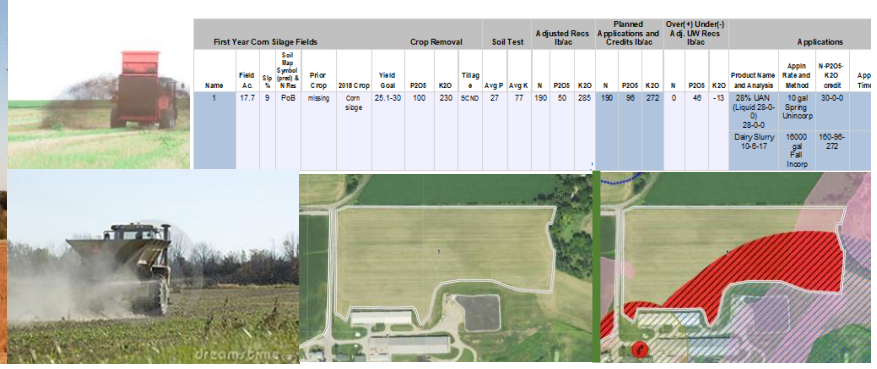


First Year Corn Silage Fields						Crop Removal				Soil Test		Adjusted Recs lb/ac			Planned Applications and Credits lb/ac			Over(+) Under(-) Adj. UW Recs lb/ac			Applications			
Name	Field Ac.	Slp %	Soil Map Symbol (pref) & N Rec	Prior Crop	2018 Crop	Yield Goal	P2O5	K2O	Tillage	Avg P	Avg K	N	P2O5	K2O	N	P2O5	K2O	N	P2O5	K2O	Product Name and Analysis	Appln Rate and Method	N-P2O5-K2O credit	App Time
1	17.7	9	PoB	missing	corn silage	25.1-30	100	230	SCND	27	77	190	50	285	190	96	272	0	46	-13	28% UAN (Liquid 28-0-0) 28-0-0	10 gal Spring Uninorp	30-0-0	
																					Dairy Slurry 10-6-17	16000 gal Fall Incorp	160-96-272	

SnapPlus

Nutrient Management Plans and Other Practices

Pat Murphy

NRCS retired

Laura Ward Good

Senior Scientist

SnapPlus Project Director

Department of Soil Science

UW-Madison

Healthy Farms, Healthy Lakes Task Force Meeting

February 7, 2018

What is a nutrient management plan?

Formal or informal plan to apply nutrients to agricultural land to maintain/enhance crop productivity while considering costs, farm workload and available equipment.

First Year Corn Silage Fields						Crop Removal				Soil Test		Adjusted Recs lb/ac			Planned Applications and Credits lb/ac			Over(+) Under(-) Adj. UW Recs lb/ac			Applications				
Name	Field Ac.	Slp %	Soil Map Symbol (pred) & N Res	Prior Crop	2018 Crop	Yield Goal	P2O5	K2O	Tillage	Avg P	Avg K	N	P2O5	K2O	N	P2O5	K2O	N	P2O5	K2O	Product Name and Analysis	Appln Rate and Method	N-P2O5-K2O credit	App Time	Total Amt
1	17.7	9	PoB	missing	Corn silage	25.1-30	100	230	SCND	27	77	190	50	285	190	96	272	0	46	-13	28% UAN (Liquid 28-0-0) 28-0-0	10 gal Spring Unincorp	30-0-0		177 gal
																					Dairy Slurry 10-6-17	16000 gal Fall Incorp	160-96-272		283200 gal

590 Nutrient Management

- Managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.

- Natural Resources Conservation Service (NRCS) Conservation Practice Standard
  - Recognized by the Environmental Protection Agency as “Best Available Technology” for prevention of non-point nutrient loss from ag land.
    - Is NOT intended to be a zero discharge practice.
    - Clean Water Act Stormwater Discharge variance does NOT prohibit the loss of manure sourced nutrients once incorporated into the soil as a fertilizer (at agronomic rates).
  - Recognized by the State of Wisconsin (NRCS, DATCP) as the basis for enforcement of Agricultural Performance Standards and baseline for WPDES permit language.

590 Nutrient Management

- Introduced in 1999 by the USDA/EPA Unified National Strategy for Animal Feeding Operations

- Initial resistance to adoption
  - Agriculture – limit management options
  - Ag retailers – potential to limit fertilizer sales
  - Biosolids generators – farmers less likely to accept sludge if P levels already high

- Raised the expected level of management;
  - Base nutrient applications based on soil test results and “crop need” as identified by peer reviewed research (primarily land grant universities).
  - Mandated development of a nutrient budget for both Nitrogen and Phosphorous.
  - Utilized conservation planning resource assessments to add additional layers of protection for surface/groundwater and later air resources.

590 Nutrient Management

Requires:

- Soil Loss to Tolerable Rates (T).
- Concentrated Flow Channels maintained in permanent vegetation.

Does NOT prohibit application of solid manure to frozen and snow covered soil.

- Provides specific mitigation practices to limit runoff (limited rates, runoff minimizing practices).
- Permitted farms and farms with liquid manure are prohibited from applying to frozen and snow covered ground.

Manure Storage as a Nutrient Loss Reduction Tool

+ Prevents application of manure during some periods of runoff risk.
+ Frees up farm labor needed for daily haul.

- Condenses manure application into spring and fall when soil conditions can be unfavorable for use of application equipment (compaction).
- Use of maximum application rates (costs/short window) increase loss of N to groundwater.
- Structures leak (liners have a limited service life).
- Structures expensive (public funding decreasing/small farms less likely to cash flow costs).

590 Nutrient Management

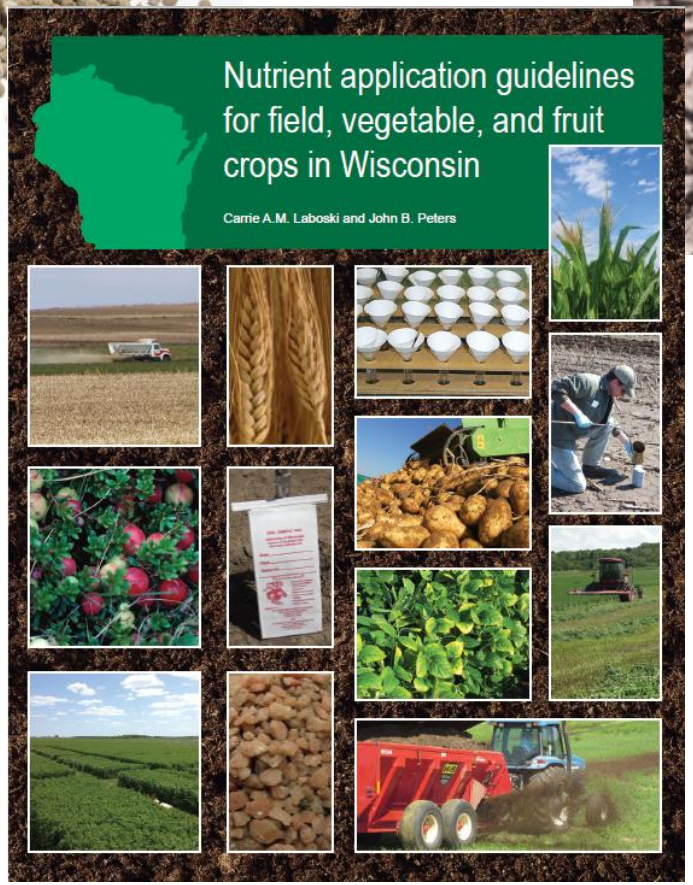
Roadblocks to implementing water quality conservation:

- Federal contracting requirements (DUNS/SCIMS).
- Mandatory treatment of all sources of livestock waste (limits small farms).
- Protracted timelines for application/contracting/design (3 years farmstead).
- State bias toward “bonding $” limits use of management practices (rented land limits usefulness of construction cropland practices).
- Availability of technically adequate staff (agronomy, design – certification).
- Lack of meaningful private sector engagement (adds non-agronomist tasks/costs, existing processes to allow use are burdensome/low return for commitment).
- High level of practice performance to justify public funding limits number of farmers willing to fully adopt practices.

590 Nutrient Management

- Soil Nutrient Application Planner (SNAP) was the primary agronomic nutrient application planning tool in use in 2001.
- Conservation agencies agreed to continue to use and enhance SNAP (now SnapPlus) as the primary tool to support the upgraded 590 practice.
- 2005 590 introduced the Phosphorus Index (PI) and SnapPlus allowing detailed planning.
  - Generalized assessment of the risk for P loss to surface water.
  - Acceptable (in concept) to move excessive P applications to low delivery risk fields.
  - SnapPlus provides some modeling of runoff P delivery to surface waters.
  - Recognized nationally as a model for a responsive planning tool widely used by WI agronomists and environmental protection planners.

NMP Goal: Provide nutrients for crop growth



NPM Goal: Protect water quality

Groundwater

Surface water

Crop Nutrients

Big three for crop growth

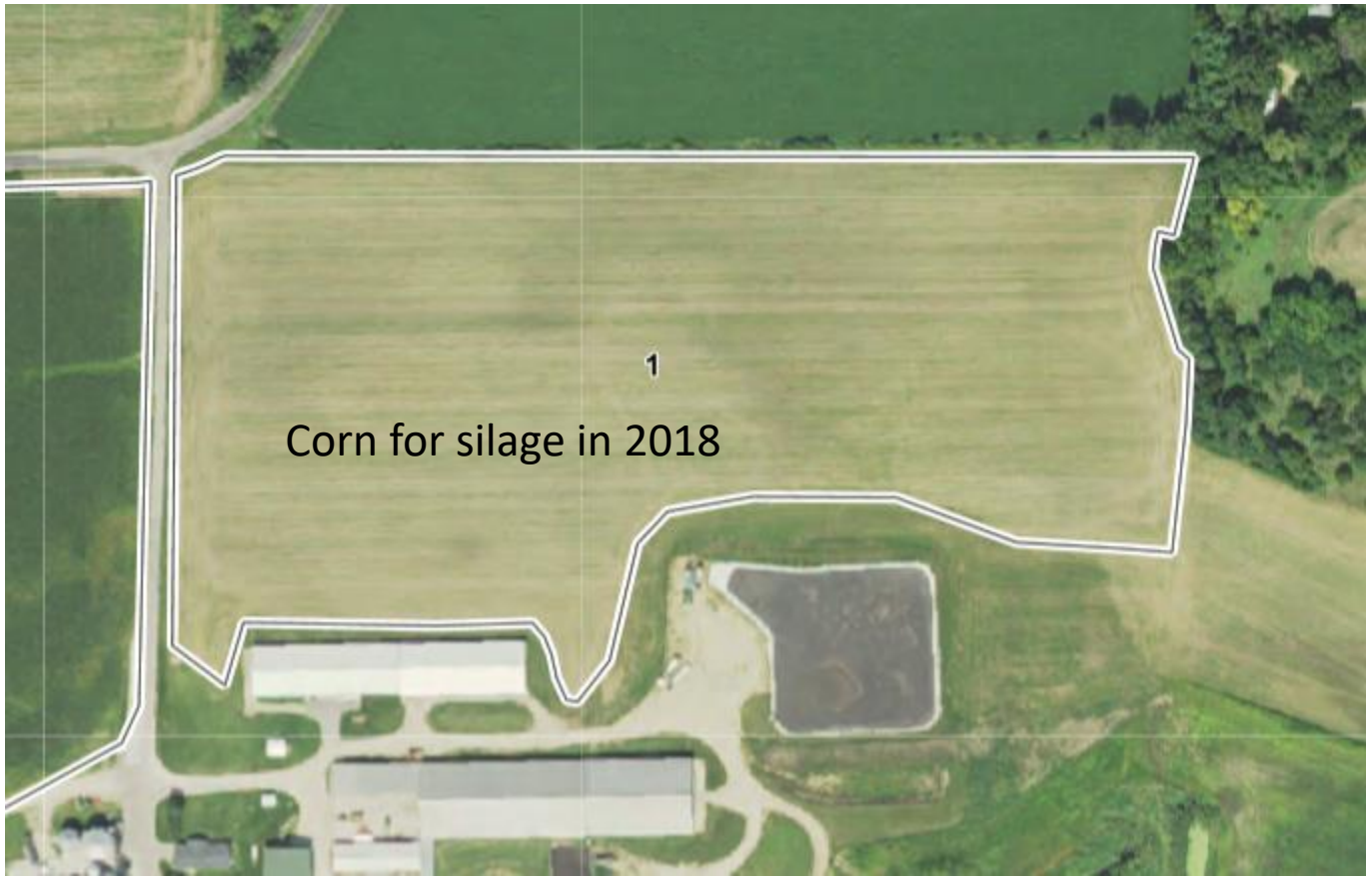
- Nitrogen (N)
- Phosphorus (P_2O_5)
- Potassium (K_2O)

Big two for water problems

- Nitrogen (N)
- Phosphorus (P)
- Potassium (K)

Field 1

17.7 acres

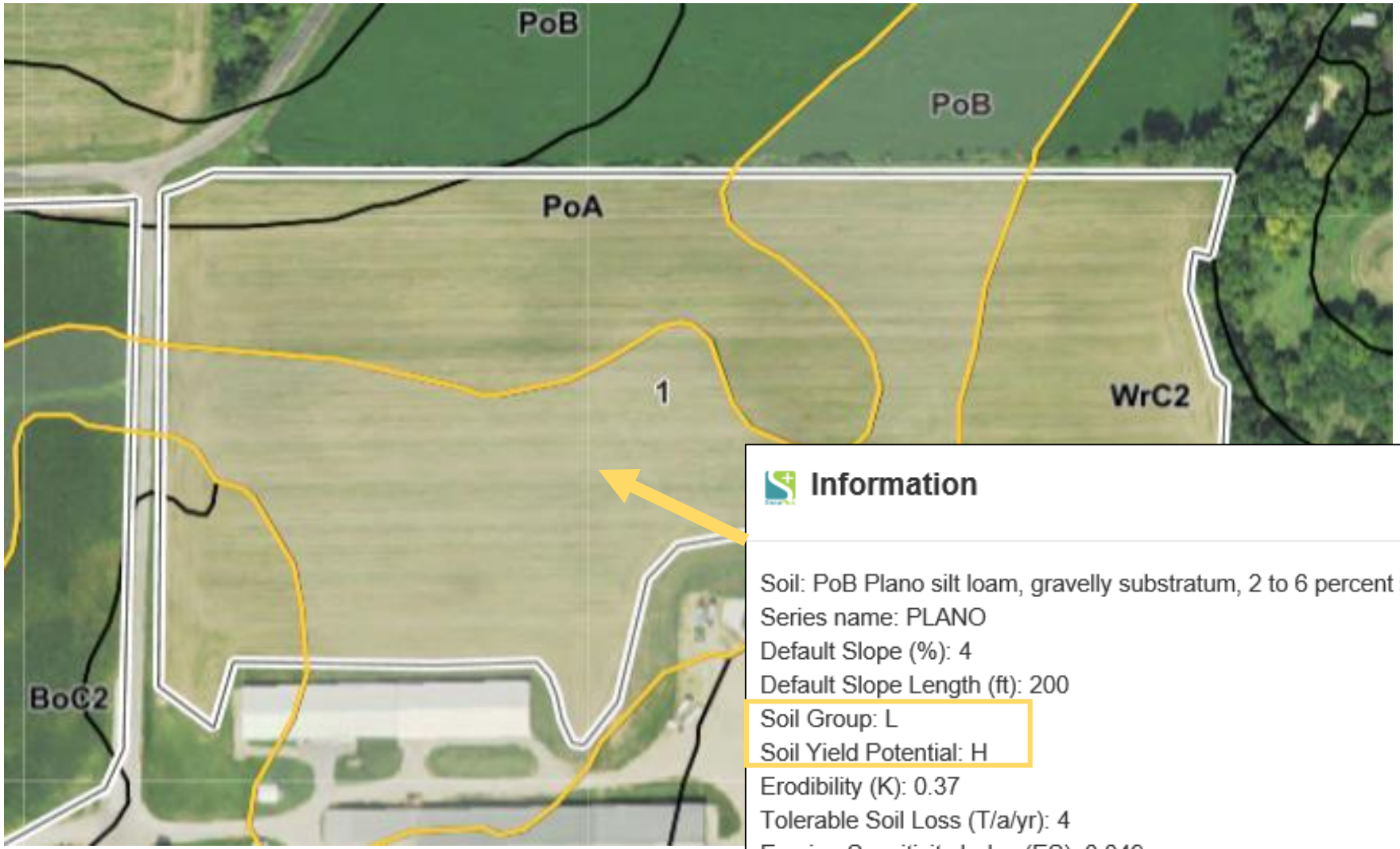


Step 1 Soil test

What is a routine agronomic soil test?

Year	Soil Test	pH	OM	P	K
2018	2015-11-05	6.5	2.7	27	77

Step 2 Identify predominant soil type



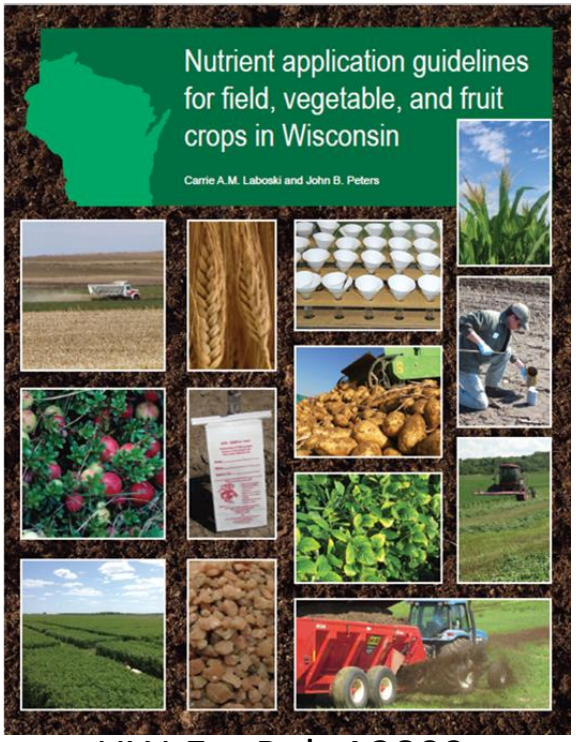
Information

Soil: PoB Plano silt loam, gravelly substratum, 2 to 6 percent slopes
Series name: PLANO
Default Slope (%): 4
Default Slope Length (ft): 200
Soil Group: L
Soil Yield Potential: H
Erodibility (K): 0.37
Tolerable Soil Loss (T/a/yr): 4
Erosion Sensitivity Index (ES): 0.049
Fall N restrictions :
CAFO manure restrictions :

Step 3 Look up UW-Extension recommendations

Year	Soil Test	pH	OM	P	K
2018	2015-11-05	6.5	2.7	27	77

Soil group: Loamy
Soil yield response to N: High



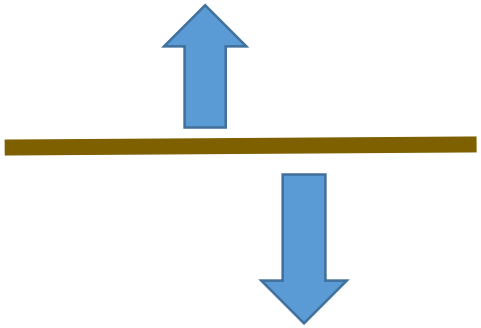
UW-Ext Pub A2809

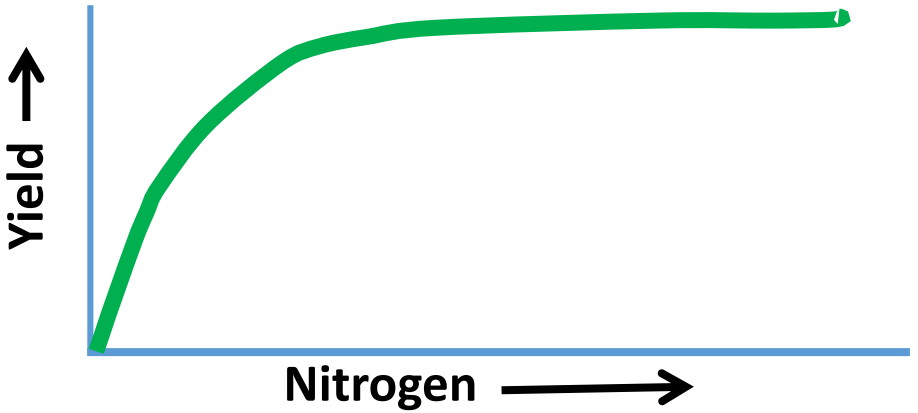
Crop Year (Fall to Fall):	2018
Crop:	Corn silage
Yield Goal:	25.1-30

(lbs/acre)	N	P2O5	K2O
UW Recommendation:	190	50	285

Nitrogen Recommendations

Nitrogen doesn't stick around





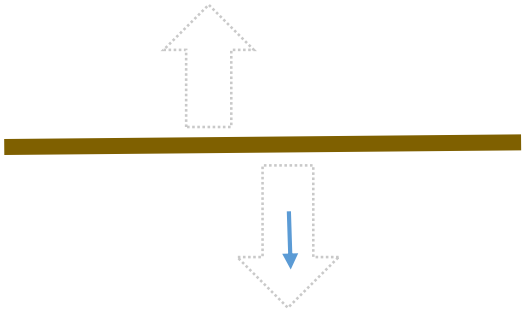
MRTN Recommendations based on $ earned

University of Wisconsin Nitrogen Guidelines for Corn

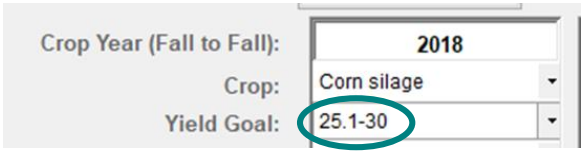
Soil[1]	Previous Crop	N:Corn Price Ratio (see table on other side) 0.05	0.10	0.15	0.20
		lbs N/acre (total to apply)[2]			
loamy: high yield potential soils	**Corn**, Forage legumes, Legume vegetables, Green manures[5]	**190**[3] 170–210[4]	**165** 155–180	**150** 140–160	**135** 125–150
	Soybean, Small grains[6]	**140** 125–160	**120** 105–130	**105** 95–115	**90** 80–105
loamy: medium yield potential soils	**Corn**, Forage legumes, Legume vegetables, Green manures[5]	**145** 130–160	**125** 115–140	**115** 105–125	**105** 95–110
	Soybean, Small grains[6]	**130** 110–150	**100** 85–120	**85** 70–95	**70** 60–80
sands/ loamy sands	Irrigated—**All crops**[5]	**215** 200–230	**200** 185–210	**185** 175–195	**175** 165–185
	Non-irrigated—**All crops**[5]	**140** 130–150	**130** 120–140	**120** 110–130	**110** 100–120

P_2O_5 and K_2O Recommendations

P and K stay in soil



Recommendations based on soil storage and expected crop removal



Year	Soil Test	pH	OM	P	K
2018	2015-11-05	6.5	2.7	27	77

	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

CORN nutrient recommendations

SILAGE

	@ 35% DM (tons/acre)	Very Low	Low	Optimum	High	Very High	Ex. High
		SOIL TEST LEVEL OF THE FIELD					
		lb P_2O_5 or K_2O/acre to apply					
Phosphate	15-20	105	95	65	35	-	0
	20-25	120	110	80	40	-	0
	25-30	140	130	100	50	-	0
	30-35	155	145	115	60	-	0
	35-40	175	165	135	70	-	0
Potash	15-20	200	185	145	75	35	0
	20-25	240	225	185	95	45	0
	25-30	285	270	230	115	60	0
	30-35	325	310	270	135	70	0
	35-40	365	350	310	155	80	0

-- Very high category does not exist for soil test phosphorus

Applying nutrients to meet recs

(lbs/acre)	N	P2O5	K2O
UW Recommendation:	190	50	285

Manure

N, P2O5, K2O & S values are for first year available nutrients in lbs/unit solid or lbs/1000 gallons

Nutrient Type	N surface	N incorp	N inject	P2O5	K2O
Dairy, slurry	7	10	12	6	17

	Source name	Season	Spread method	Acres applied	Rate	Units
▶	Dairy Slurry	Spring	Injected	17.7	12,000	gals/a...

144 lb N

Fertilizer

	Source name	Season	Spread method	Acr
	starter	Spring	Incorpor...	
▶	28% UAN (Li...	Spring	Unincor...	

(lbs/acre)	N	P2O5	K2O
UW Recommendation:	190	50	285
This year's manure:	144	72	204
This year's fertilizer:	42	23	30
Total credits & applications:	**186**	**95**	**234**
Over(+)/Under(-) adj UW rec:	**-4**	**45**	**-51**

Identifying over-applications

Nitrogen: Can't exceed recommendations

Adjusted UW recommendation:	190	50	285
1st & 2nd year legume credit:	0	-	-
2nd & 3rd year manure credit:	0	-	-
This year's manure:	192	96	272
This year's fertilizer:	59	0	0
Total credits & applications:	251	96	272
Over(+)/Under(-) adj UW rec:	61	46	-13

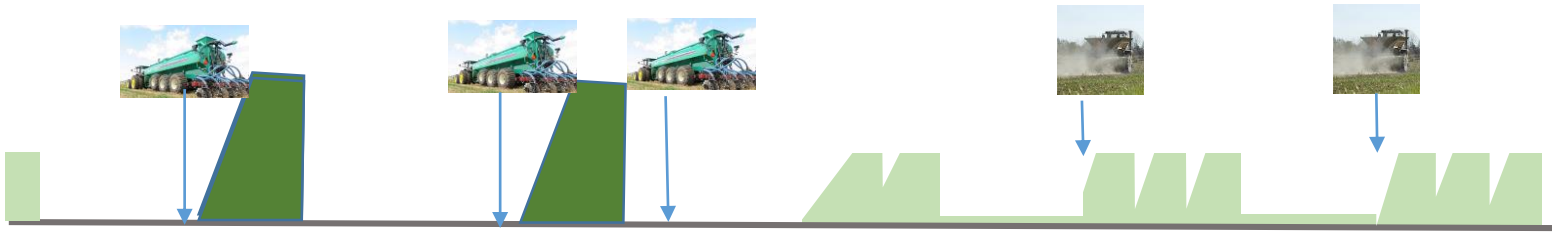
Phosphorus:

- Fertilizer can't exceed rotation recommendations
- Manure phosphorus has options:

  Soil test P balance

  P Index

Phosphorous is managed over the crop rotation



Crop Year (Fall to Fall):	2018	2019	2020	2021	2022
Crop:	Corn silage	Corn silage	Alfalfa Seeding Spring	Alfalfa	Alfalfa
Yield Goal:	25.1-30	25.1-30	2.6-3.5	3.6-4.5	3.6-4.5
Tillage:	Spring Chisel, no disk	Spring Chisel, no disk	Spring Chisel, no disk	None	None

Soil Test P Balance

All Rotation Additions - Crop Removal

	P2O5	K2O	
Removal	340	1K	lb/ac
Balance	-90	6	lb/ac

Soil test P is 50 or less so no P2O5 balance target is needed.

P Index

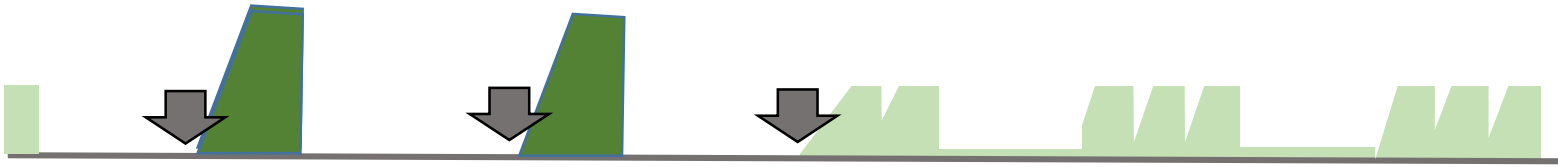
Estimates runoff P losses

Summary 2018 to 2022			
Avg soil loss	4.6		t/ac/yr
Field "T"	3		t/ac/yr
Avg P Index	4	SCI	0.0

Erosion

590: No manure or fertilizer on fields with soil loss above T

Summary 2018 to 2022		
Avg soil loss	4.6	t/ac/yr
Field "T"	3	t/ac/yr



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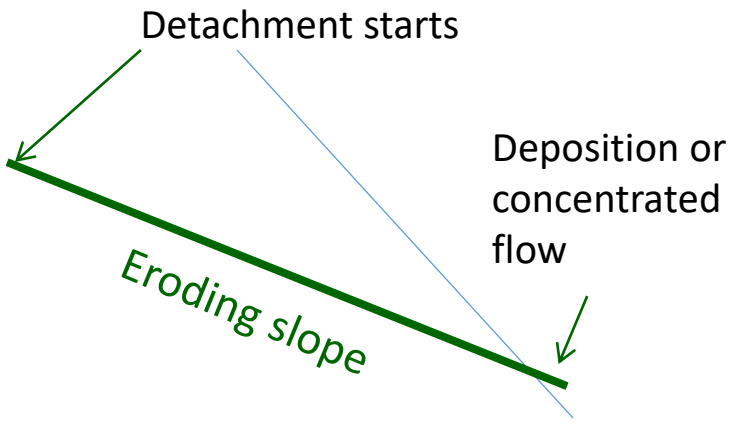
Tillage:	Spring Chisel, no disk	Spring Chisel, no disk	Spring Chisel, no disk	None	None

RUSLE2

Universal Soil Loss Equation

Erosion = R x K x S x L x C x P

- R = Erosivity of local rainfall
- K = Erodibility of soil
- S = Slope steepness
- L = Slope length
- C = Cover management
- P = Practices



Result: Average annual sheet and rill erosion on a slope in ton/acre/year

SnapPlus RUSLE2 soil loss estimates

- Simplify steps for users
- Follow NRCS guidelines, use dominant critical soil

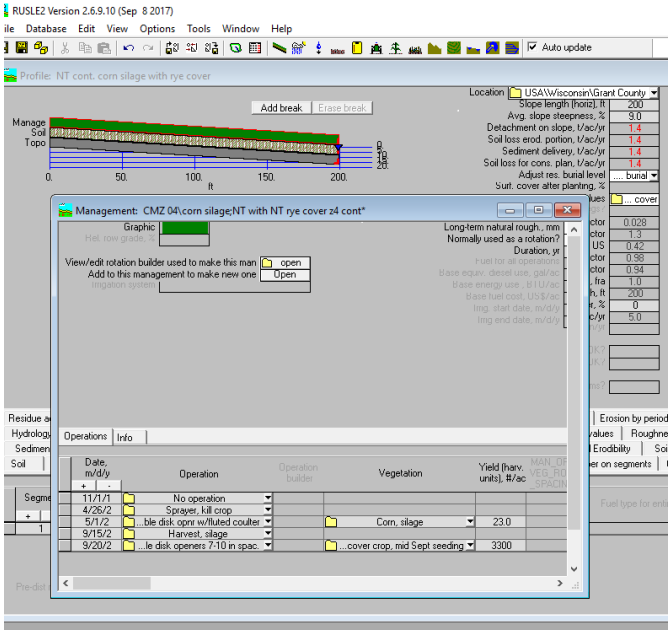
Dominant critical soil details:

Name: Warsaw

Symbol: WrC2 Slope: 9.0

Texture: Silt Loam

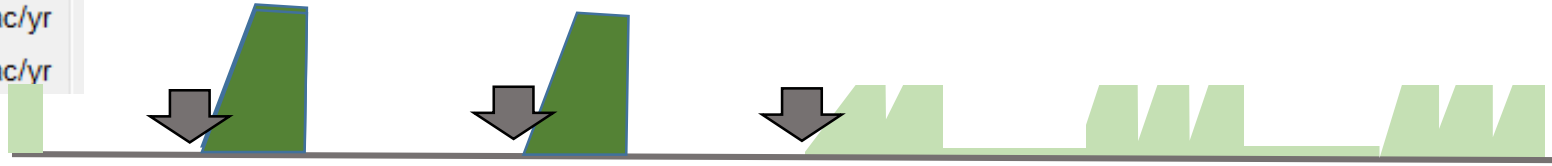
- Err on side of over-estimating soil loss



T is not a water quality standard

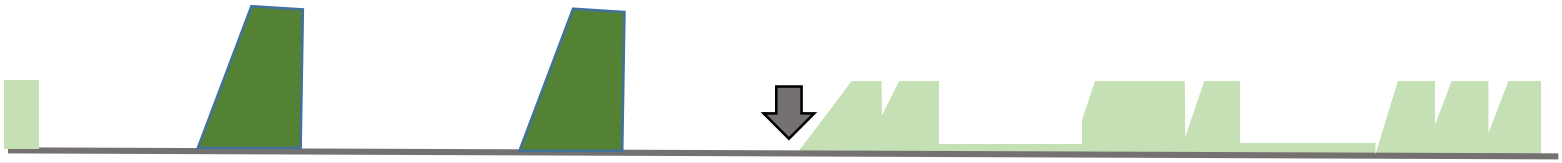
Reducing tillage reduces soil loss

Summary 2018 to 2022		
Avg soil loss	4.6	t/ac/yr
Field "T"	3	t/ac/yr



Crop Year (Fall to Fall):	2018	2019	2020	2021	2022
Crop:	Corn silage	Corn silage	Alfalfa Seeding Spring	Alfalfa	Alfalfa
Yield Goal:	25.1-30	25.1-30	2.6-3.5	3.6-4.5	3.6-4.5
Tillage:	Spring Chisel, no disk	Spring Chisel, no disk	Spring Chisel, no disk	None	None

Summary 2018 to 2022		
Avg soil loss	2.3	t/ac/yr
Field "T"	3	t/ac/yr



2018	2019	2020	2021	2022
Corn silage	Corn silage	Alfalfa Seeding Spring	Alfalfa	Alfalfa
25.1-30	25.1-30	2.6-3.5	3.6-4.5	3.6-4.5
No Till	No Till	Spring vertical tillage	None	None

Other methods to reduce soil loss

Adjust crop rotation to add soil cover

Cover crops

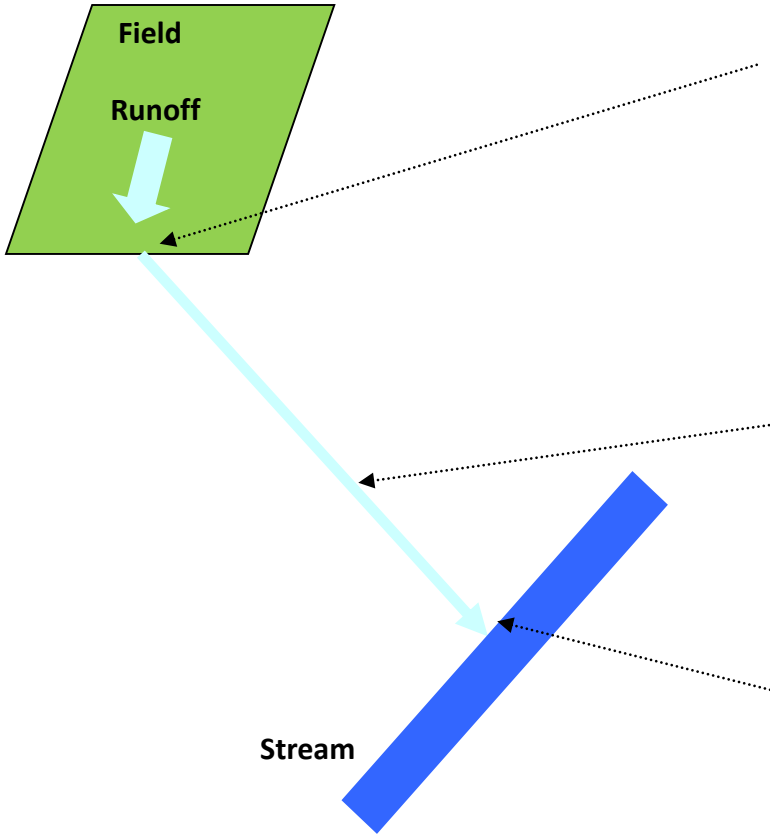
Contour farming

Strip cropping

Contour grass buffers

Wisconsin P Index

P Index estimates P delivery to nearest surface water body in lb/a/yr with long-term average weather



Annual "field-edge" runoff losses estimated for each crop year:

- *Sediment-bound P*
- *Dissolved P from soil*
- *Dissolved P from manure and fertilizer*

x

Total P field to stream delivery ratio

=

Annual P delivery to stream (P Index)

Not a water quality assessment

Erodible or Dissolvable Phosphorus

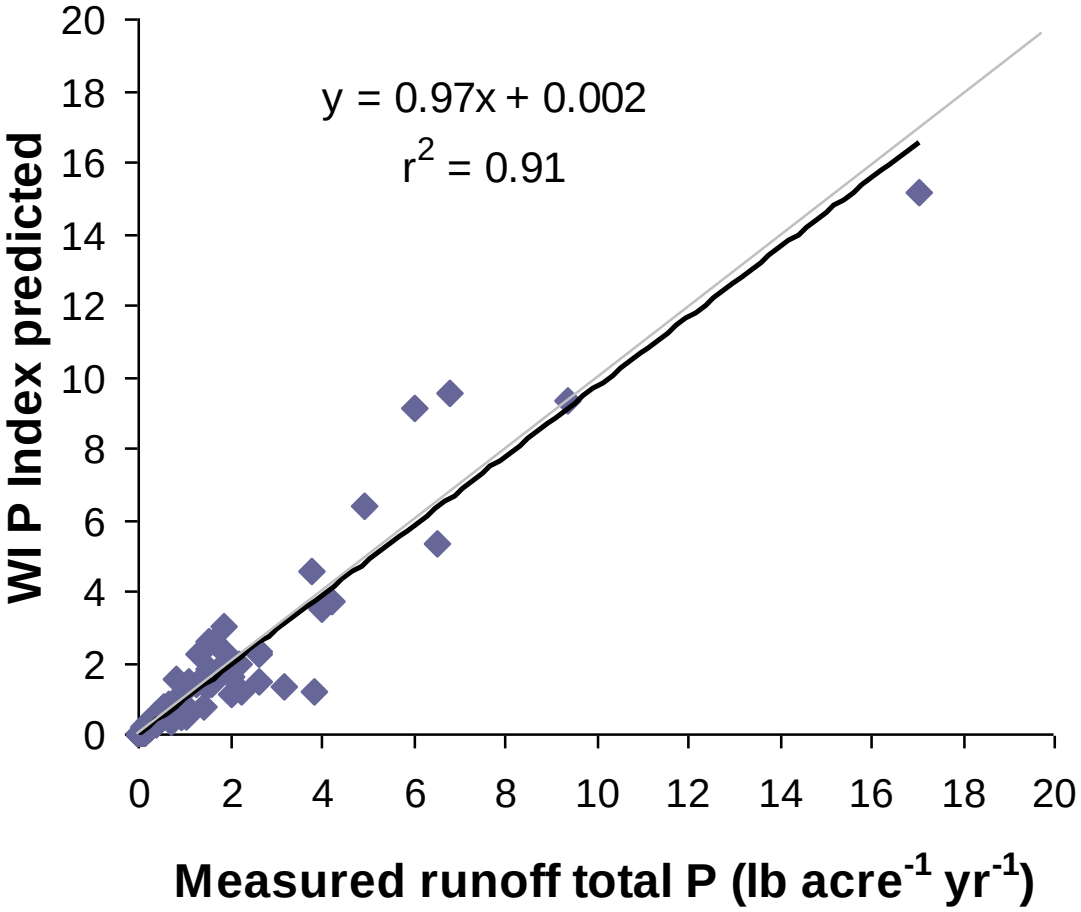
and

Erosion and Runoff

=

P Losses

"Source" Components of P Index Equations Tested



Revised WI P Index compared to measured runoff losses for 86 site years using measured sediment and runoff volume in the equations

Source: Good, L.W., P. Vadas, J.C. Panuska, C.A. Bonilla, W.E. Jokela, 2012. Testing the Wisconsin Phosphorus Index with Year-Round Field-Scale Runoff Monitoring. Journal of Environmental Quality. 41:1730-1740.

Estimating Transport

- Eroding sediment

  - RUSLE2 erosion

- Rainfall runoff

  - Runoff curve numbers

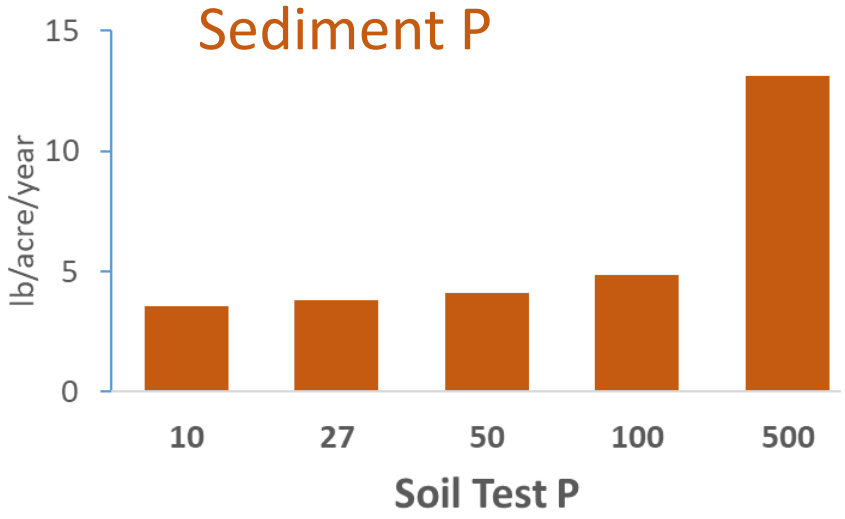
- Snowmelt runoff

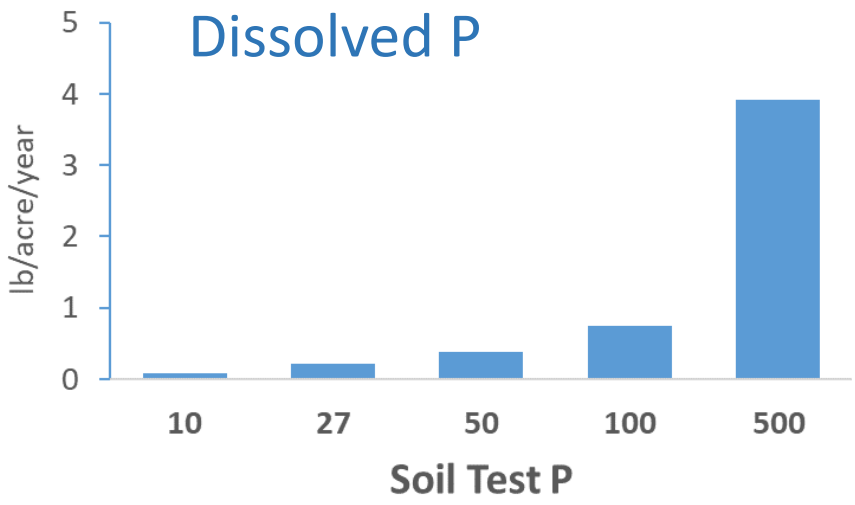
  - Method based on surface depressional storage and measured long-term average winter runoff for agricultural watersheds

Soil test P and P losses

- Sediment P related to Soil total P related to soil organic matter and soil test P
- Runoff dissolved P related to soil test P

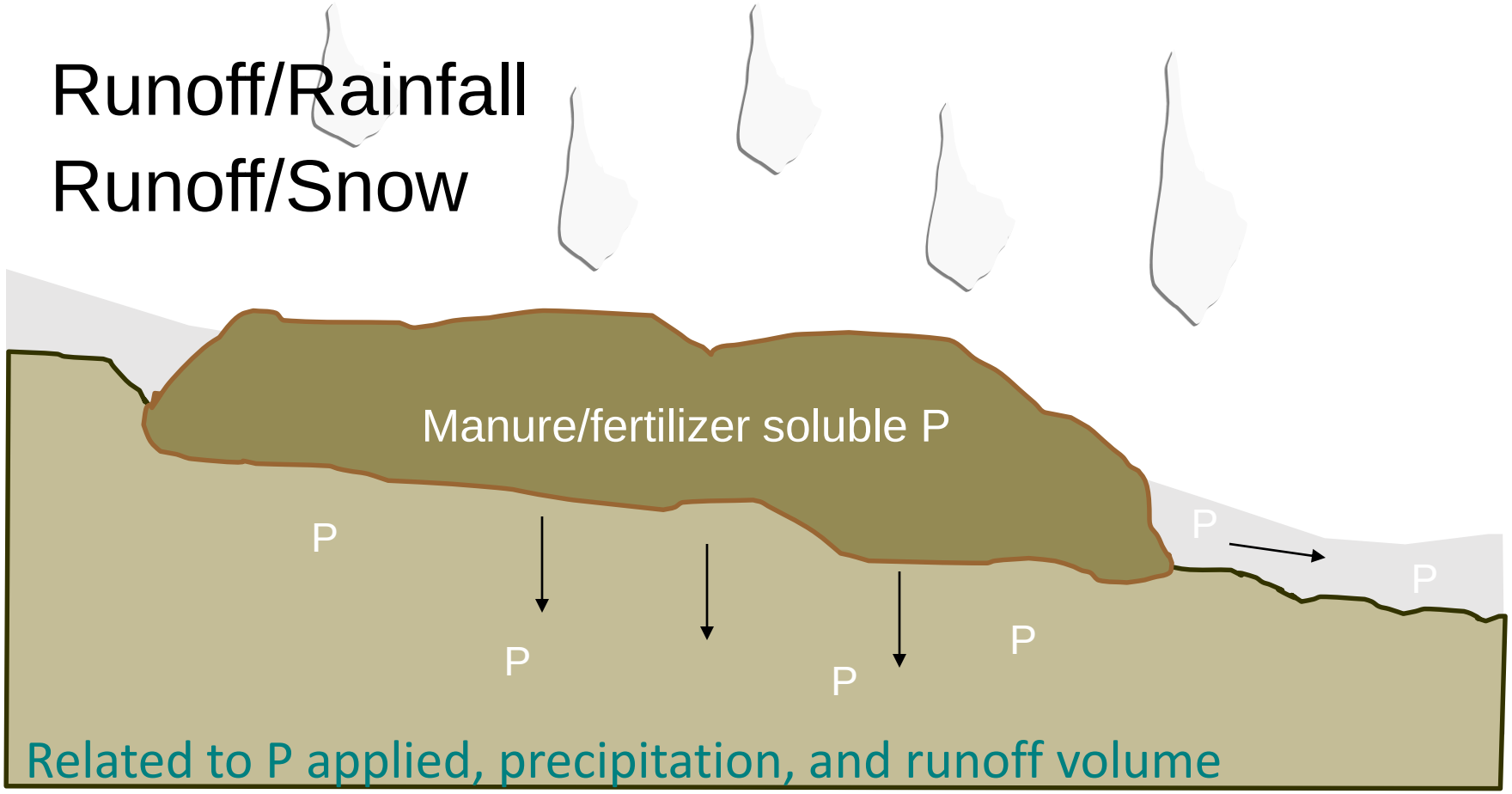
Estimated runoff P losses for example field varying soil test P





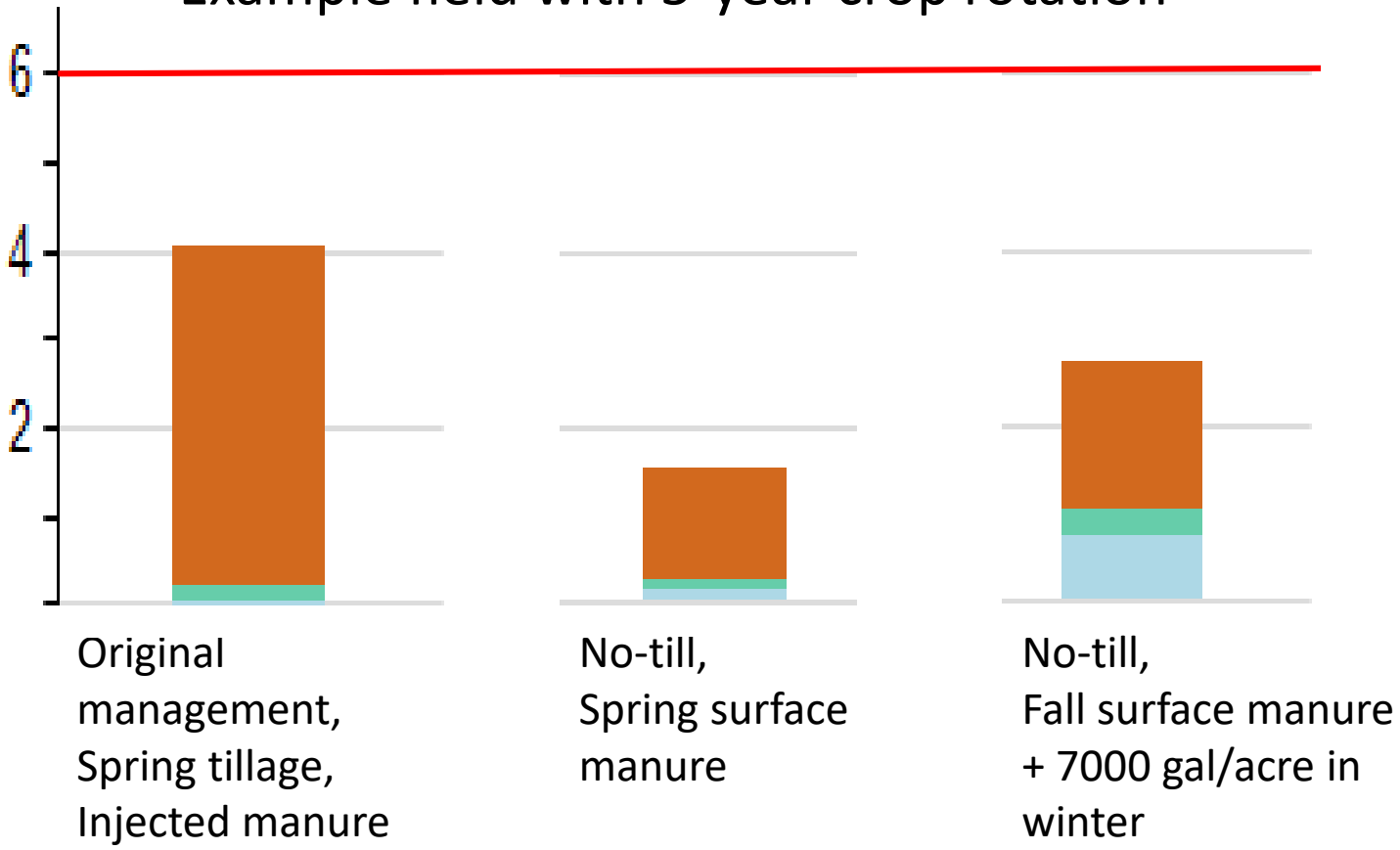
Soil test P, Dane County 2010-14: 50 ppm average and 500 ppm maximum

P losses from manure or fertilizer

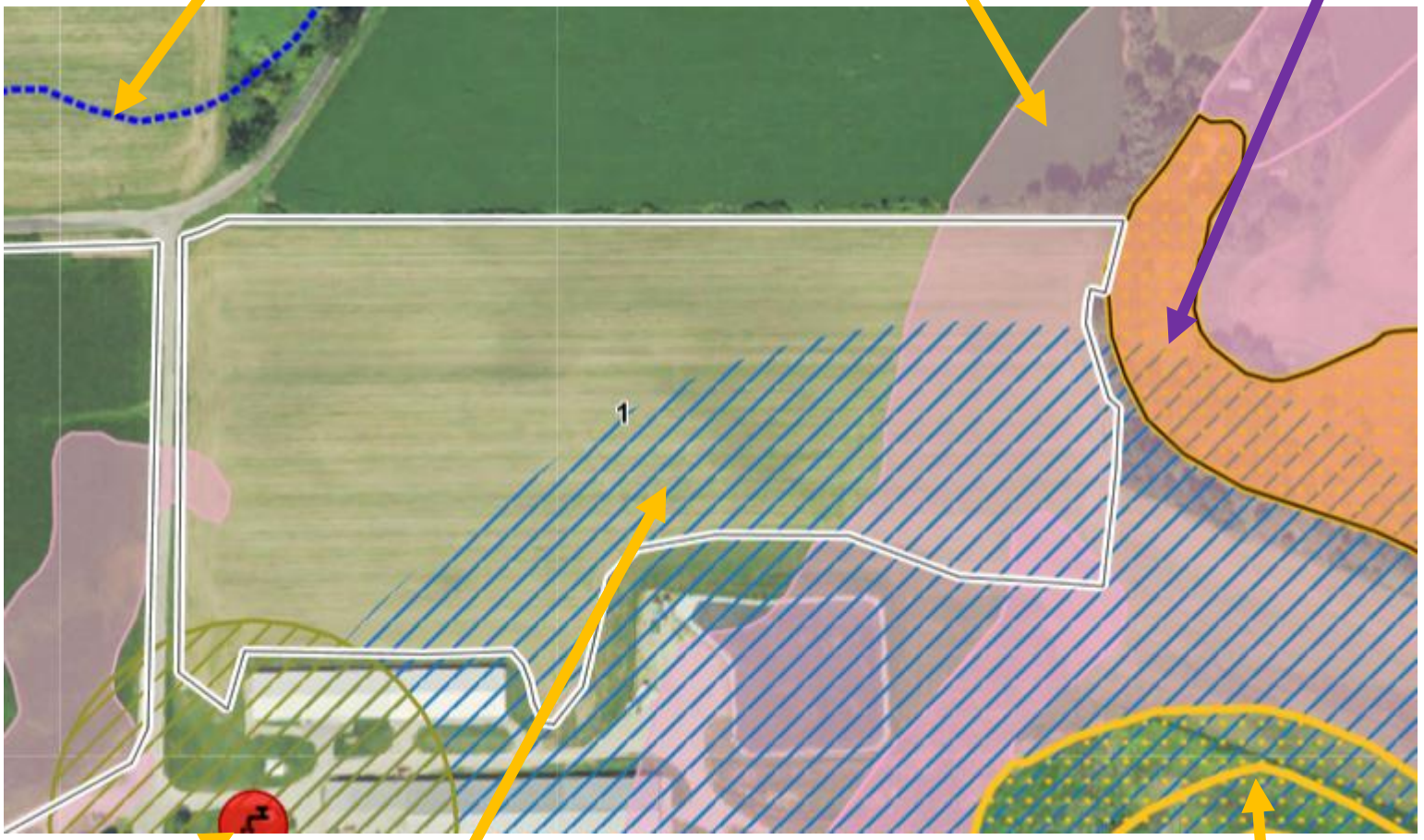


P Index varies with management

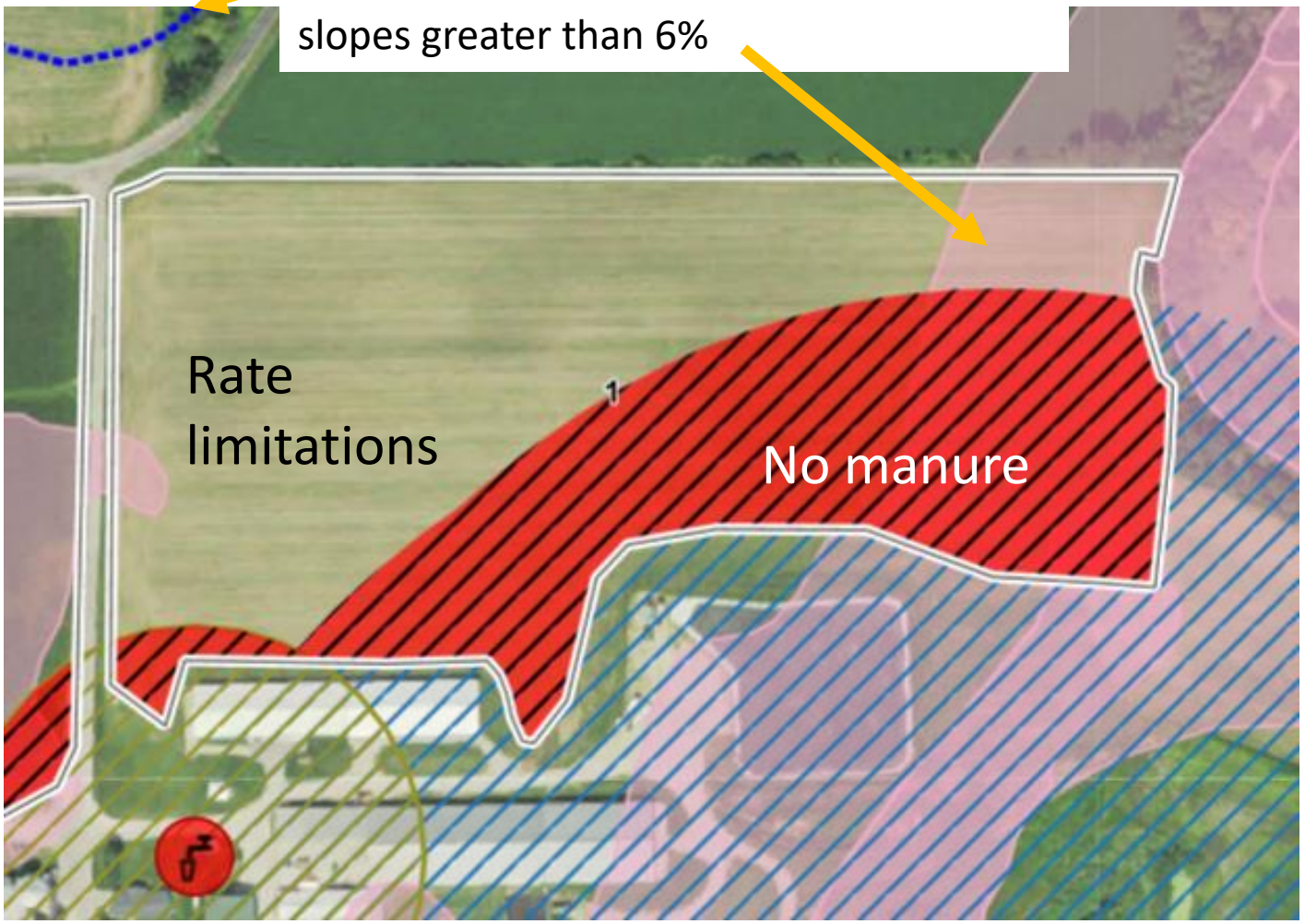
Example field with 5-year crop rotation



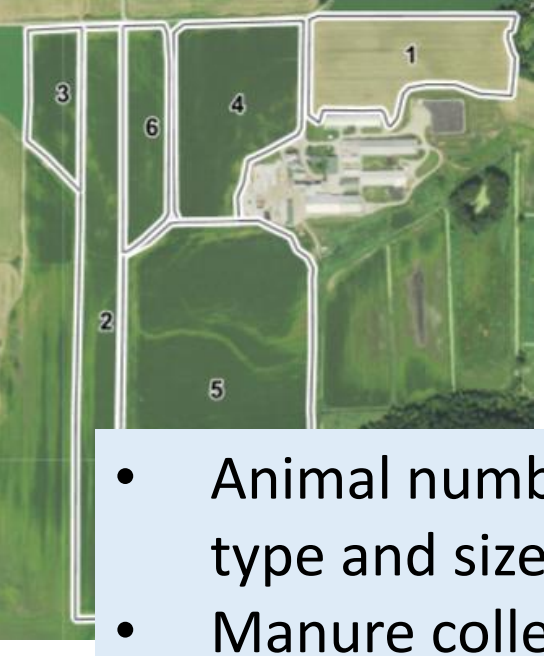
590: Nutrient application restriction areas



590: Winter spreading restrictions



590: Farm-level calculations



- Animal numbers, type and size
- Manure collected and stored

→ Manure produced

-

Manure spread

=

Manure surplus/deficit

All manure produced must be accounted for

Farm level nutrient supply accounting

- Manure (how many animals, when its available, do they have storage in the winter, are their animals out on pasture, where does the manure go?)
- Amount of manure and when it needs to be spread
- Is there enough storage or fields suitable for winter spreading?
- N, P, K content of the manure
- Equipment for spreading (how many tons per acre can it spread?)
- Fertilizers to fill remaining recommendations

Example: Planning for a small dairy farm

70 milk cows +
70 calves/young cows

Manure

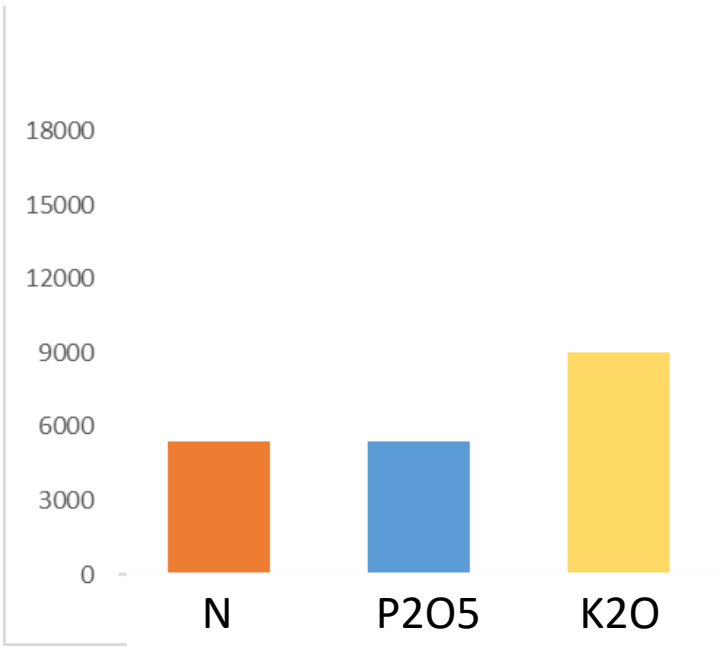
2600 tons per year

- 1800 tons collected and spread on fields
- 800 tons deposited on pasture

Farm level nutrient supply vs crop need

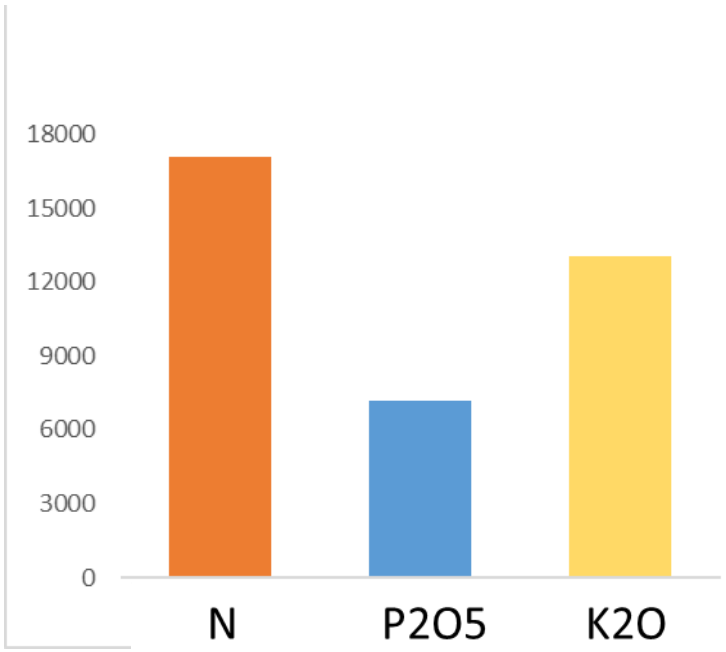
1800 ton manure

Crop-available nutrients in lb.



Corn need for 90 acre

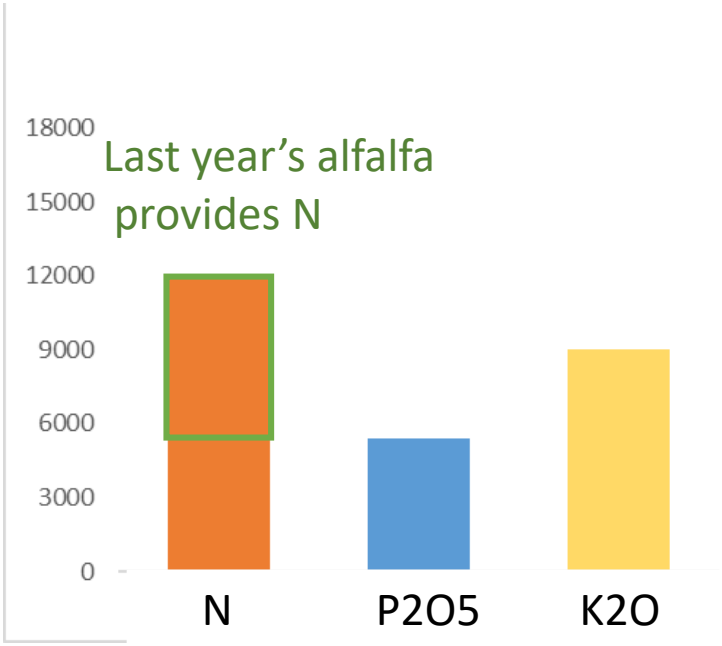
Required nutrients in lb.



Farm level nutrient supply vs crop need

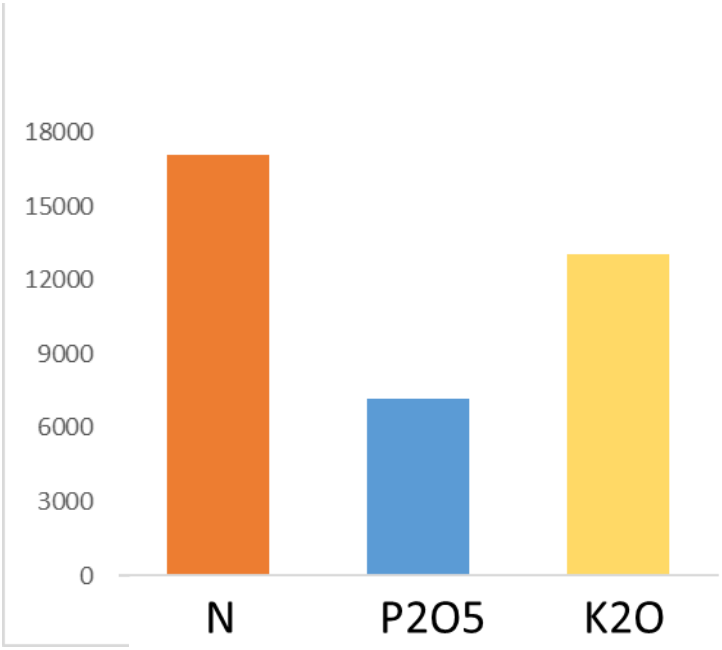
1800 ton manure

Crop-available nutrients in lb.



Corn need for 90 acre

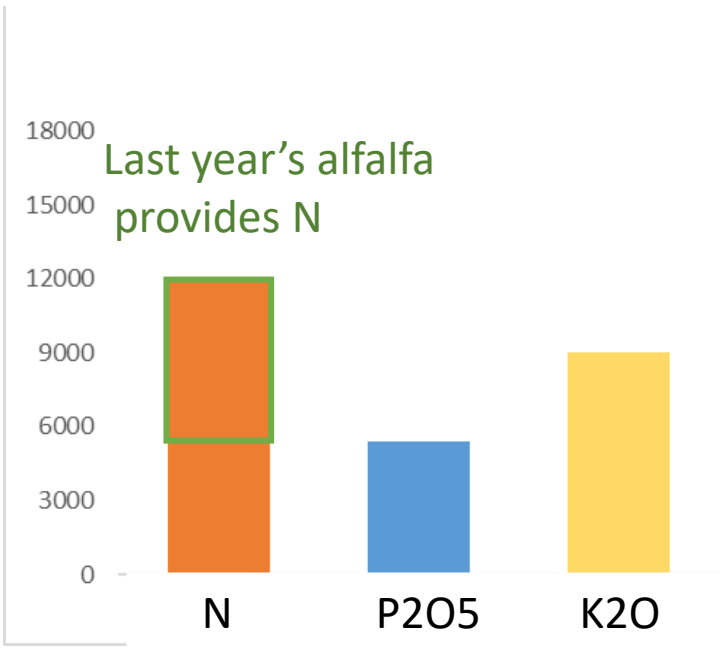
Required nutrients in lb.



Farm level nutrient supply vs crop need

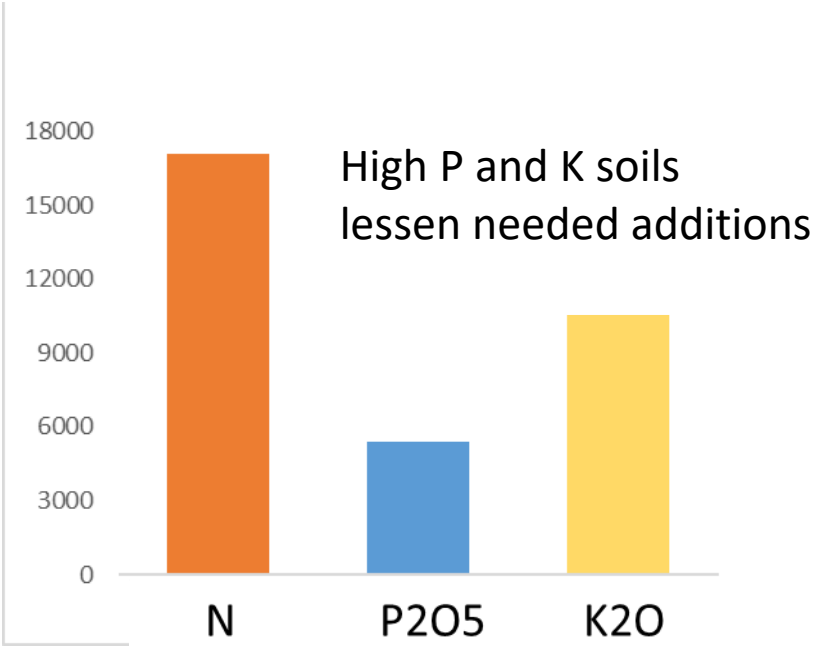
1800 ton manure

Crop-available nutrients in lb.



Corn need for 90 acre

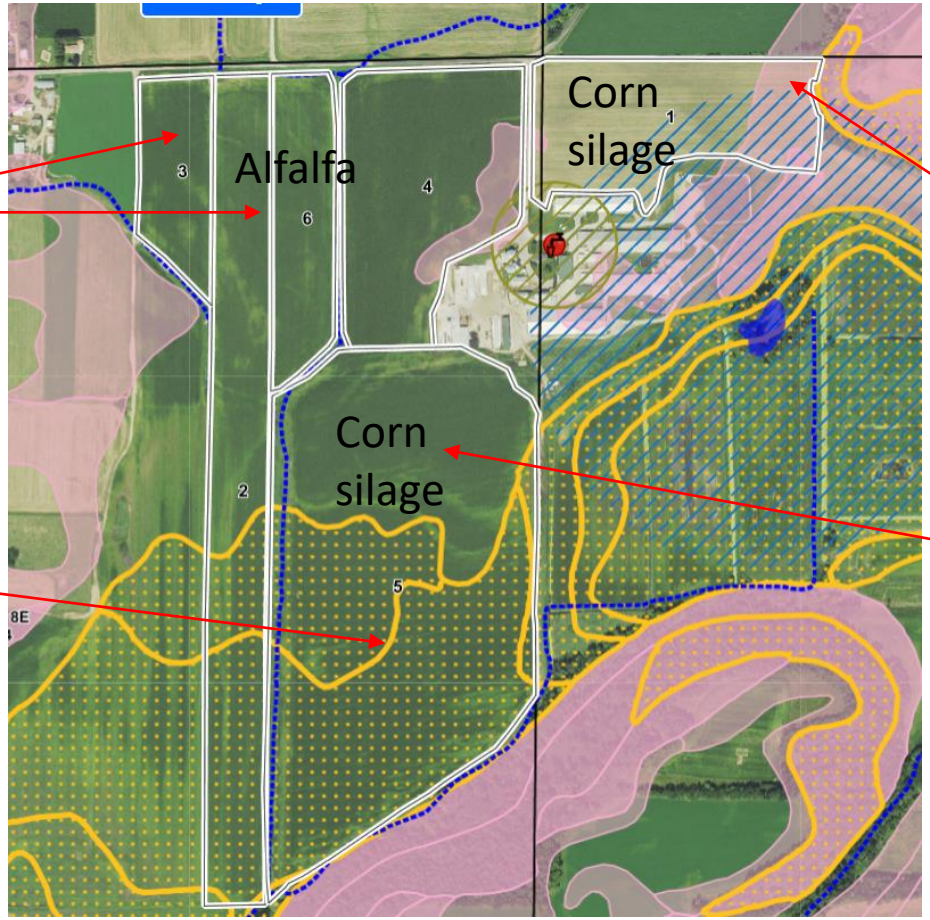
Required nutrients in lb.



Challenge to get farm plan to work at field level every year

Don’t want to put manure on alfalfa

Fall N restrictions

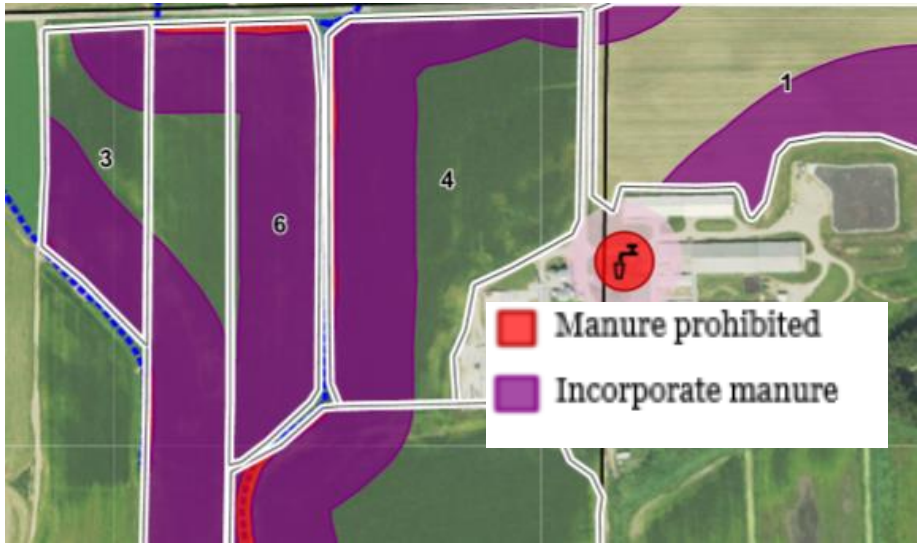


Limitations on winter spreading

Soil high in phosphorus already

CAFO plans more restrictive

- No winter spreading of liquid manures
- Limitations on winter spreading solid manures
- Manure prohibition setbacks on conduits to groundwater and concentrated flow channels



Who does NM Planning in Wisconsin?

Certified Crop Advisers
- Lab Agronomists
- Coop Agronomists
- Independent crop consultants

Farmers in NM training

SnapPlus

Who sees the plans?

Farmers - *Data confidentiality is an increasing concern. Once in the public record, all of data is available for review.*

Haulers and applicators (sometimes)

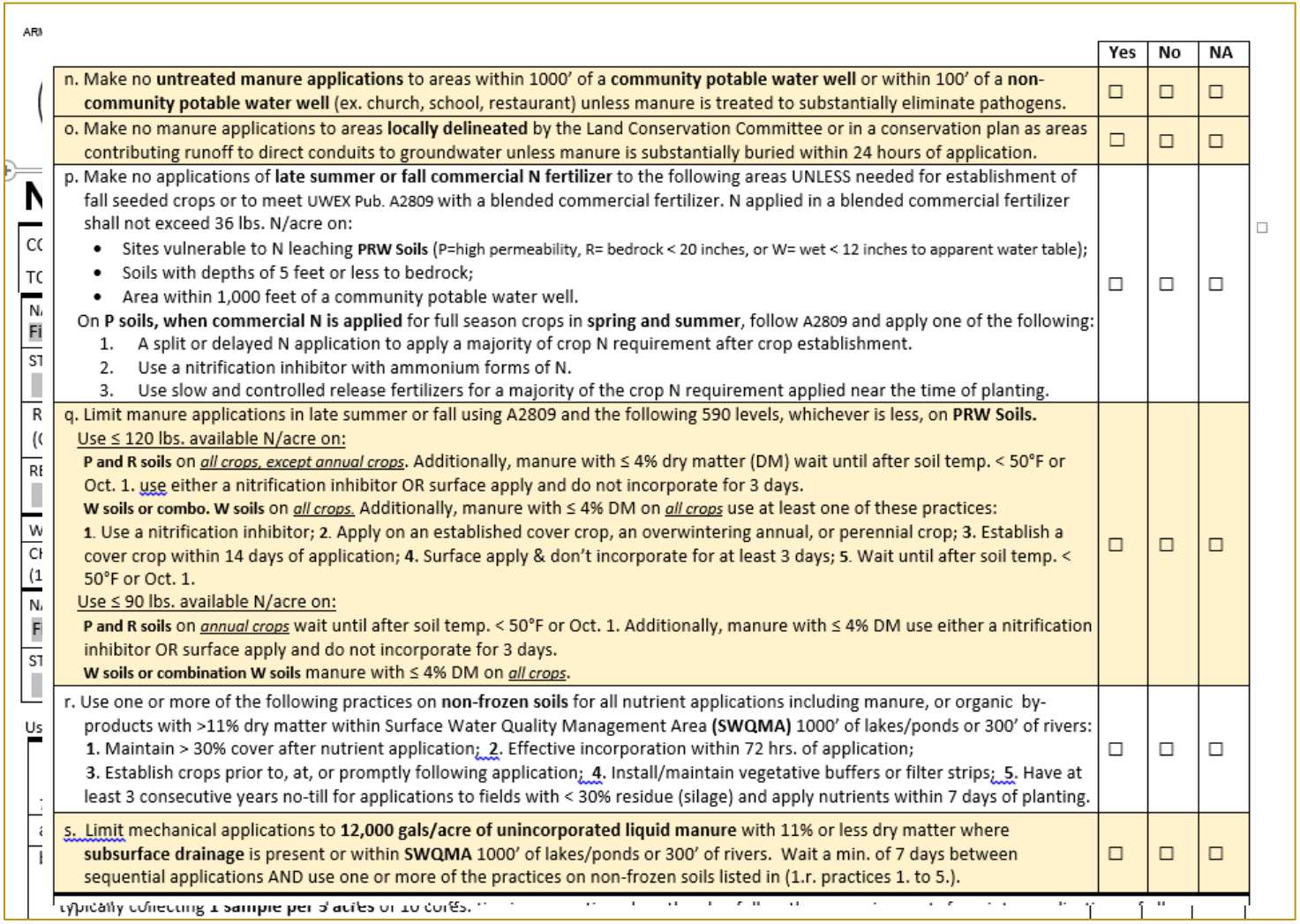
County Land Conservation Department may receive (depending on program and cost-sharing):

- Complete plan on paper
- SnapPlus database
- Checklist (for updates)

CAFO plans – DNR requires complete plan with maps

Nutrient Management Checklist

DATCP collects checklists



	Yes	No	NA
n. Make no **untreated manure applications** to areas within 1000' of a **community potable water well** or within 100' of a **non-community potable water well** (ex. church, school, restaurant) unless manure is treated to substantially eliminate pathogens.	☐	☐	☐
o. Make no manure applications to areas **locally delineated** by the Land Conservation Committee or in a conservation plan as areas contributing runoff to direct conduits to groundwater unless manure is substantially buried within 24 hours of application.	☐	☐	☐
p. Make no applications of **late summer or fall commercial N fertilizer** to the following areas UNLESS needed for establishment of fall seeded crops or to meet UWEX Pub. A2809 with a blended commercial fertilizer. N applied in a blended commercial fertilizer shall not exceed 36 lbs. N/acre on: • Sites vulnerable to N leaching **PRW Soils** (P=high permeability, R= bedrock < 20 inches, or W= wet < 12 inches to apparent water table); • Soils with depths of 5 feet or less to bedrock; • Area within 1,000 feet of a community potable water well. On **P soils, when commercial N is applied** for full season crops in **spring and summer**, follow A2809 and apply one of the following: 1. A split or delayed N application to apply a majority of crop N requirement after crop establishment. 2. Use a nitrification inhibitor with ammonium forms of N. 3. Use slow and controlled release fertilizers for a majority of the crop N requirement applied near the time of planting.	☐	☐	☐
q. Limit manure applications in late summer or fall using A2809 and the following 590 levels, whichever is less, on **PRW Soils.** Use ≤ 120 lbs. available N/acre on: **P and R soils** on *all crops, except annual crops*. Additionally, manure with ≤ 4% dry matter (DM) wait until after soil temp. < 50°F or Oct. 1. use either a nitrification inhibitor OR surface apply and do not incorporate for 3 days. **W soils or combo. W soils** on *all crops.* Additionally, manure with ≤ 4% DM on *all crops* use at least one of these practices: **1**. Use a nitrification inhibitor; **2**. Apply on an established cover crop, an overwintering annual, or perennial crop; **3**. Establish a cover crop within 14 days of application; **4**. Surface apply & don't incorporate for at least 3 days; **5**. Wait until after soil temp. < 50°F or Oct. 1. Use ≤ 90 lbs. available N/acre on: **P and R soils** on *annual crops* wait until after soil temp. < 50°F or Oct. 1. Additionally, manure with ≤ 4% DM use either a nitrification inhibitor OR surface apply and do not incorporate for 3 days. **W soils or combination W soils** manure with ≤ 4% DM on *all crops*.	☐	☐	☐
r. Use one or more of the following practices on **non-frozen soils** for all nutrient applications including manure, or organic by-products with >11% dry matter within Surface Water Quality Management Area **(SWQMA)** 1000' of lakes/ponds or 300' of rivers: **1.** Maintain > 30% cover after nutrient application; **2.** Effective incorporation within 72 hrs. of application; **3.** Establish crops prior to, at, or promptly following application; **4.** Install/maintain vegetative buffers or filter strips; **5.** Have at least 3 consecutive years no-till for applications to fields with < 30% residue (silage) and apply nutrients within 7 days of planting.	☐	☐	☐
s. Limit mechanical applications to **12,000 gals/acre of unincorporated liquid manure** with 11% or less dry matter where **subsurface drainage** is present or within **SWQMA** 1000' of lakes/ponds or 300' of rivers. Wait a min. of 7 days between sequential applications AND use one or more of the practices on non-frozen soils listed in (1.r. practices 1. to 5.).	☐	☐	☐

WDATCP Instructions to NM planners:

- Review NM plan annually
- Make changes if needed
- Submit checklist annually to your county
- Use as a NM plan review form

Who checks implementation?

?

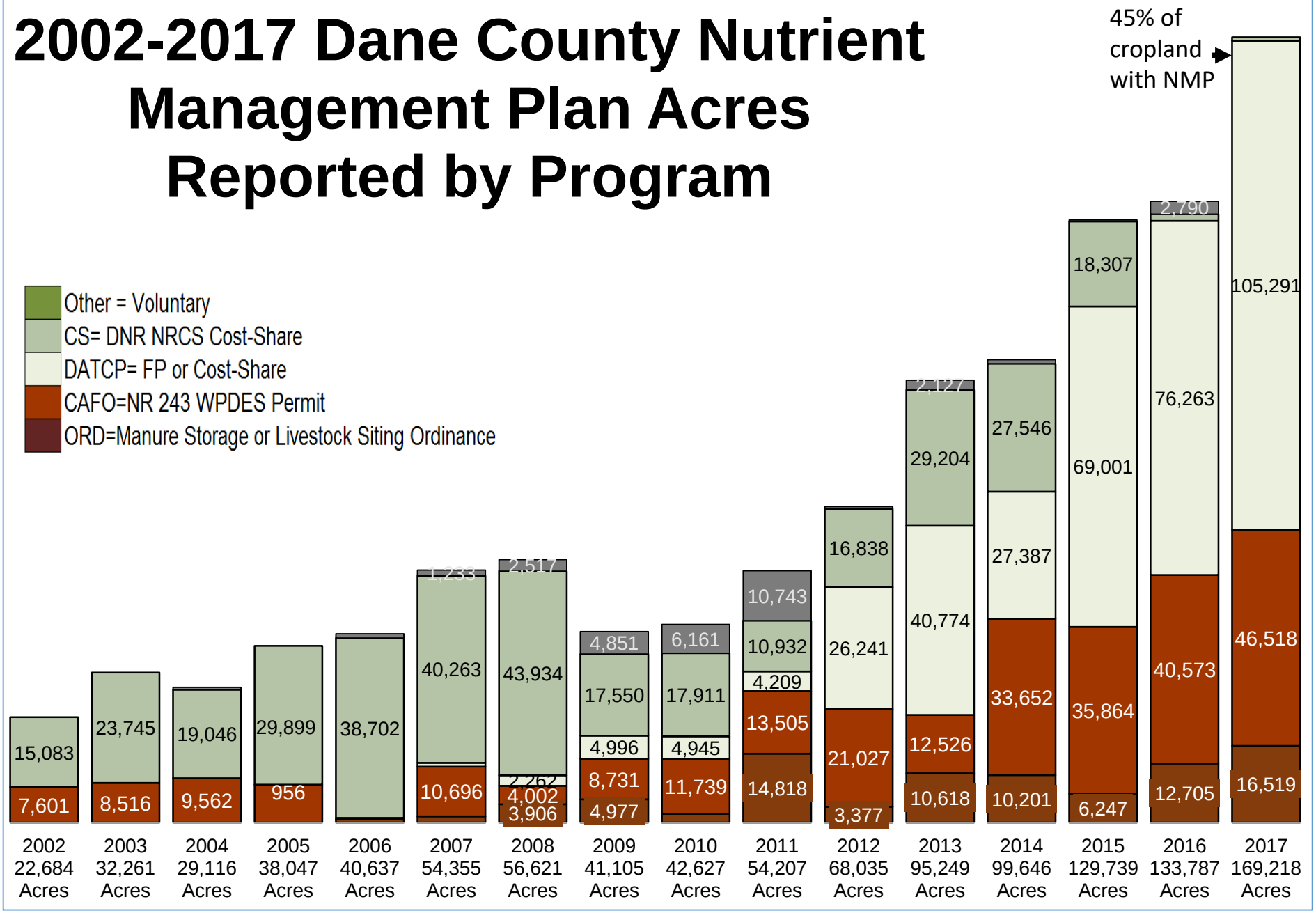
- Each plan review can take 2 -5 hours. Additional follow up is usually needed.
- Requires agronomic credentials to engage farmers and plan writers on crop production issues.

Can implementation be accurately checked?

NMP Incentives

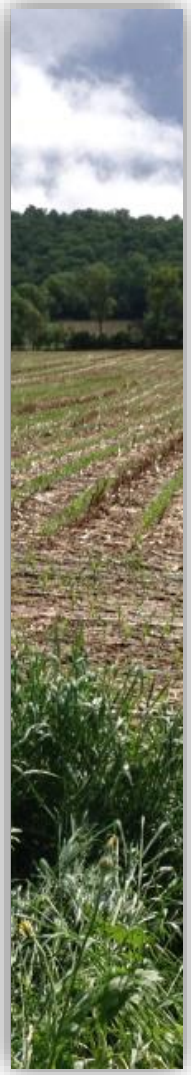
- Cost-sharing
- Tax Credits
- Permit/ordinance requirements
- Save $

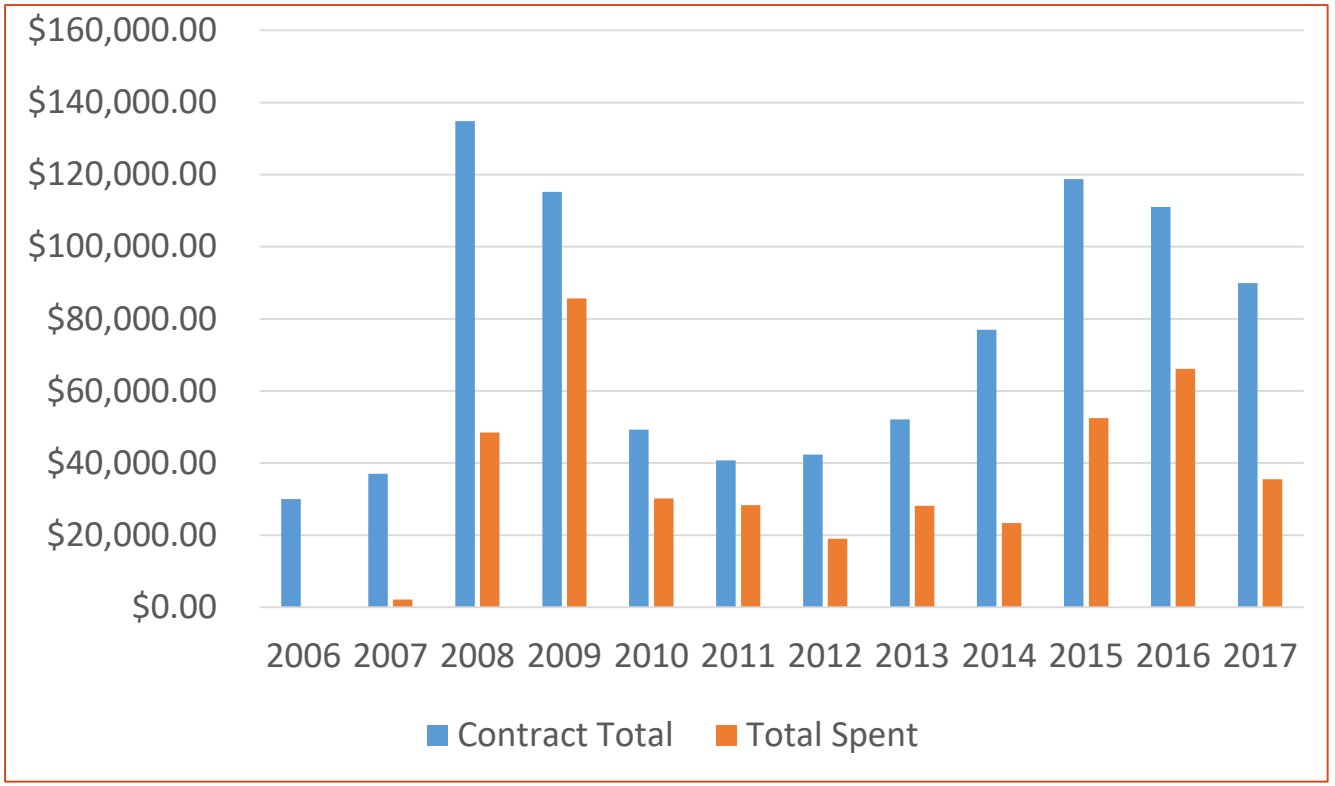
2002-2017 Dane County Nutrient Management Plan Acres Reported by Program



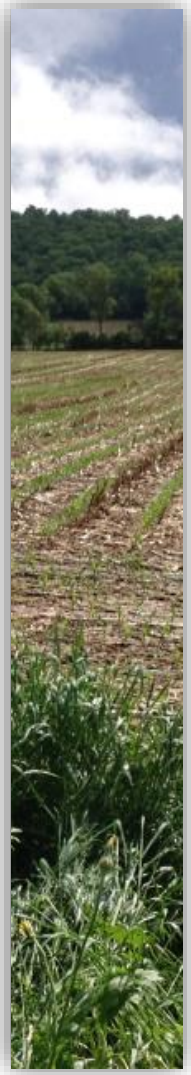
Source: Sara Walling WDATCP

State Cost-Sharing in Dane County

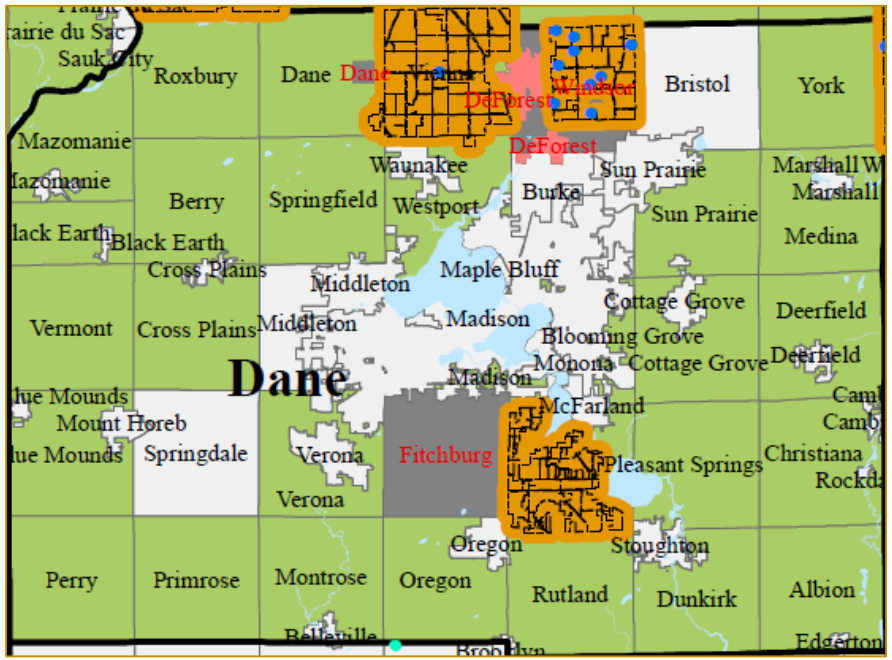




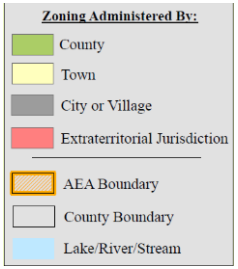
Source: Sara Walling, WDATCP



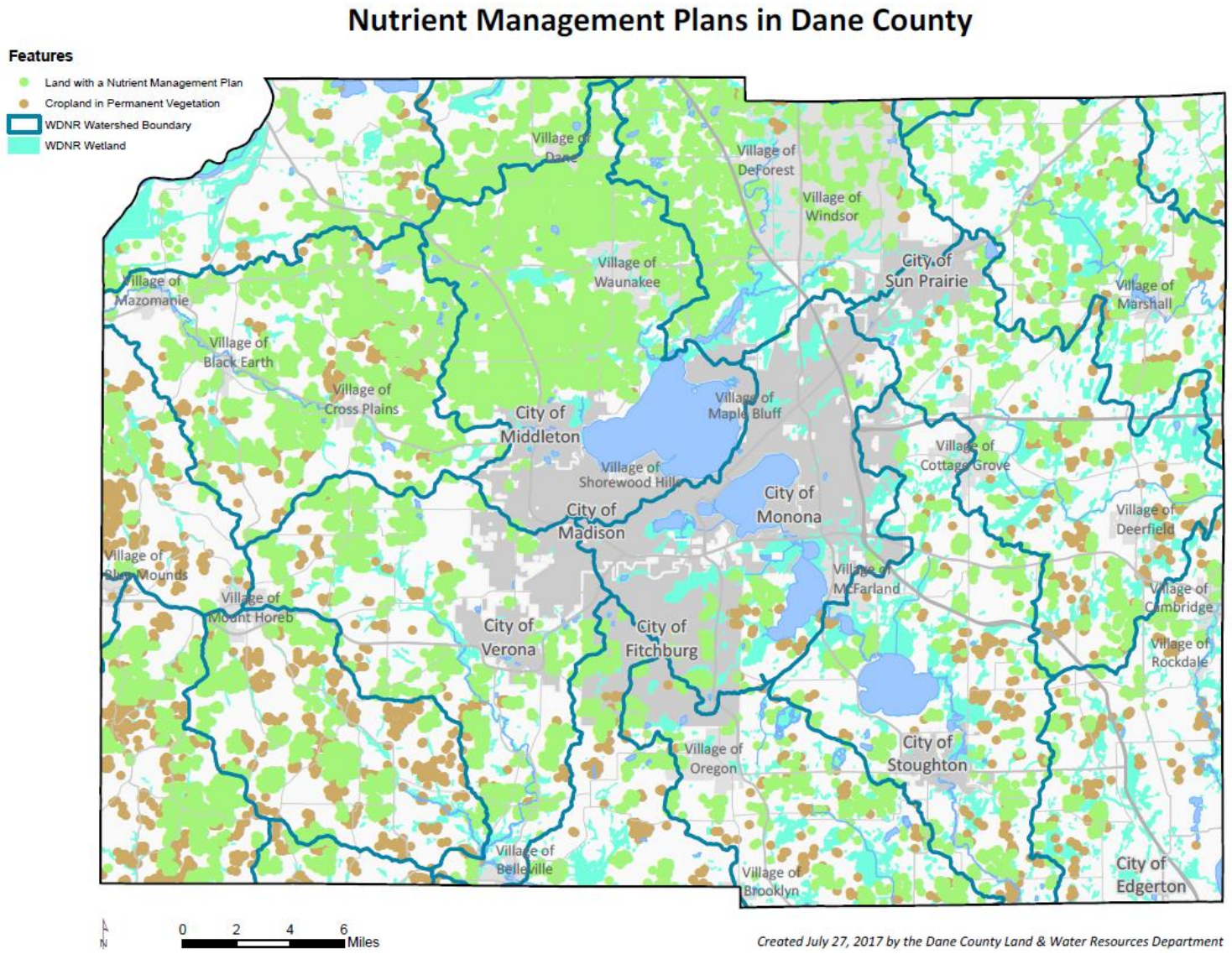
Dane County Farmland Preservation



2015 Tax Year Stats for Dane County	
Number of Claimants	Nearly 1,400
Acres Claimed	~233,000
Total Credits Received	$1.68 Million
Credits per acre per year	$5 – Agreements $7.50 – Zoned Ag $10 – Agreement and Zoned Ag



Source: Sara Walling, WDATCP



Dane County Land Conservation:

Increasing documentation and improving tracking of nutrient management

Adding ~14,000 acres of NM documentation annually

Building a spatial based dataset

590 NMP: Part of state agricultural runoff performance standards (NR151)

Basic NR 151 requirements related to NM planning:

- Soil loss meets T
- Develop and follow NMP
- Meet P Index standard:

  Average P Index no greater than 6,

  Annual P Index no greater than 12

Important caveats:

- *590 plan NOT required unless a valid offer of cost-sharing is made*
- *Must maintain 590 plan in "perpetuity"*

Clean water act livestock permitting

- Large farm (1000+ animal units)
- Medium (300-99 animal units and discharge via “man-made conveyance)
- Documented Discharge

Runoff P loss practice assessment with the P Index

To determine viable options, need to understand

- Current situation
- Farm goals
- Potential reductions

Example: Does manure injection in no-till help reduce runoff P losses?
Answer: Yes but not on steeper slopes where the injection leads to greater eroding sediment P losses

No practice is always “Best” everywhere

Research: Winter manure application effects on runoff P

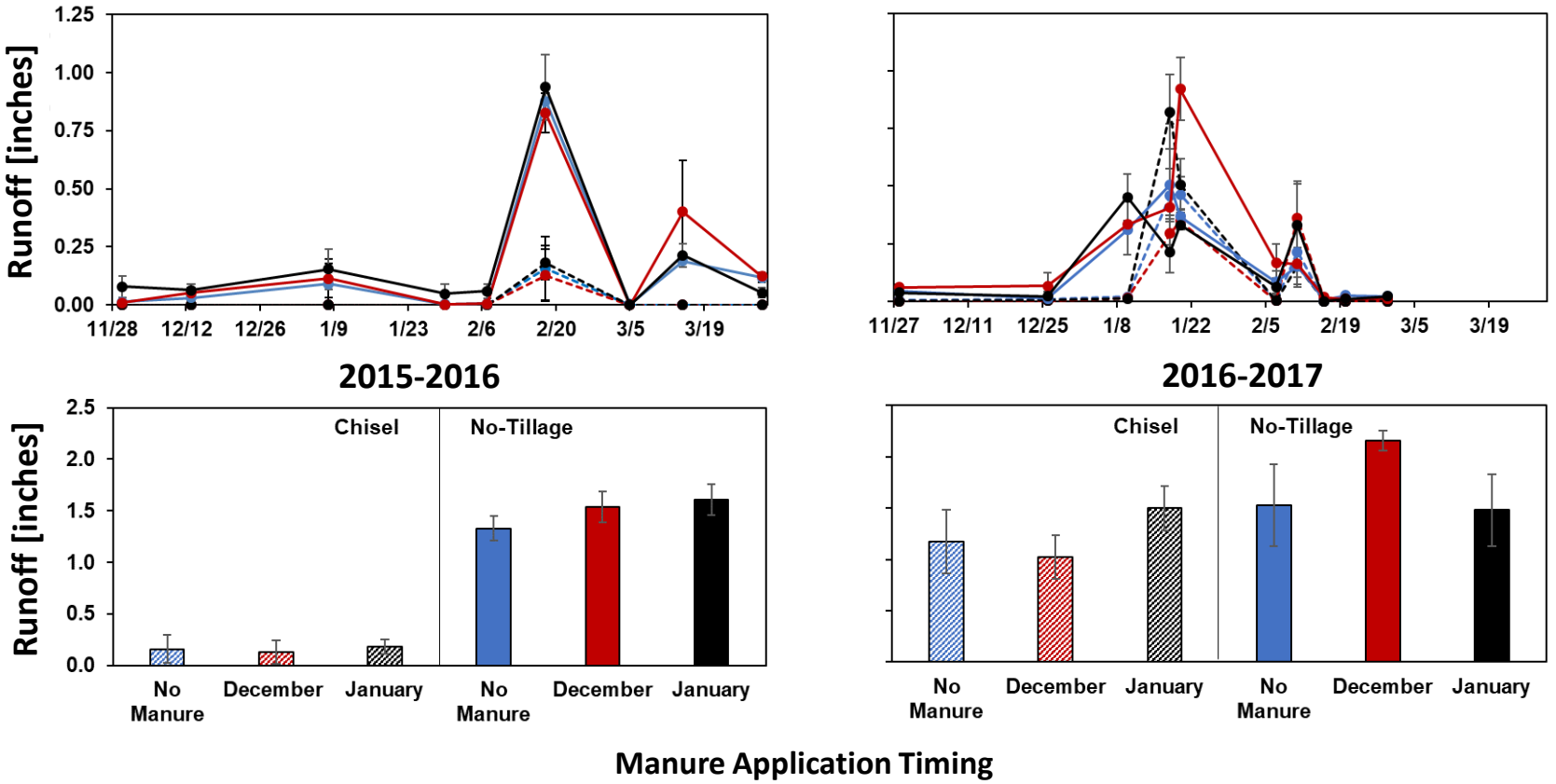
Current research at Arlington Research Station

Manure Application Timing

- Control – No Manure
- December
- January

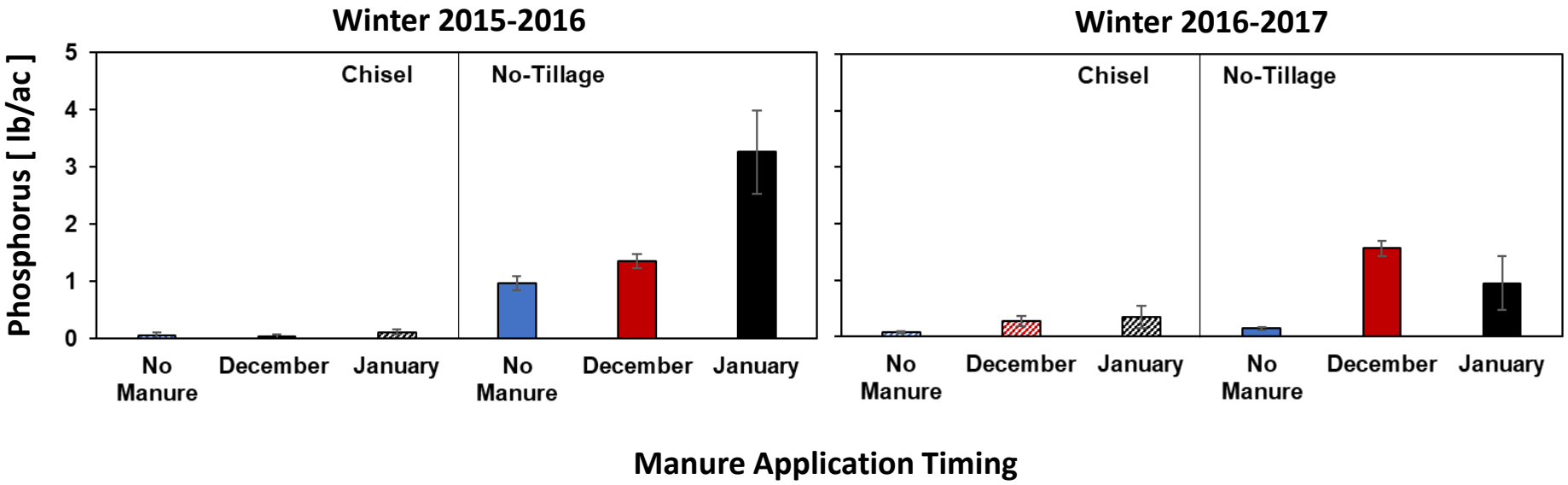
Courtesy of Melanie Stock, Dept. of Soil Science, UW Madison

Fall tillage reduced snowmelt runoff



Courtesy of Melanie Stock, Dept. of Soil Science, UW Madison

Fall tillage reduced snowmelt phosphorus loss



Courtesy of Melanie Stock, Dept. of Soil Science, UW Madison

Summary points

Nutrient management planning:

- Requires detailed information and record-keeping for all of the nutrients applied on a farm
- Promotes awareness of manure nutrient value
- Requires matching manure and fertilizer applications to crop needs
- Can identify fields with high soil loss or runoff P loss potential
- Provides farmers with options for addressing problems
- Is replacing conservation plans for estimating and addressing sheet and rill soil erosion, identifying ephemeral erosion

Nutrient Management Bibliography

NRCS 590 Nutrient Management Conservation Practice Standard:

https://efotg.sc.egov.usda.gov/references/public/WI/590_Standard-(2015-12).pdfNRCS Agronomy

NRCS Conservation Planning Technical Note #1 Nutrient Management:

https://efotg.sc.egov.usda.gov/references/public/WI/Conservation_Planning-TN-1.pdfutrien

2015 Updates Wisconsin 590 Nutrient Management Practice Standard

https://datcp.wi.gov/Documents/NM590Summary2015.pdf

2015 Nutrient Management Plan Checklist

https://datcp.wi.gov/Documents/NM590Checklist2015.docx

Nutrient Management Plan Detailed Review Guidance:

https://datcp.wi.gov/Documents/NMSelfPlanReview.pdf

UWEX A-2809 Nutrient Application Guidelines for Field, Vegetable and Fruit Crops in Wisconsin

http://learningstore.uwex.edu/Assets/pdfs/A2809.pdf

University of Wisconsin SNAP+ website (download software and user information)

https://snapplus.wisc.edu/

Wisconsin Department of Agriculture, Trade and Consumer Protection Nutrient Management References:

https://datcp.wi.gov/Pages/Programs_Services/NutrientManagement.aspx

EPA/USDA Unified National Strategy for Animal Feeding Operations

https://www3.epa.gov/npdes/pubs/finafost.pdf

Wisconsin's Runoff Rules: What farmers need to know

https://dnr.wi.gov/topic/nonpoint/documents/farmersneed.pdf