responses, 4 individuals wanting to present	
		3. Propose to conduct survey every 4-5 years	3. Next Survey in 2026, potentially			start thinking on this next year, if this makes sense after we have a couple of board presentations
Educational Opportunities	**UW Engagement:** Annual meeting between LWCB and UW partners to review what work has been done, and UW partners utilizing survey results in grant opportunities	1. use distribution survey contact list to invite participants to an online reflection form	Annually			
		2. host hybrid meeting between communities	Annually? Long-term			
	Outside Partners Engagement: work with partners outside of UW-Wisconsin System and current LWCB partners to further address gaps found in survey					
	LWCB Educaton: Educational opportunities aimed to help board make recommendations to UW System	1. prepare list of potential presenters and topics to LWCB board chair	Suggest up to 3 presentations to the board per year	Have committee decide on potential presenter. Kirsten Biefeld and Ron Grasshoff suggest these presenters to the board planners	At the July 2, 2024 Meeting, the board moved to recommend Chelsea Zegler and Matt Ruark as the first presenters to the board. On 7/19/24, Kirsten Biefeld has extended an invitation to Chelsea Zegler.	Include a standard list of questions for presenters: what's next for their research, how their research advances the needs of county conservation departments, how the board can support their work, and to discuss the economic and social impacts of their work.
Advising and Recommendations	LWCB creates recommendations to UW System based on educational opportunities		annually? Bi-annually, switching off with survey period?	TBD		**Revisit this item after we have a board presentation completed.** After each presentation, at the next committee meeting, discuss what can we offer them i.e. support/participation in their work. How do we avoid a continuous line of presenters without a clear end point?

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VOICES FOR CONSERVATION

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FARM SUSTAINABILITY REWARDS PROJECT

www.wigreenfire.org/our-work/fsr-project


Photo by Richard Cates

A NEW MODEL FOR FARM CONSERVATION

Wisconsin producers have a long tradition as committed conservationists. Yet, market realities and existing farm incentive programs have led to failures in protecting water quality in farm country and beyond. With funding from the USDA-NRCS, we are piloting the Farm Sustainability Rewards (FSR) Project.

AN INNOVATIVE APPROACH

Unlike one-time cost-share programs that focus on isolated practices, this project will develop the structure to offer qualifying producers financial reward payments for achieving key environmental goals on a continuing, farm-wide basis.

The FSR project will use field-tested models to estimate nutrient loss, soil erosion, and greenhouse gas (GHG) emissions based on relevant farm characteristics and practices. Farms that do better in each of these categories can earn higher rewards.

AT A GLANCE

Tiered model of $ rewards

Improved water quality

Voluntary participation

PERFORMANCE METRICS

- Nutrient loss (Nitrogen & Phosphorus)
- Soil loss
- Greenhouse gas emissions

LEARN MORE

As the project progresses, we'll be engaging a larger team of stakeholders. Contact us to get involved!

Please help us support farmers while conserving working lands and protecting clean water.

Visit our website to learn more about the FSR Project!

SCAN ME

BEN BECKER
Project Coordinator
bbecker@wigreenfire.org

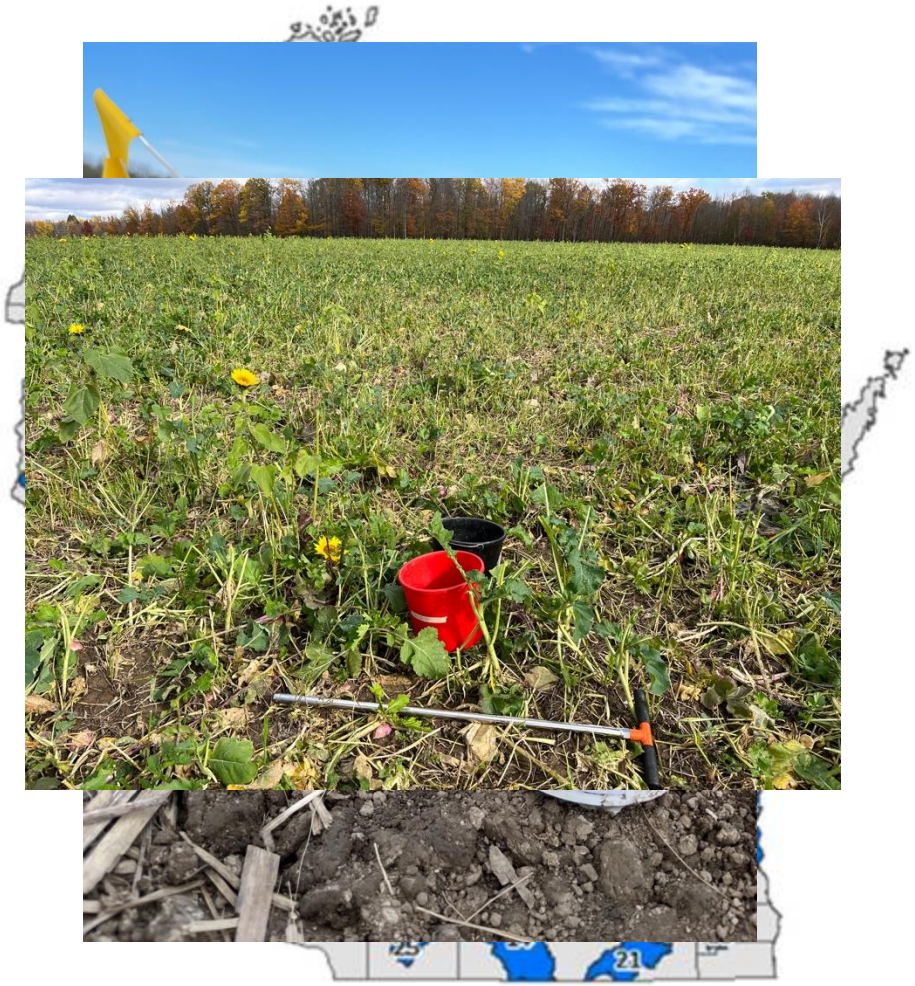
The zone of interaction: Assessing water quality risk through soil sampling- A participatory research project.

Chelsea Zegler
UW-Madison, Division of Extension, Ag Water Quality

Extension
UNIVERSITY OF WISCONSIN-MADISON
AGRICULTURE WATER QUALITY

Working with Producer-Led Groups

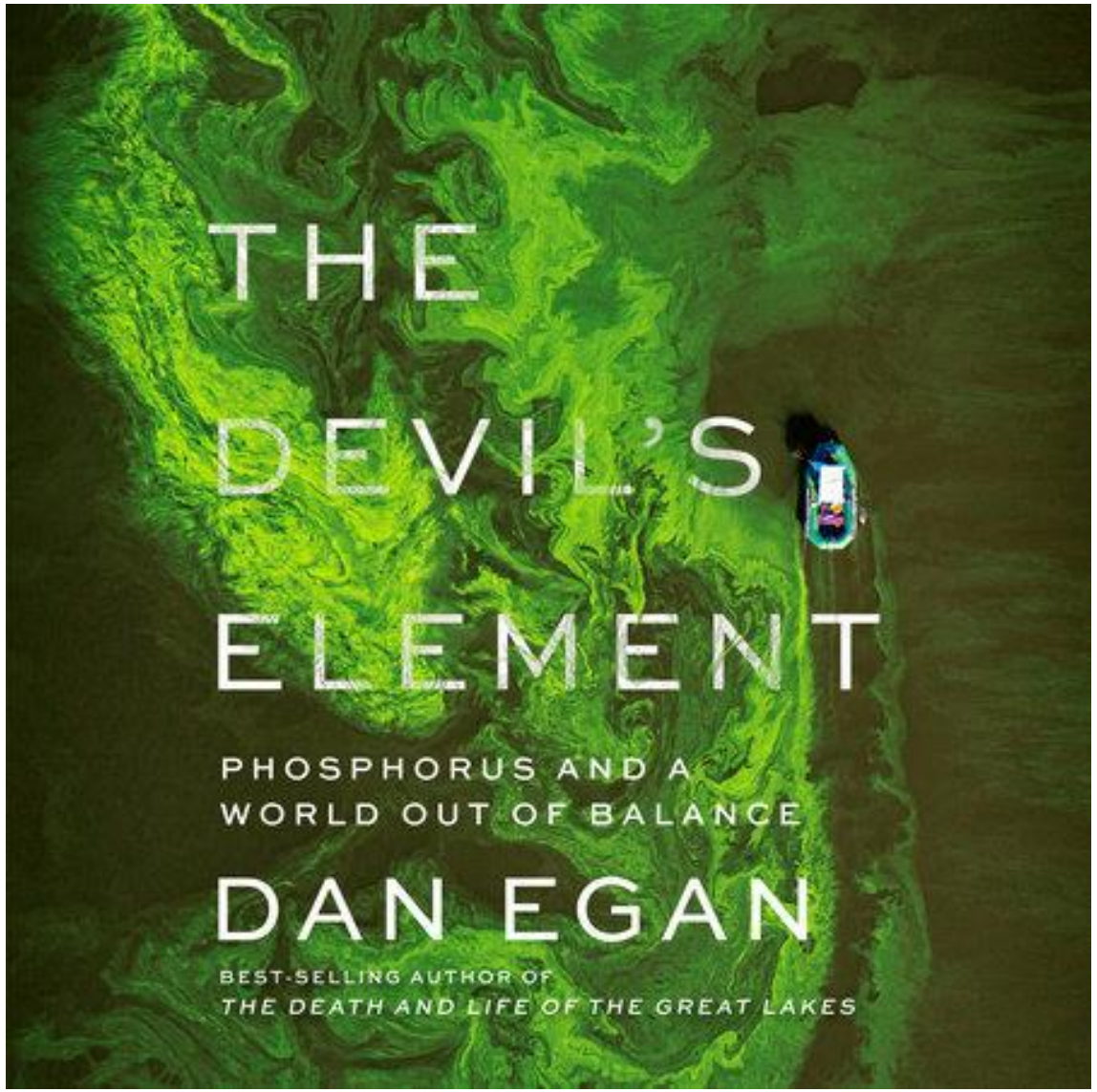
"Grants provide support to groups to deliver cost share programs, on-farm demonstration and research projects, and education and outreach efforts on conservation systems and innovative practices that improve water quality to farmers and other community members within their local watersheds."



Multiple benefits of participatory research and demonstration

Research from working farm data

Trust and community building


THE
DEVIL'S
ELEMENT
PHOSPHORUS AND A
WORLD OUT OF BALANCE
DAN EGAN
BEST-SELLING AUTHOR OF
THE DEATH AND LIFE OF THE GREAT LAKES

Soil Analysis

Submitted By: **BN05765**
MARIE RABOIN - COUNTY OF DANE
5201 FEN OAK DR
MADISON, WI 53718

Submitted For:
Marie Raboin

AgSource LABORATORIES

Laboratory Sample #
CH41510 - CH41517

Date Received:
05/17/2022

Date Processed:
05/18/2022

Information Sheet #
791746

County: Dodge
Account No: BN05765
Field: Anderson N
Acres: 0.0
Soil Name/Subsoil group: unknown
Plow Depth: 7.00
Previous Crop: Rye, grain
Slope:
Irrigated: No
Tiled: No

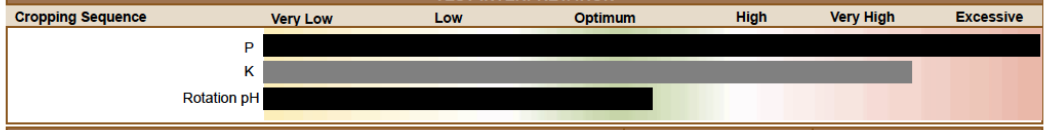
NUTRIENT RECOMMENDATIONS

Cropping Sequence	Yield Goal	Crop Nutrient Need N	P_2O_5	K_2O	Fertilizer Credits Legume N	Manure N	P_2O_5	K_2O	Nutrients to Apply N	P_2O_5	K_2O
	- per acre -	-------- lbs/a --------			--- lbs/a ----	-------- lbs/a --------			-------- lbs/a --------		
Corn, grain	191-210 bu	***	0	15	0	0	0	0	***	0	15
(no crop)	n/a	0	0	0	0	0	0	0	0	0	0
(no crop)	n/a	0	0	0	0	0	0	0	0	0	0
(no crop)	n/a	0	0	0	0	0	0	0	0	0	0

There is no lime recommendation for this rotation. Please see Additional Information below.

*** Please use the new Wisconsin Nitrogen Application Rates table to determine the N Application rate. Table included at end of report.

TEST INTERPRETATION



LABORATORY ANALYSIS / LAB USE / MISC

Adjusted Avg:	6.2	2.6	77	170		1261	201	0.3	6	3.4	6.4				9.4	4.6	66.9	17.5	89.4	10.6

Sample ID	Soil pH	O.M. %	Phosphorus PPM	Potassium PPM	60-69 Lime Req T/a	Calcium PPM	Magnesium PPM	Boron PPM	Manganese PPM	Zinc PPM	Sulfate Sulfur	Sulfur Avail Index	Texture Code	Sample Density	Buffer Code	Total CEC	% Base Saturation %K	%Ca	%Mg	Tot %	%H
1	6.2	2.6	77	170		1261	201	0.3	6.0	3.4	6.4		2	0.84	7.2	9.4	4.6	66.9	17.5	89.4	10.6

SECONDARY & MICRONUTRIENT RECOMMENDATIONS

Interpretations ----------> Ca-H Mg-Opt B-VL Mn-L Zn-Opt S-L

Response to added Ca is unlikely.
Soil Mg is optimum. Maintain level with dolomitic lime.
See Chapter 8, page 63 of publication A2809 for information on the sulfur application guidelines for Wisconsin.
Year 1 Confirm the need for B by plant analysis.
Year 2,3,4 Response to B is unlikely.
Year 2,3,4 Response to Mn is unlikely.
Year 1 Band 3 lbs Mn/a as sulfate or foliarly apply 1 or 0.15 lb Mn/a as sulfate or chelate forms, respectively.
Year 1,2,3,4 Response to Zn is unlikely.

ADDITIONAL INFORMATION

Starter fertilizer (e.g. 10+20+20 lbs N+P2O5+K2O/a) is advisable for row crops on soils slow to warm in the spring.
Because of very high P levels, P2O5 applications from fertilizer or manure should be reduced and crops with a high P removal should be grown.
Recommended rates are the total amount of nutrients to apply (N-P-K), including starter fertilizer.
Year 1 If corn is harvested for silage instead of grain apply extra 90 lbs K2O per acre to next crop.
A lime recommendation is calculated only when soil pH is more than 0.2 units below the optimum pH. Starter fertilizer (e.g. 10 + 20 + 20 lbs N + P_2O_5 + K_2O/a) is advisable for row crops on soils slow to warm in the spring.
A soil nitrate test may better estimate actual corn N needs. If conservative tillage leaves more than 50% residue cover when corn follows after corn, add an additional 30 N lb/a.
If alfalfa will be maintained for more than three years, increase recommendated: K_2O by 20% each year.

DISCLAIMER: Data and information in this report are intended solely for the individual(s) for whom samples were submitted. Reproduction of this report must be in its entirety. Levels listed are guidelines only. Data was reported based on standard laboratory procedures and deviations.

106 North Cecil Street, PO Box 7 • Bonduel, WI 54107 • P: 715.758.2178 • bonduel@agsource.com

“Types” of Soil Phosphorus

P within SOM, microbes, residue

Organic P

Bound, primary, and secondary P

Mineral P

P dissolved in soil water

Dissolved P

Index of P availability to crops

Soil Test P

Particulate P

Total P

STP

Phosphorus Water Quality Risks

Particulate P

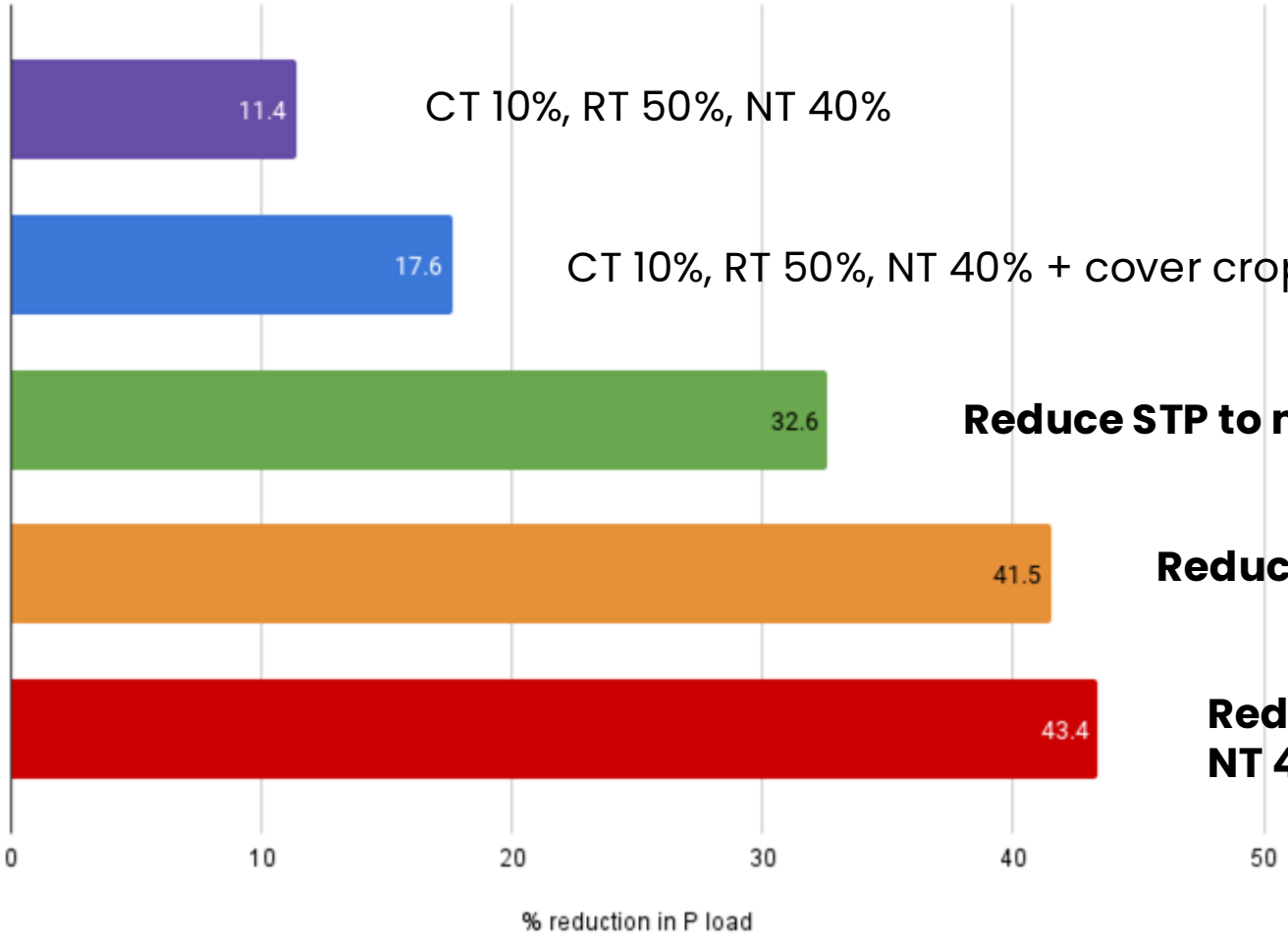
Soil erosion • Availability impacted by water chemistry • Legacy phosphorus

Dissolved Reactive P

Runoff • Tile drain losses • Immediately available

Phosphorus Water Quality Risks

Modeled Impact of BMPs within GB Watershed



Maintain STP at optimum or lower STACK conservation practices

*Relative to baseline 90% Conventional Tillage (CT)

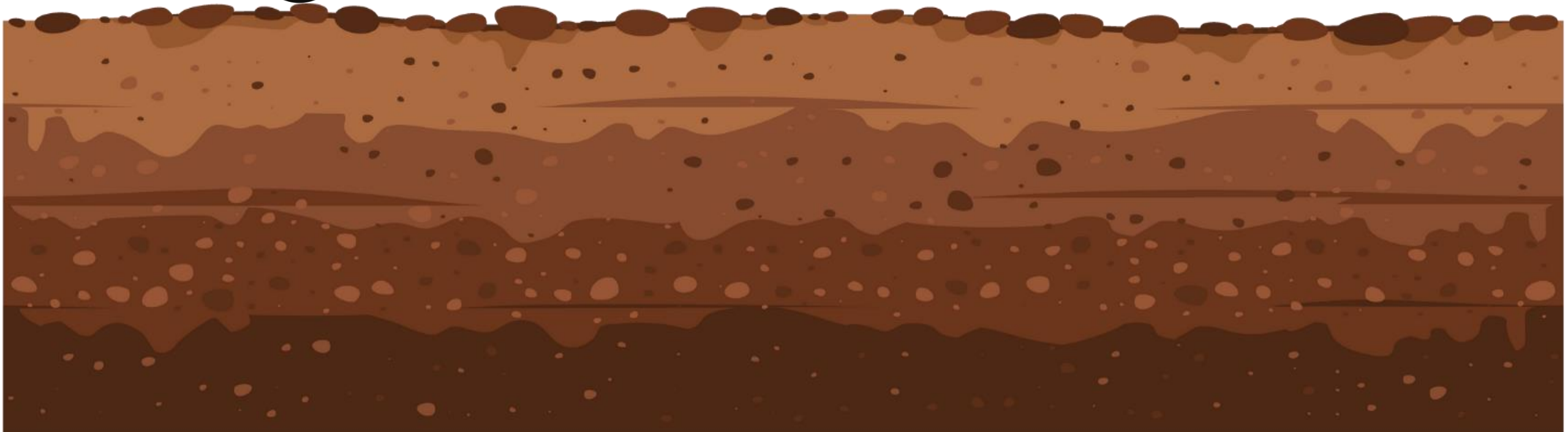
(Baumgart & Fermanich 2022 draft)

Soil Phosphorus Pools and Soil Health Impacts

Winter fertility applications increase risk!

Typical liquid manure application at 12,000 gal/ac (<4% DM)
= 21 lbs P/ac applied

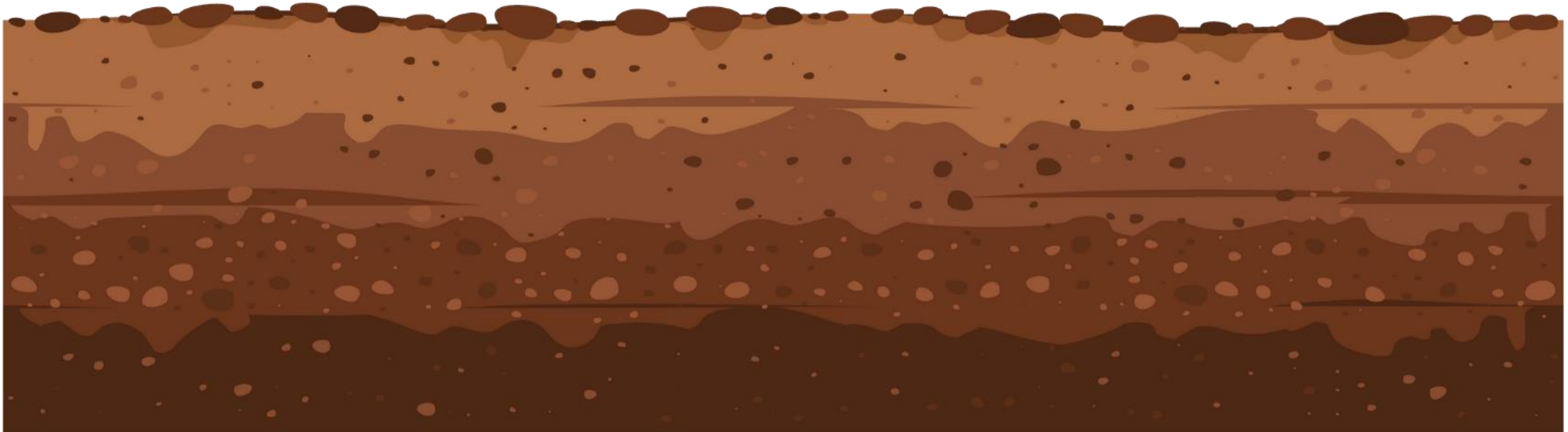
- 80% available first year!



Winter fertility applications increase risk!

Maintenance application rate
= 33 lbs P /ac

Commercial phosphorus fertilizer is near 100% available upon application



In Soil Health Mgmt Systems…

Total & particulate P losses

Due to –

- Reduced erosion

Dissolved reactive P losses

Due to –

- Surface P concentrations
- Biopores/hydraulic connectivity
- Microbial biomass P and cycling
- Soil sorption capacity

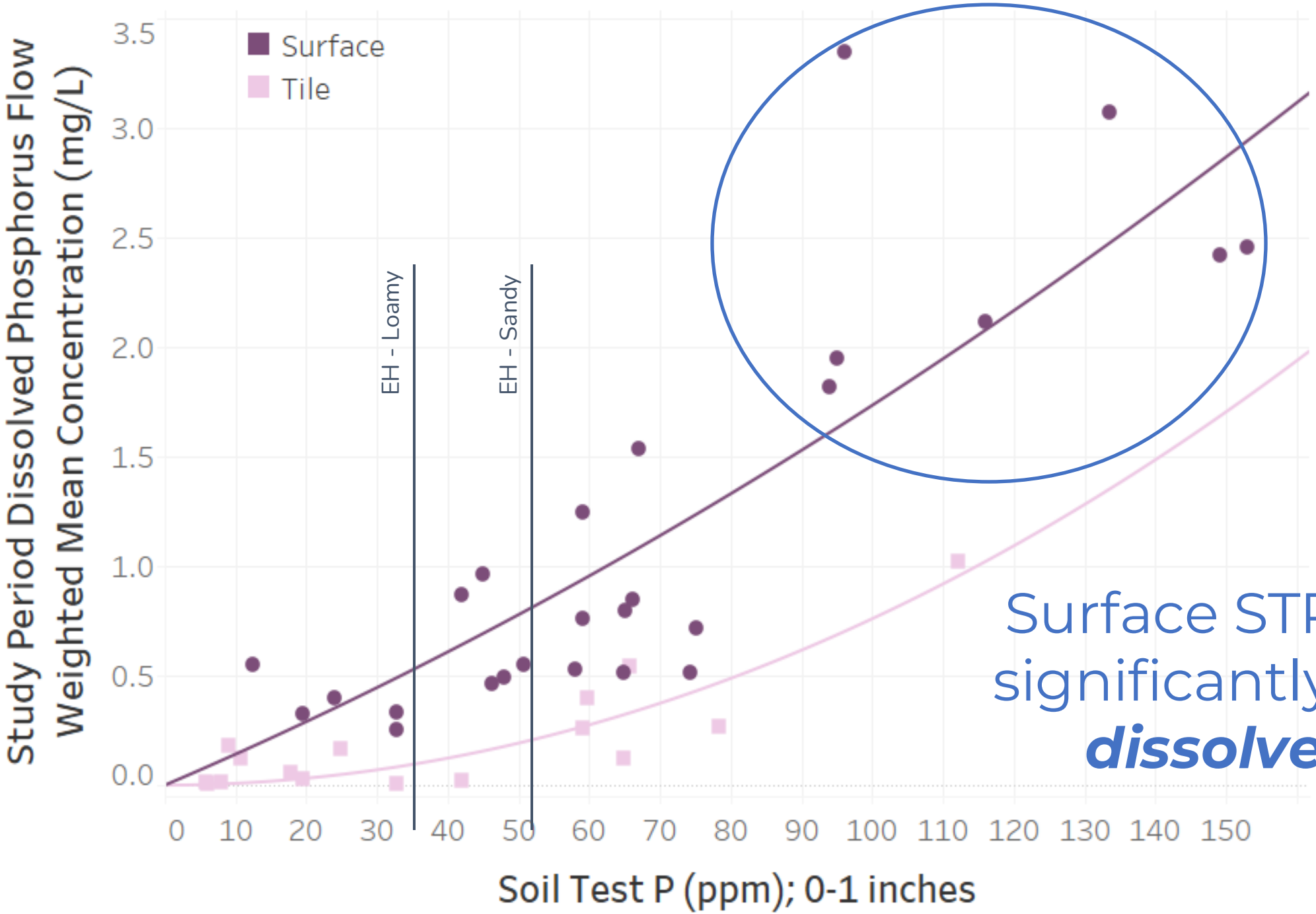
E. Duncan, et al. (2019). Phosphorus and Soil Health Management Practices. Agricultural and Environmental Letters, 4:190014. doi:10.2134/ael2019.04.0014

The phosphorus paradox: how to minimize soil erosion and reduce surface phosphorus levels?

How high are surface concentrations are in order to help suggest ways to assess risk?

Are there systems that do a good job of mitigating high surface concentrations even when P is routinely surface applied?

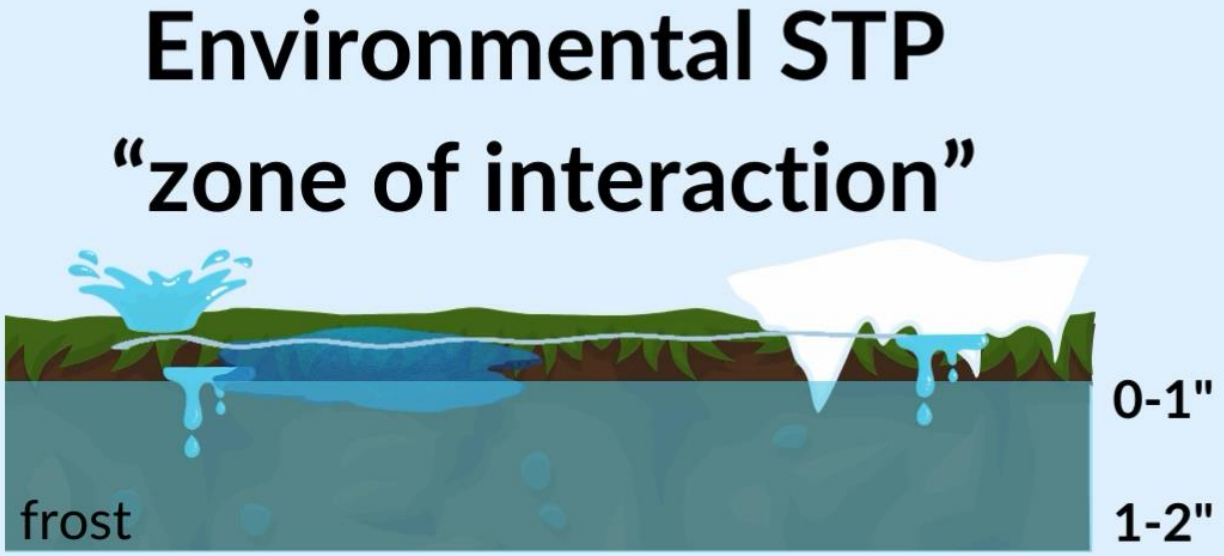
Assessing Initial P Risk to Water Quality



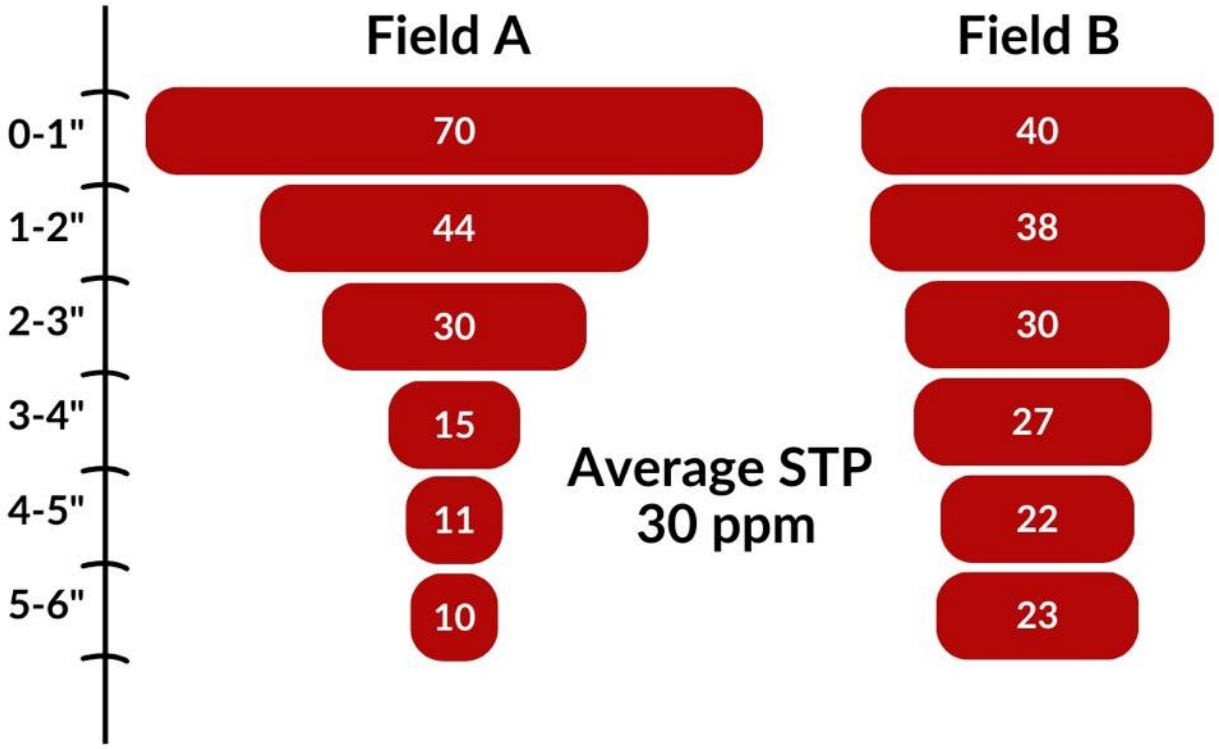
DISCOVERY FARMS WISCONSIN

Surface STP > 80ppm significantly increased ***dissolved*** P risk

Assessing P Risk to Water Quality



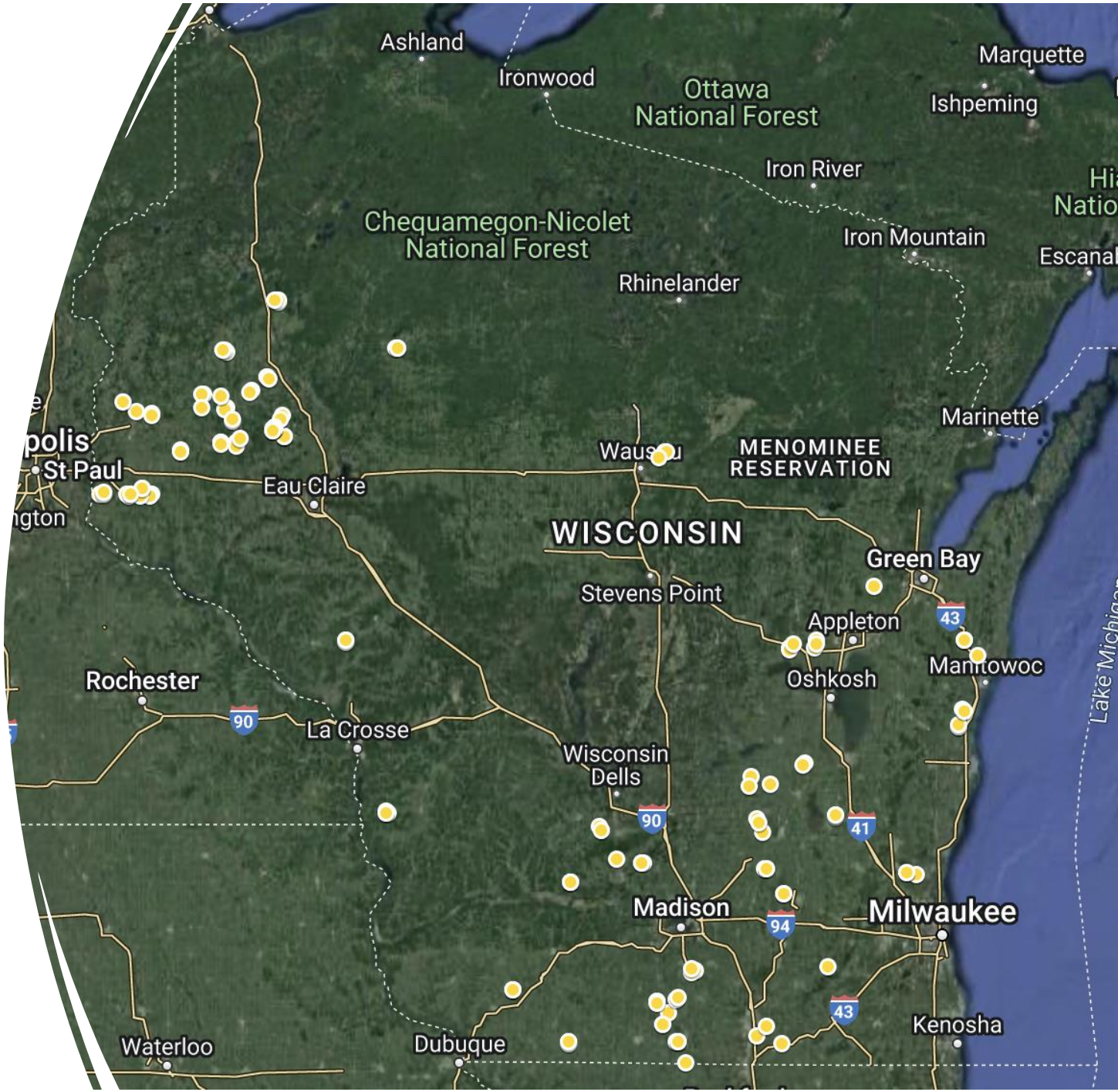
Agronomic vs Environmental Sampling Depth



On-Farm STP Survey

- 59 farmers
  - 157 fields, 24 counties
  - 0-2 inch sample
  - 2-6 inch sample

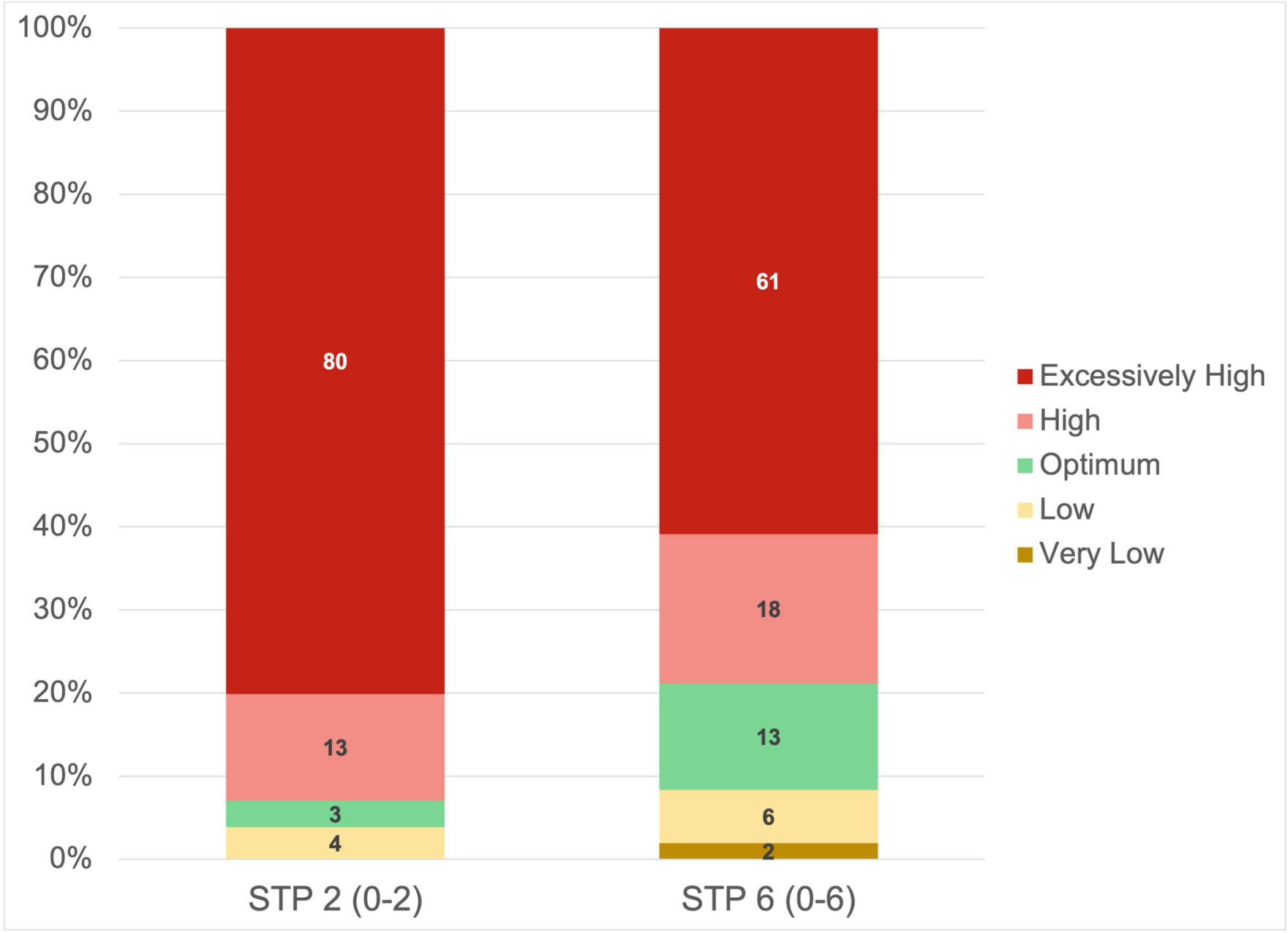
- Field management history
  - Tillage, cover crop use, fertility placement, crop rotation, etc.



	Soil test category				
	Very low (VL)	Low (L)	Optimum (O)	High (H)	Excessively high (EH)
Soil group[a]	soil test P ppm[b]				
Demand level 1: corn grain, soybean, clover, small grains (but not wheat), grasses, oilseed crops, pasture					
Loamy	< 10	10–15	16–20	21–30	> 30
Sandy, Organic	< 12	12–22	23–32	33–42	> 42
Demand level 2: alfalfa, corn silage, wheat, beans, sweet corn, peas, fruits					
Loamy	< 12	12–17	18–25	26–35	> 35
Sandy, Organic	< 18	18–25	26–37	38–55	> 55
Demand level 3: tomato, pepper, brassicas, leafy greens, root, vine, and truck crops					
Loamy	< 15	15–30	31–45	46–75	> 75
Sandy, Organic	< 18	18–35	36–50	51–80	> 80
Demand level 4: potato					
Loamy	< 100	100–160	161–200	> 200	
Sandy, Organic	< 30	30–60	61–90	91–120	> 120

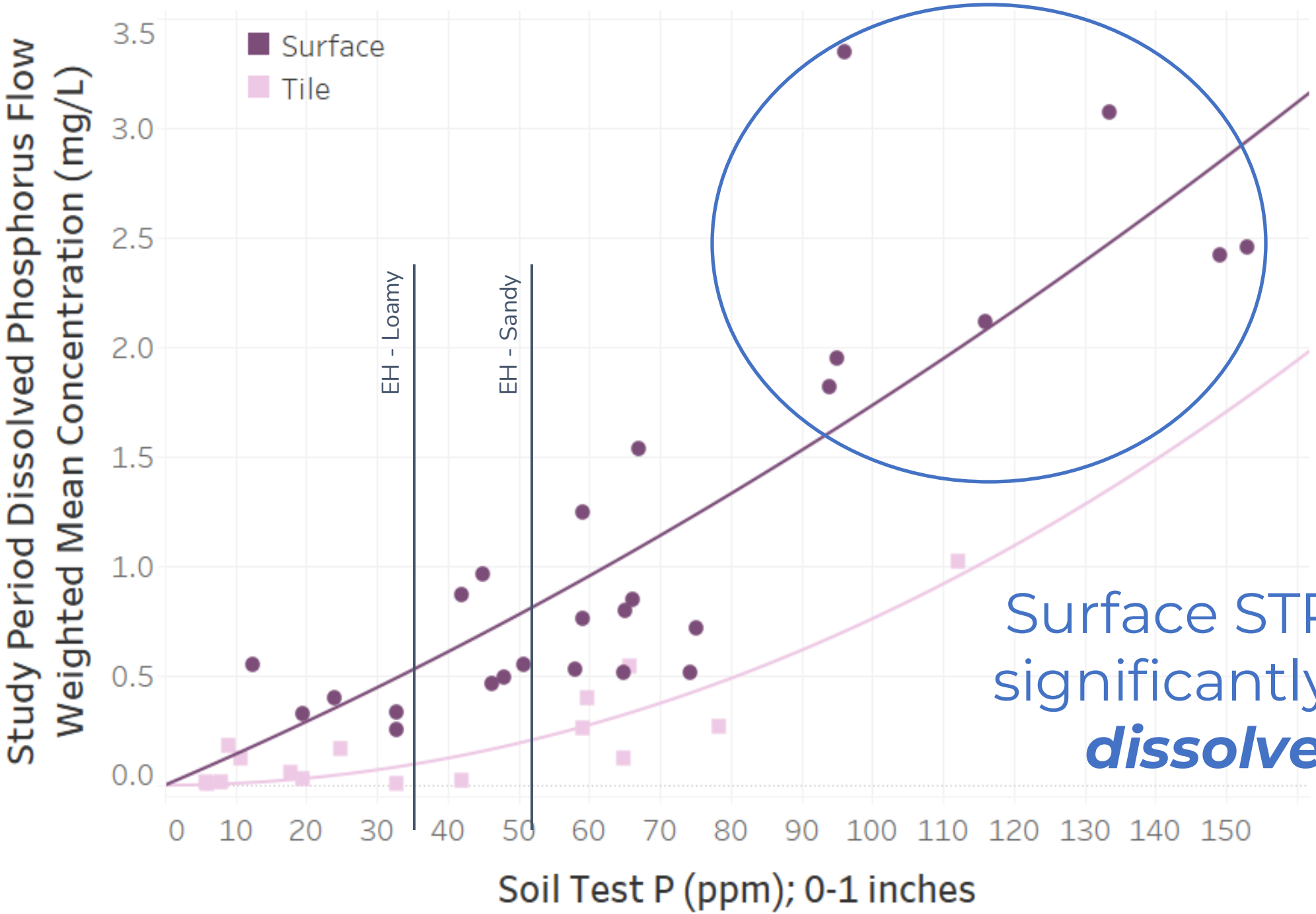
[a] See Chapter 4: Soil and crop information for more details on soil groups.

[b] ppm (wt/vol; g/m^3)



61% agronomic samples with Excessively High STP

<2% chance of yield response to additional P fertility



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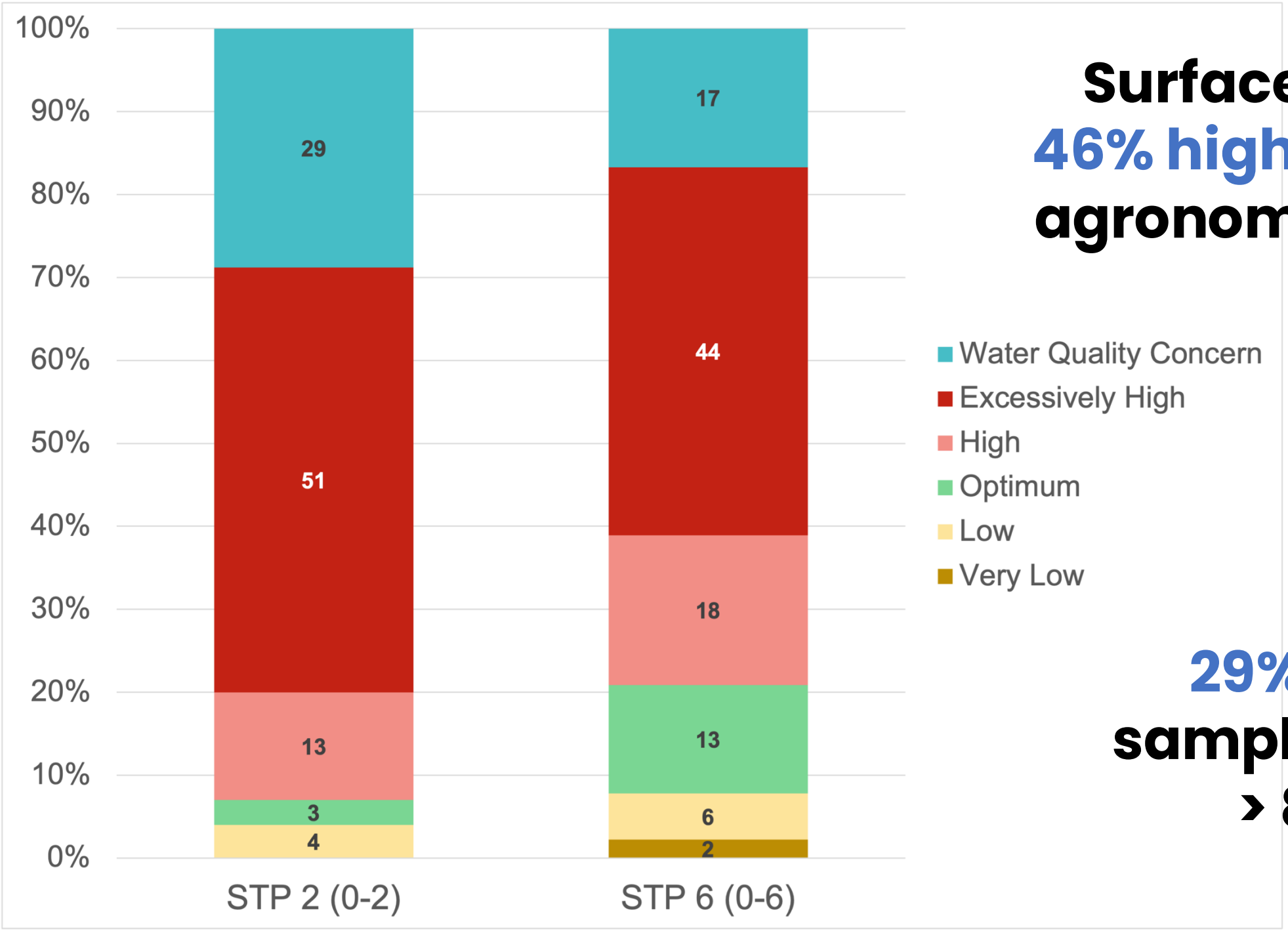
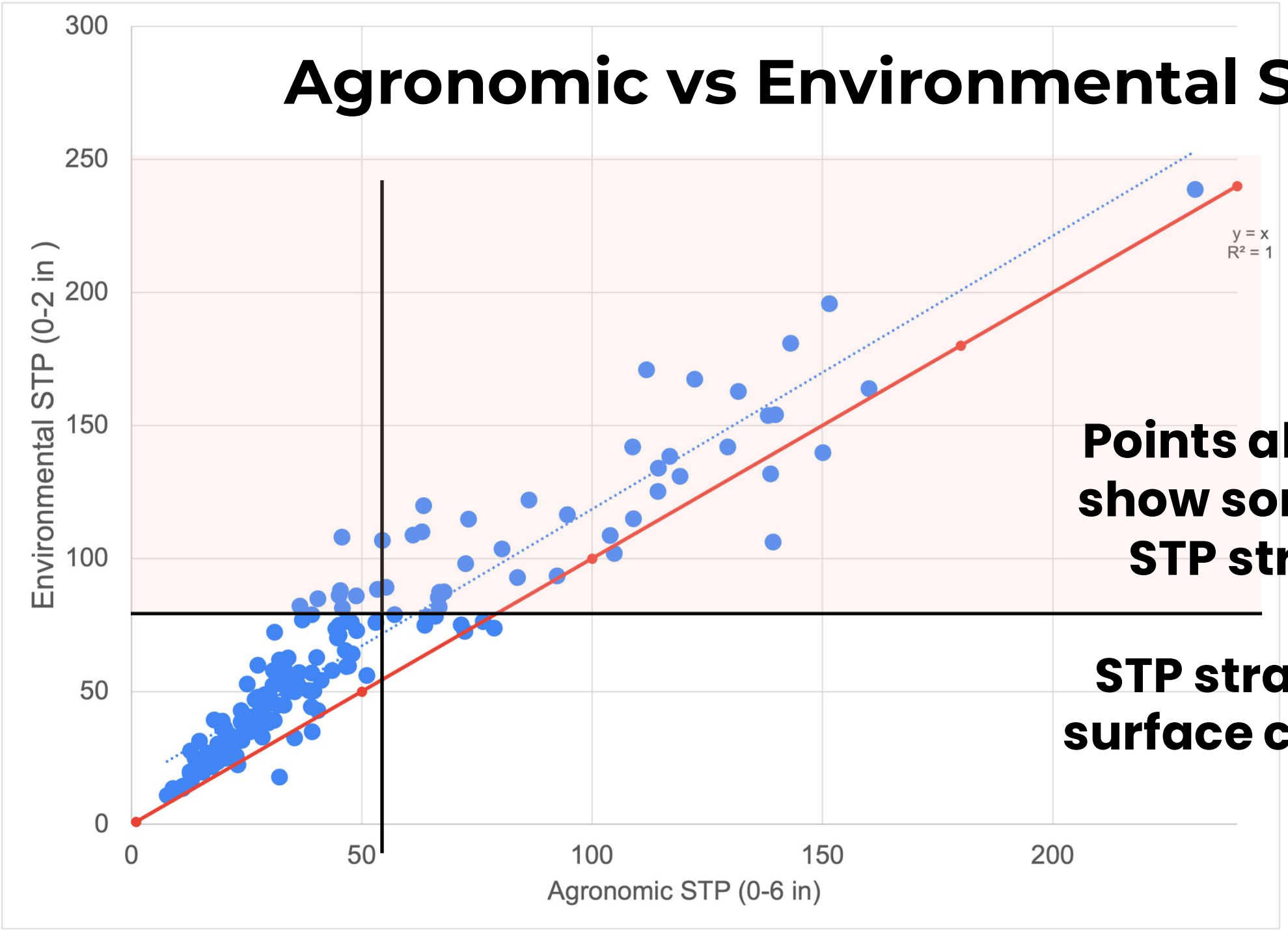


Surface samples 46% higher STP than agronomic samples

29% surface samples with STP > 80ppm

Agronomic vs Environmental STP



Points above red line show some degree of STP stratification

STP stratification vs surface concentration

Soil Health Mgmt System Approach

Soil Testing and Nutrient Management

Reduced Tillage

Crop Rotations

Cover Crops

Contouring and Strip Cropping

Hard Practices – waterways, WASCABs, buffers, wetlands, 2-stage ditches, terraces

Stack Practices

Integrated Pest Management

Compaction Avoidance

…

The project has led to meaningful outreach opportunities

SOIL TEST PHOSPHORUS SURVEY 2023

Map: 2023 Statewide Soil Test Phosphorus Project - 23 counties, 58 farms, 156 fields

Extension
UNIVERSITY OF WISCONSIN-MADISON

go.wisc.edu/ExtAgSTP

Assessing Water Quality Risk
through soil sampling

Mission and Methods

Extension's Agriculture Water Quality Program sought on-farm data to improve understanding on how soil health practices impact surface soil phosphorus levels. A trade-off of reduced tillage systems are surface applications of fertility. The goal of this soil and management survey data is to explore how high surface concentrations are in order to assess risk, and to find if there are systems that are mitigating high surface concentrations even when phosphorus is routinely surface applied.

Interested farmers chose up to 3 fields to be sampled in the fall before fertility applications. Fields of interest included those utilizing soil health practices for varied lengths of time. Soil samples were taken from 5 acre portions of fields at 0-6 inch depth, cores were split into 0-2" and 2-6" segments and composited into two samples submitted for routine analysis.

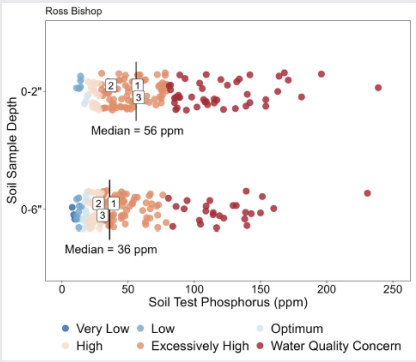
Phosphorus Build Up and Soil Test Phosphorus (STP)

The long history of animal agriculture and manure application in Wisconsin has led to an excess of phosphorus in soils. More phosphorus has been added through manure or fertilizer than removed by crops which makes the excess susceptible to being lost through soil erosion and runoff. Phosphorus, essential for crops, also contributes to aquatic degradation and is a finite resource, making it crucial agriculturally, environmentally, and economically.

Figure 1. Soil sampling to measure STP in Northern Wisconsin

Soils contain 200-6,000 lbs/ac of phosphorus, but about 90% is unavailable to plants, being tied up in organic matter or bound to soil particles. Only phosphorus in soil solution is accessible to plants. (Sturgul et al., 2004) Phosphorus becomes available through mineralization and chemical reactions, influenced by temperature, moisture, and soil binding properties. Additions of manure, fertilizer, and crop residue can increase phosphorus levels, raising the risk of phosphorus loss to water if binding sites are saturated.

An EEO/AA employer, University of Wisconsin-Madison Division of Extension provides equal opportunities in employment and programming,including Title VI, Title IX, the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act requirements.



Your results summary:

All STP values for fields included in our 2023 soil sampling are shown to the left.

Points at the top of the figure correspond to 0–2" soil samples, and points at the bottom are the 0–6" samples.

The points are color-coded based on soil test categories. The red data points indicated STP greater than 80 ppm, which is a water quality concern. We have labeled the median or middle values using a vertical black line. The STP results from your fields are plotted over top of the group data using white boxes labeled with the field ID number.

Phosphorus Drawdown Strategies

Soil test phosphorus (STP) builds up from overapplication, and reducing this excess takes much longer than nitrogen or herbicides due to soil's buffering capacity. A typical corn crop removes only 3-5 ppm of soil P annually, making it a slow process to lower soil phosphorus levels (Laboski et al., 2012). During this time, phosphorus is prone to environmental loss. Soil's ability to bind phosphorus has made it a major source of phosphorus after years of overapplication. Reducing STP economically minimizes water quality risks without sacrificing yield.

Due to Wisconsin soils' strong buffering capacity, reducing STP takes years. When phosphorus is removed, more is released from soil particulate pools to maintain equilibrium. Consistent drawdown strategies are crucial for reducing STP and water quality risks. This should be done alongside erosion control practices like cover crops and grass waterways to address particulate phosphorus loss. Lowering soil phosphorus will impact dissolved phosphorus losses, which are harder to control with other conservation practices.

Drawdown strategies include:

- Reduce or eliminate phosphorus inputs on high-risk fields (STP >80 ppm), as yield response is unlikely (<2%) based on data from 0-6" soil samples.
- Increase phosphorus removal by harvesting overwintering cover crops close to planting to maintain soil erosion benefits.
- Place fertility below the surface (e.g., manure injecting or banding) while minimizing disturbance if maintenance applications are necessary.

Resources:

1. Laboski C. M. & Peters J. P., (2012). Nutrient Applications Guidelines for Field Vegetable, and Fruit Crops in WI, https://learningstore. extension.wisc.edu/products/nutrient-application-guidelines-for-field-vegetable-and-fruit-crops-in-wisconsin-p185?_pos=1&_sid=636613ba5&_ss=r
2. Sturgul S. J. & Bundy L. G., (2004). Understanding Soil Phosphorus, https://ipcm.wisc.edu/wp-content/uploads/sites/54/2022/11/UnderstandingSoilP04.pdf
3. Zopp Z. P., Ruark M. D., Thompson A. M., Stuntebeck T. D., Cooley E., Radatz A. M., Radatz T., (2019). Effects of Manure and Tillage on Edge-of-Field Phosphorus Loss in Seasonalls Frozen Landscapes, *Journal of Environmental Quality, 48*(4), 966-977.

Contributors from the Ag Water Quality Program:

Outreach Specialists: Chelsea Zegler, Kelsey Hyland, Guolong Liang, Laura Paletta, Sheri Schwert
Discovery Farms Researcher: Ellen Albright
Program Manager: Amber Radatz

The project has led to meaningful outreach opportunities

Lessons Learned

- **Strong interest in on-farm research and demonstration**
- **Could point to some need for edge of field needs (snow melt)**
- **Wide range of knowledge of soil testing and nutrient management planning**
- **Differing interest on potential solutions**

Scaling success: from pilot project to broader impact

- **Focus on data exploration and management practices**
- **Continued outreach and project expansion**
- **Increased and intentional participation with county staff**
  - **Focus groups**
  - **County farms**
  - **Coordination with area LCD groups**

Questions?

Chelsea Zegler
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AGRICULTURE WATER QUALITY