Minnesota's Nutrient Reduction Strategy

Progress toward milestone goals

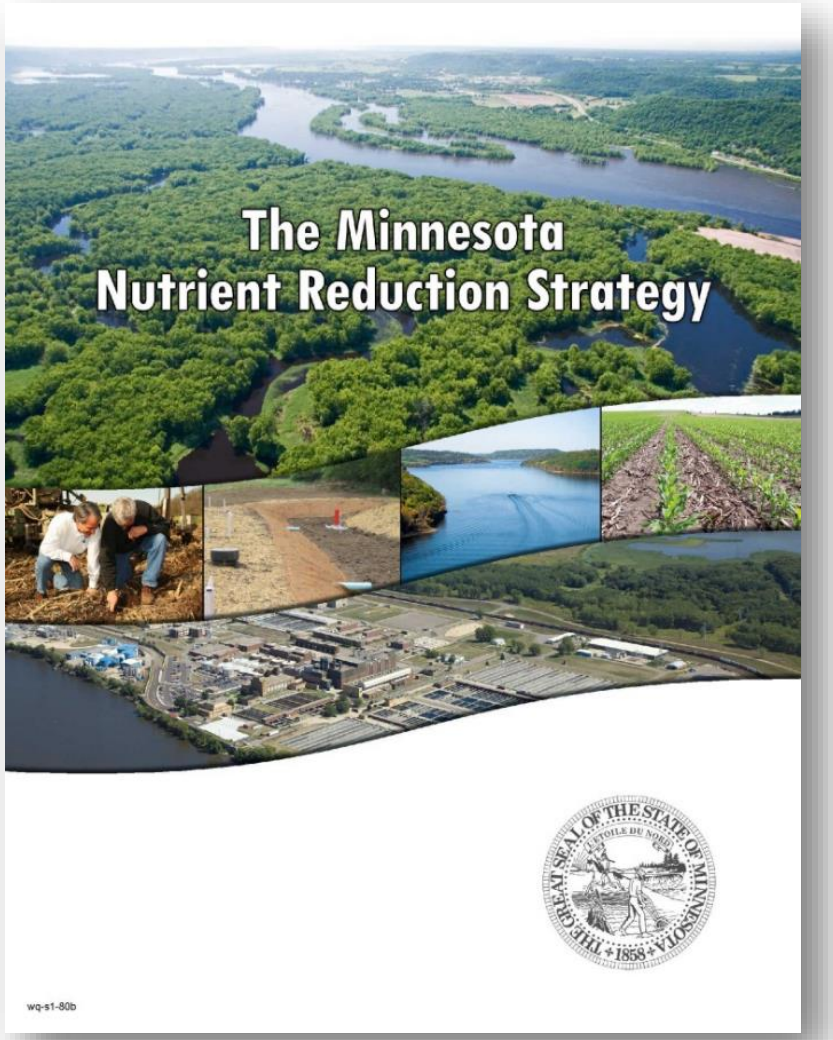
A multi-agency assessment (in draft)

Glenn Skuta |Watershed Division Director

MINNESOTA POLLUTION CONTROL AGENCY

CLEAN WATER LAND & LEGACY AMENDMENT

NRS finalized in 2014 by 11 organizations



Minnesota Pollution Control Agency

MINNESOTA DEPARTMENT OF AGRICULTURE

Minnesota Board of Water & Soil Resources

NRCS

FSA FARM SERVICE AGENCY

Minnesota DEPARTMENT OF NATURAL RESOURCES

MINNESOTA MDH DEPARTMENT OF HEALTH

PFA Minnesota Public Facilities Authority

UNIVERSITY OF MINNESOTA Driven to Discover℠

METROPOLITAN COUNCIL

USGS science for a changing world

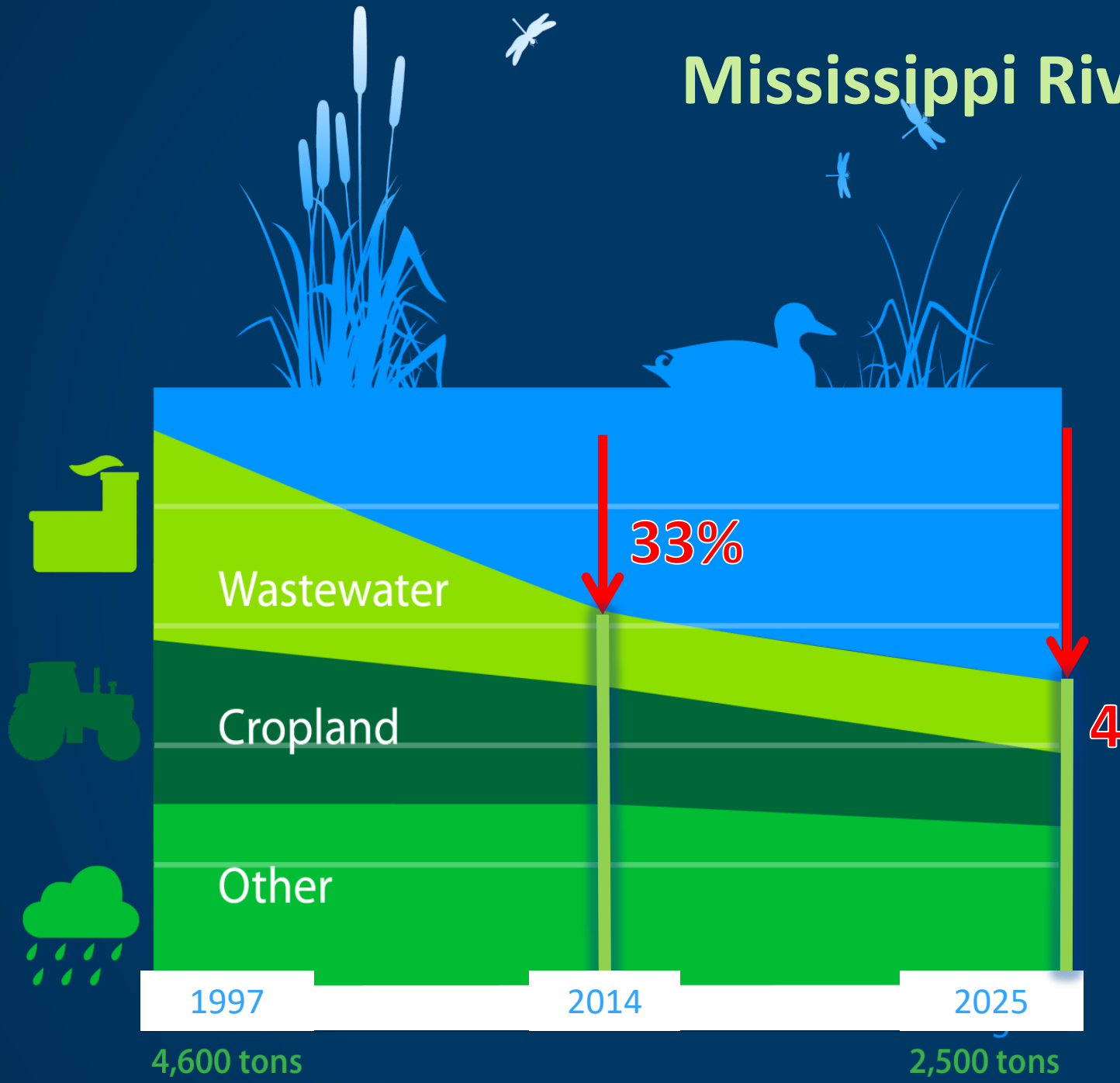
www.pca.state.mn.us/water/nutrient-reduction-strategy

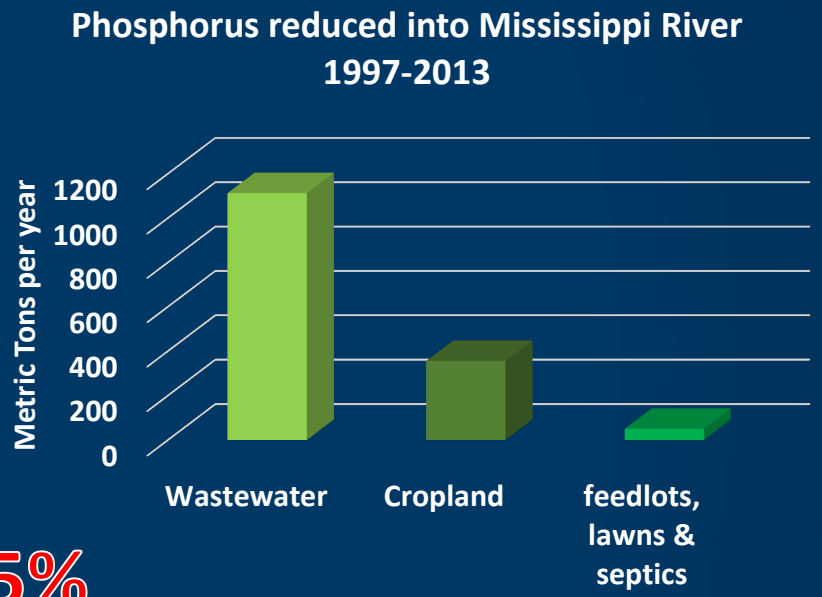
Milestones 10-20%

Final goals 45-50%

Major basin	2014 to 2025 (Milestones)	"final" goals
1. Mississippi River	**12%** for P (of pre-2000 baseline loads)	**45%** and meet Minnesota lake and river standards
	20% for N	
2. Red River & Lake Winnipeg	**10%** for P	**50%**
	13% for N	
3. Lake Superior	**No net increase from 1970s**	
Statewide Groundwater/ Source Water	**Meet 1989 Groundwater Protection Act Goals**	

Mississippi River Phosphorus Goals

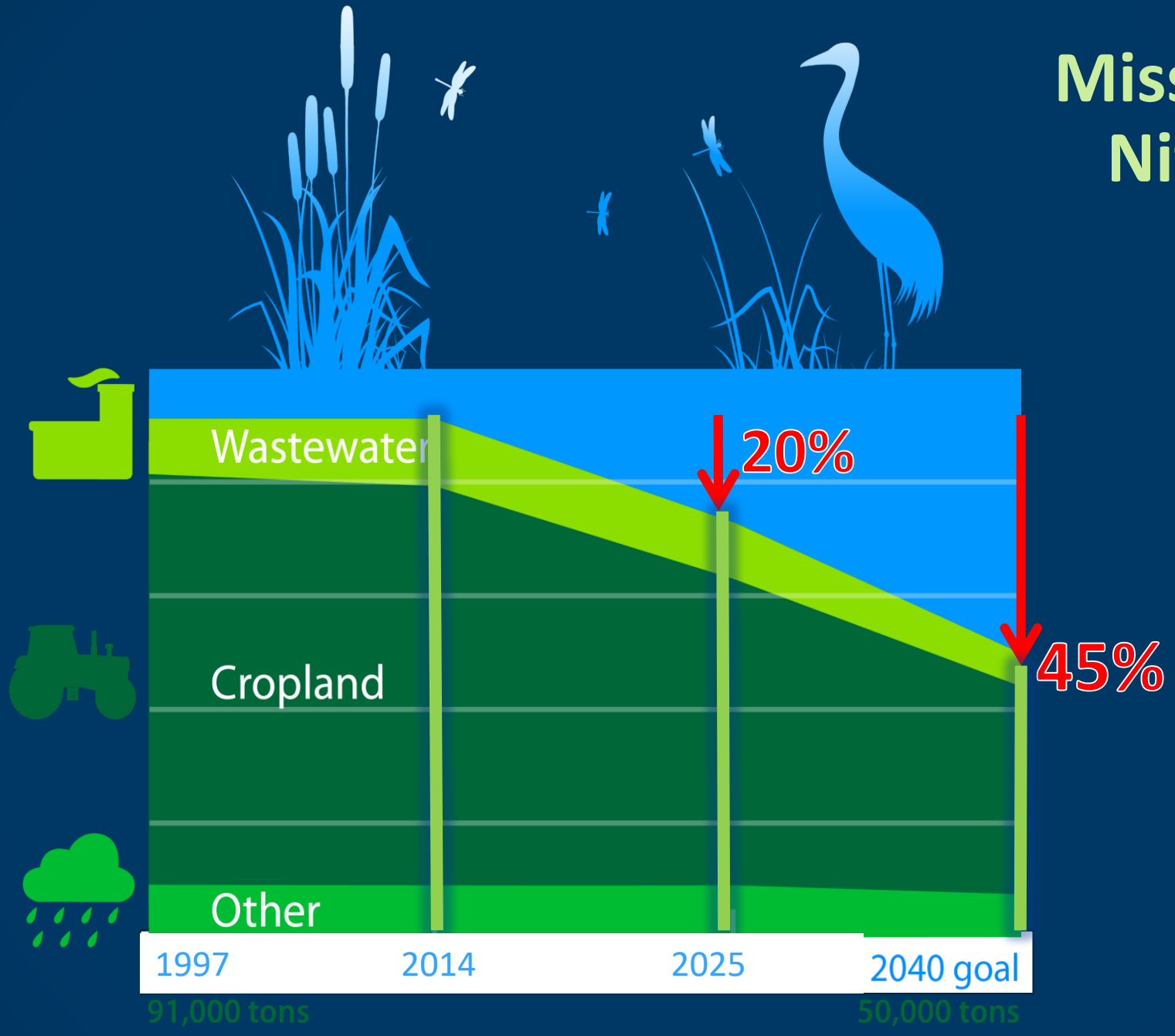




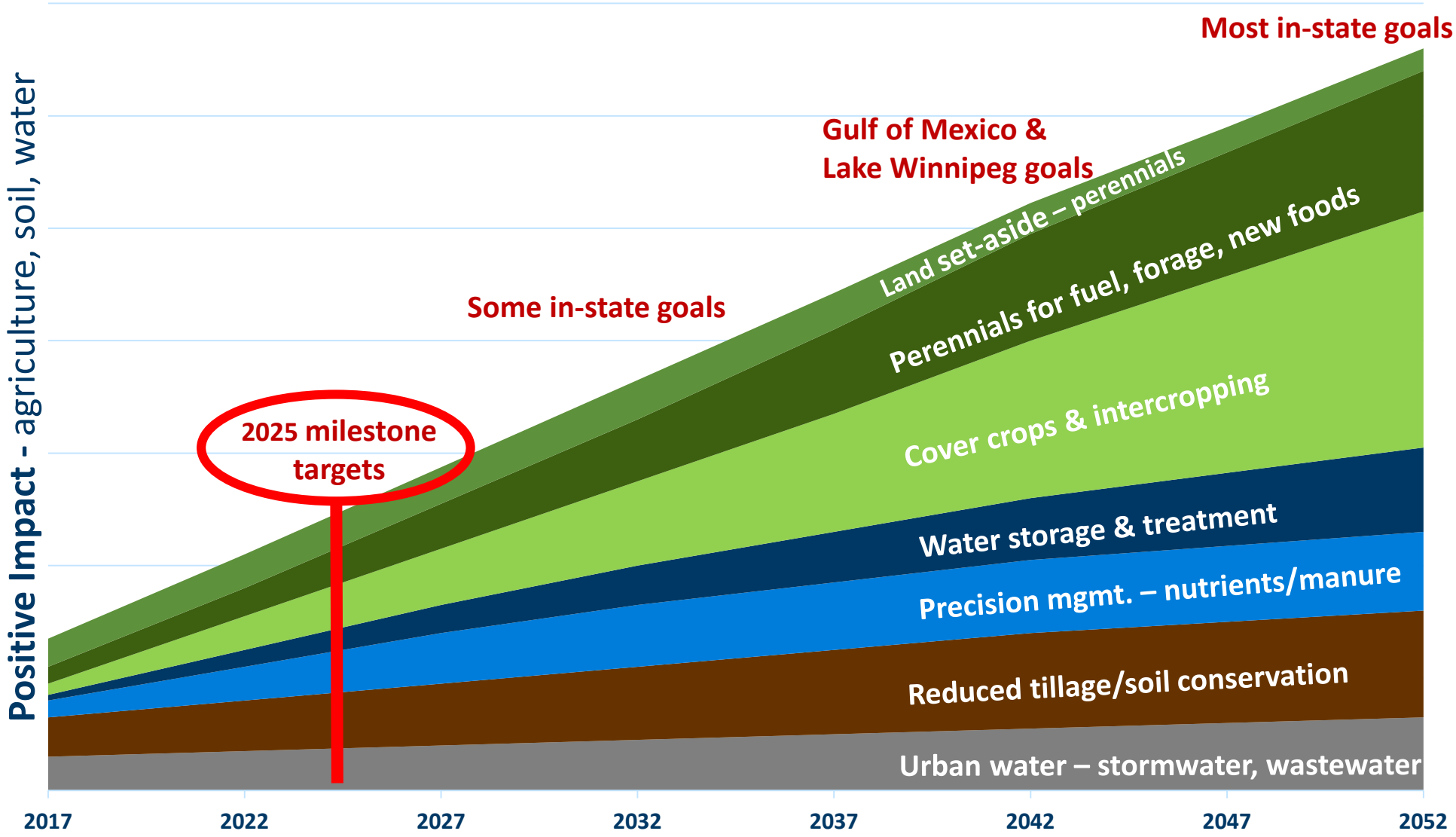
Also, considerable P reduction was documented from agricultural conservation prior to 1997

Based on National Conservation Effects Assessment Project (USDA 2010).

Mississippi River Nitrogen Goals

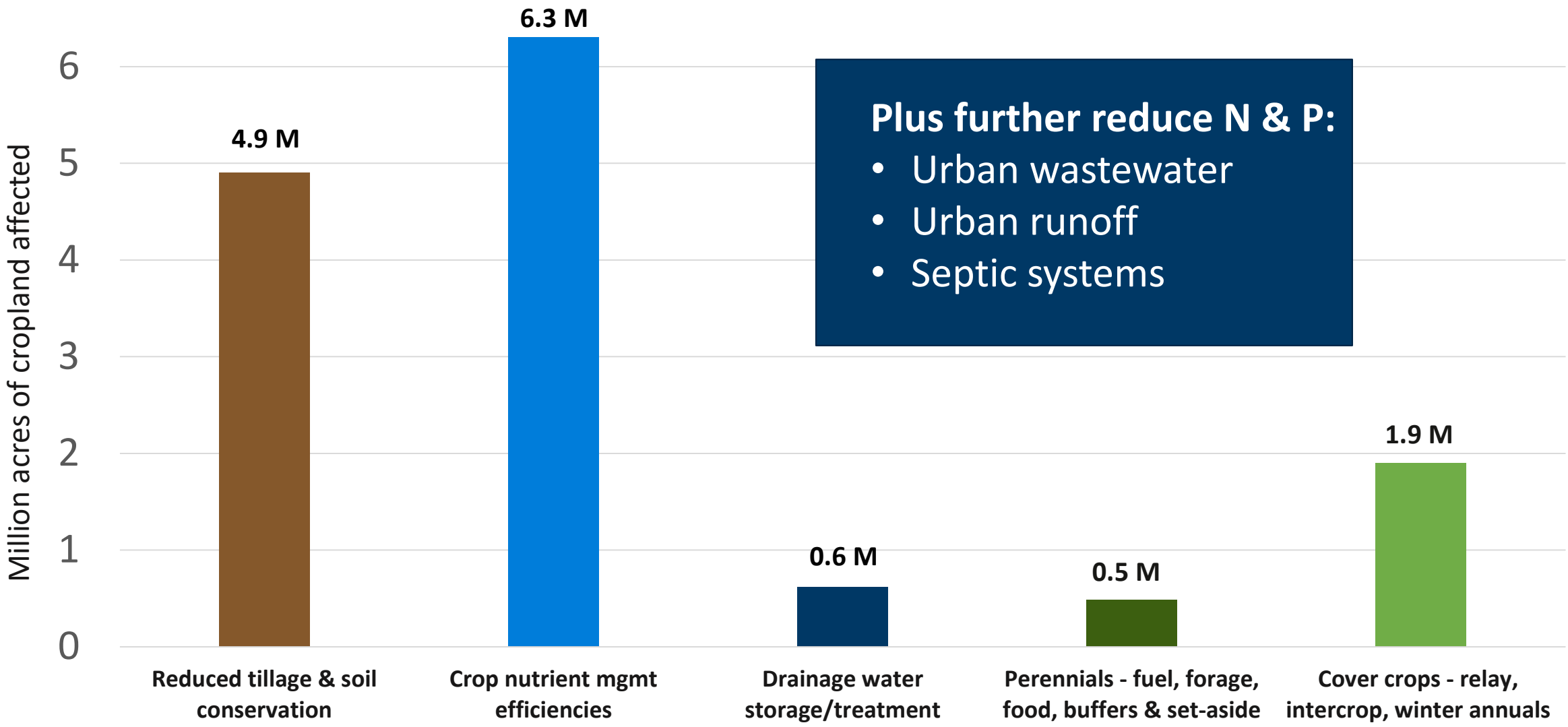


We need increases in multiple areas

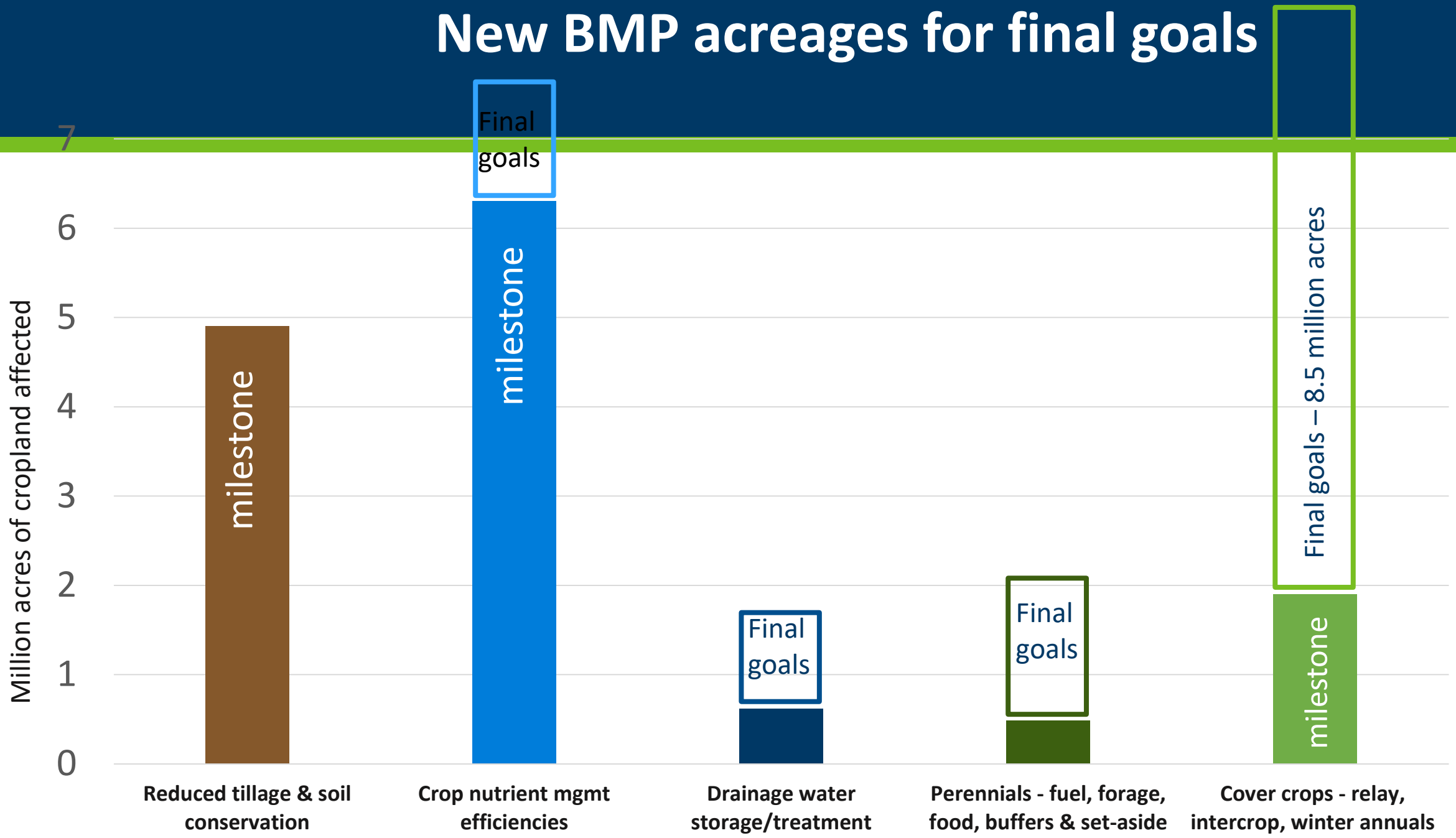


Conceptual diagram

Needed BMP acreage additions

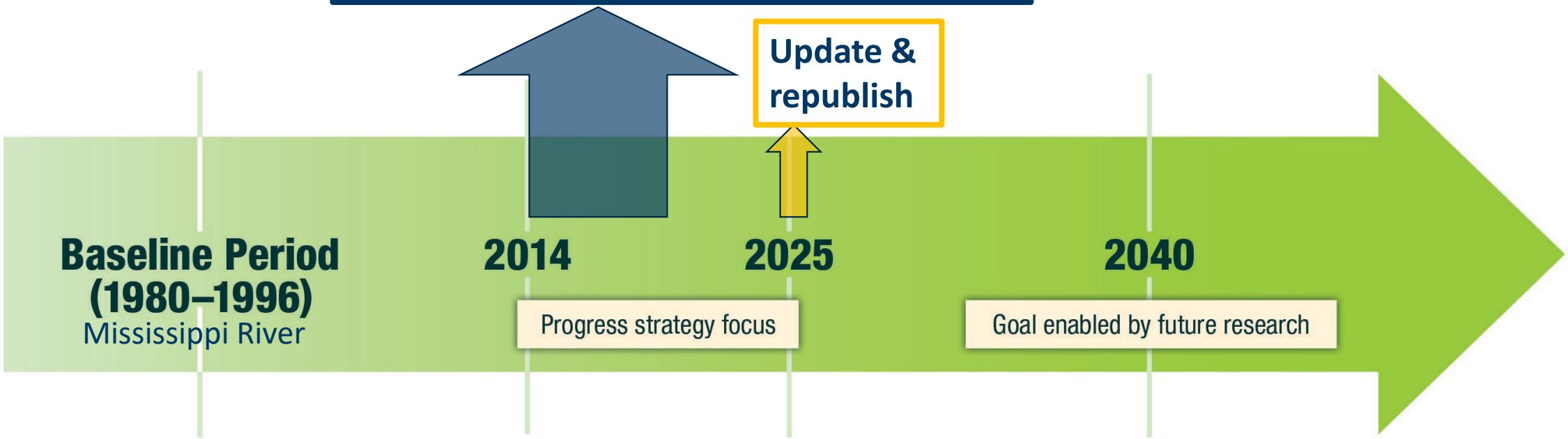


New BMP acreages for final goals



Five-year progress evaluation

1. Are NRS strategies/programs in place?
2. How much progress with BMP adoption?
3. Can we see improvements in water?
4. Next steps for 2020-25?



1. NRS Strategies & associated advances since 2014 (part 1)

Integrate with watershed approach
- WRAPS w/NRS goals
- 1W1P w/NRS goals

City wastewater nitrogen monitor & treat
- N monitoring plan dev.
- 450 WWTFs testing for N
- Fed. Grant to model
- Wastewater certainty

Research to advance best practices
- Split N fertilizer application
- Perennials & cover crops
- MDA Clean Wat. Research
- Stormwater research council
- ++ more

Education campaign
- Nitrogen Smart (500+)
- Gov. 25% by 2025
- Nutrient & N mgmt. conferences
- Ag BMP & drainage handbooks

Partnership with Ag Private Industry
- Forever Green
- N fertilizer education
- Soil Health & 4R promo
- Nitrogen Smart

Soil Health focus
- MN Office Soil Health
- Soil Health position
- Private and local Soil Health partnerships

Socio-economics advanced
- Social research at Center for changing landscapes at UMN

Demo Small-scale successes
- Discovery Farms
- 20 new watershed projects Sect. 319
- Root R. field to stream
- Cedar R. partnership
- Red River Basin water storage
- Wellhead area implementation

Ag WQ Certific.
- Over ½ million acres
- Over 1500 New Practices
- Over 40,000 lbs P reduce

2. NRS strategies & associated advances (part2)

Tracking systems for BMP use
- Gov't program BMPs – Healthier Waters site
- Satellite imagery

Perennials & living cover advanced
- Forever Green
- CREP Program
- Buffer Law
- EQIP Cover Crop
- Cover Crop Insurance Pilot

Advance stormwater & septic programs
- Stormwater permits (251)
- New stormwater manual
- Reduced direct septic outlets

Ground water protect & restore
- Rule related to N fert.
- Source Water Protect. Prog.
- GRAPS (6)
- N fertilizer mgmt. plan

Local capacity increased
- Clean Water Fund $
- Training & Certif. Prog.
- Multipurpose DWM grant program
- Watershed-based funding

Feedlots, manure & nutrient efficiencies advanced
- Nutrient Mgmt Initiative
- Manure application inspections increased
- N fertilizer mgmt. plan
- New WQ manure specialist

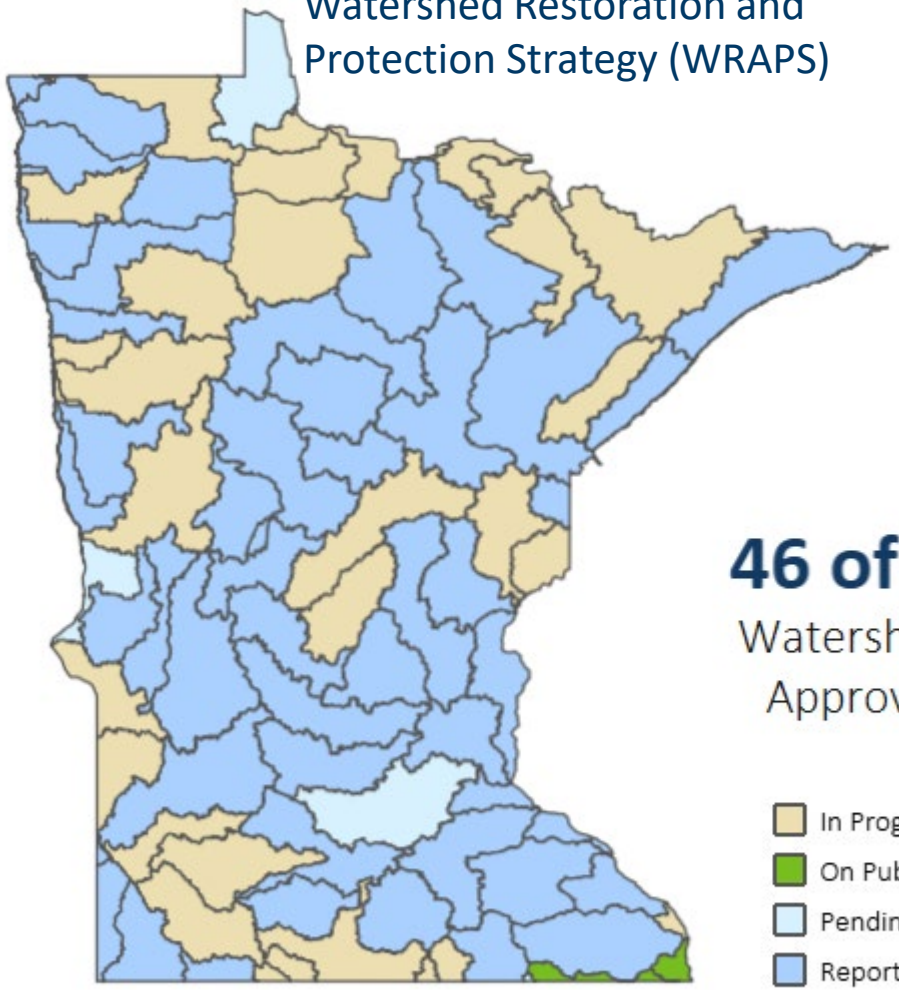
Market-based programs
- Point-nonpoint trading
- GHG reduction benefits of WQ BMPs defined

Coordinate Federal & state & local
- NWQI & MRBI projects
- Watershed Conservation Planning Initiative
- One Water One Plan
- Healthier Watersheds website
- River trends assessment

Ongoing water monitoring
- Watershed Pollutant Load Monitoring Network
- Well water nitrate monitoring network

Many programs implemented through local watersheds

Watershed Restoration and Protection Strategy (WRAPS)

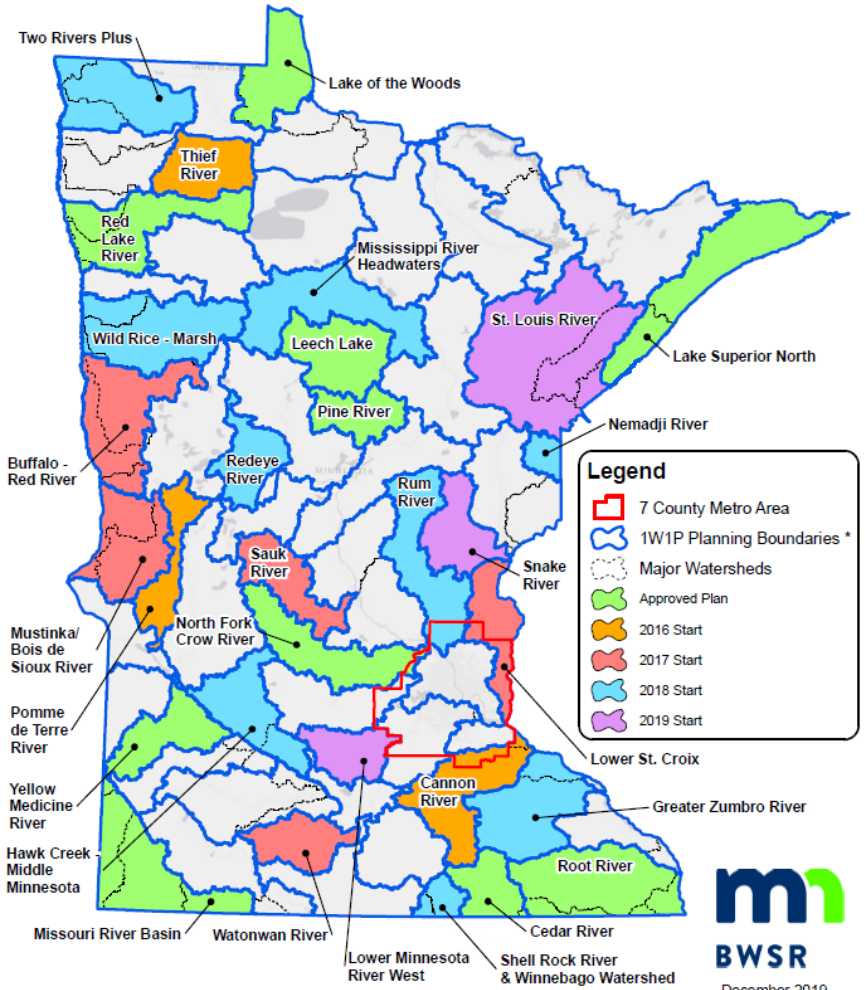


46 of 80
Watersheds
Approved

- In Progress
- On Public Notice
- Pending Approval
- Report Approved

MINNESOTA POLLUTION CONTROL AGENCY

One Watershed, One Plan
Participating Watersheds



*Not legal boundaries; intended for planning purposes through One Watershed, One Plan only.

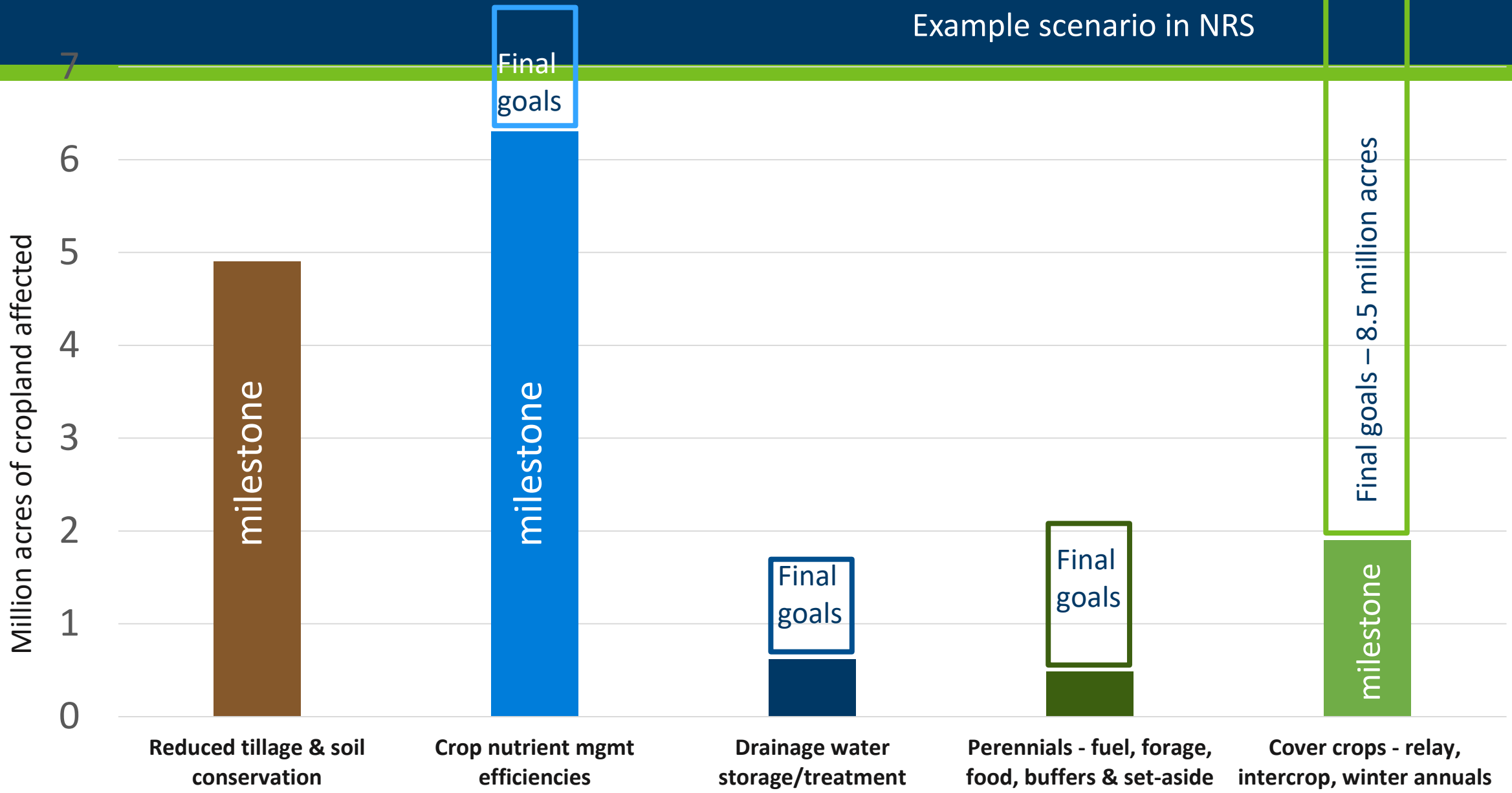
BWSR
December 2019

Summary of NRS strategies advancement

1. **Are NRS strategies/programs in place?**
   - Greatly advanced most strategy areas
   - More time needed before full implementation
   - Most every strategy area needs continued implementation & development
2. **How much progress are we making with BMPs (2014-18)?**
3. **Can we see nutrient improvements in water?**
4. **Next steps for 2020-25?**

New BMP acreages for milestones & final goals

Example scenario in NRS



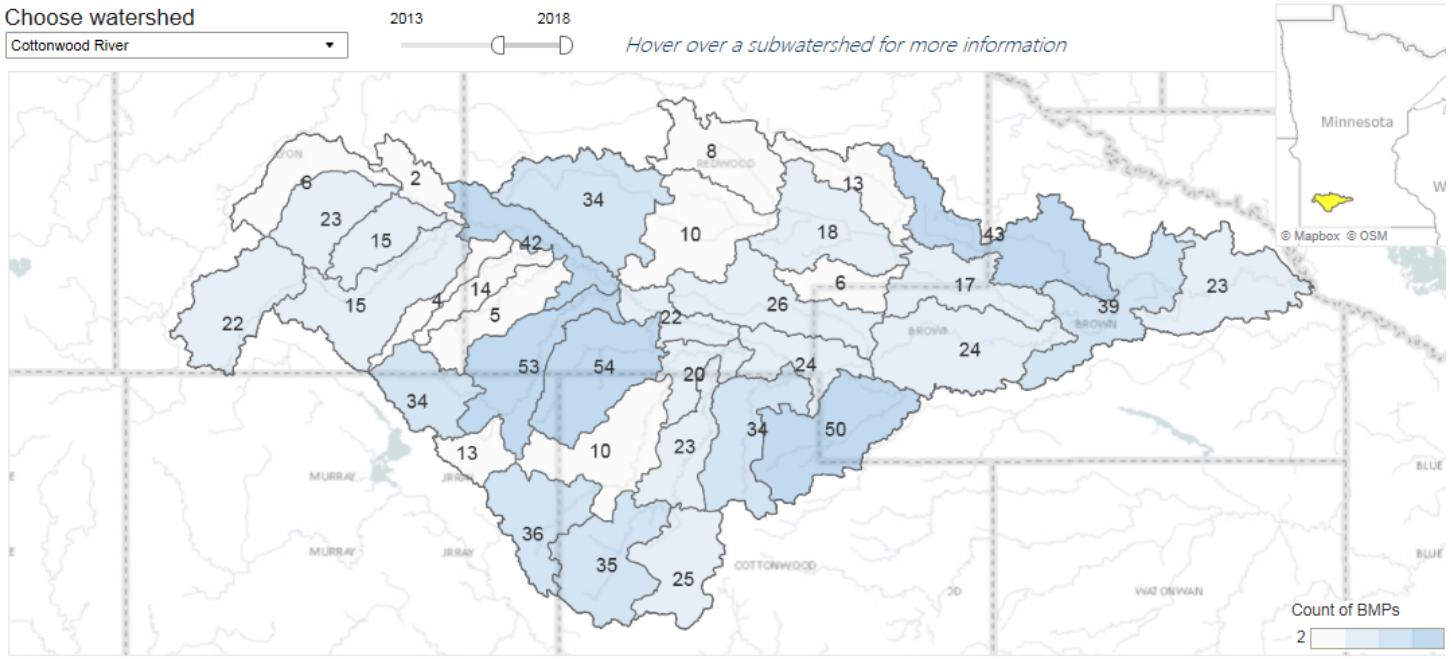
Indicators of BMP adoption progress

A. Adoption through government support programs

B. Broader overall adoption

1. Census of Agriculture and surveys
2. Satellite imagery
3. Permitting information
4. Sales information
5. Nutrient use efficiency trends

BMP adoption through government programs



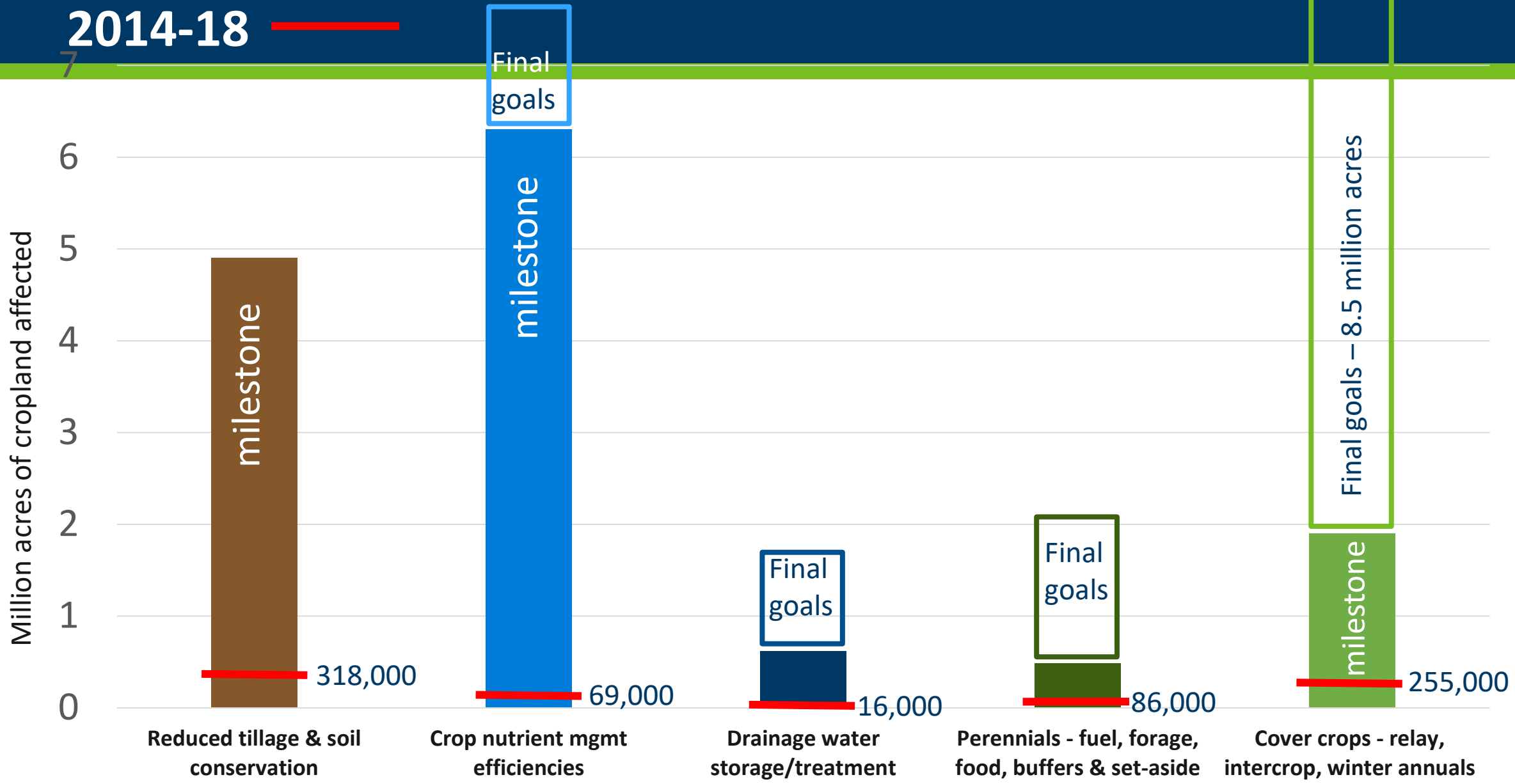
Cottonwood River watershed

Strategy	Practice Description	Total BMPs	Number of BMPs (by unit)	Installed Amount (by unit)	Units
Designed erosion control	Water & Sediment Control Basins	100	2	1,001	Feet
			98	1,450	Count
	Grassed Waterway	43	43	113	Acres
	Terrace	14	3	7,057	Feet
			11	3	Acres
	Sediment Basin	1	1	2	Count
Stream banks, bluffs & ravines	Grade Stabilization Structure	43	43	43	Count
	Streambank and Shoreline Protection	24	24	5,560	Feet
	Structure for Water Control	2	2	7	Count
Buffers and filters - field edge	Conservation Cover	33	33	487	Acres
	Filter Strip	40	40	286	Acres
Lliving cover to crops in fall/spri..	Cover Crop	75	75	13,002	Acres
Converting land to perennials	Conservation Cover	33	33	487	Acres
	Critical Area Planting	24	24	60	Acres

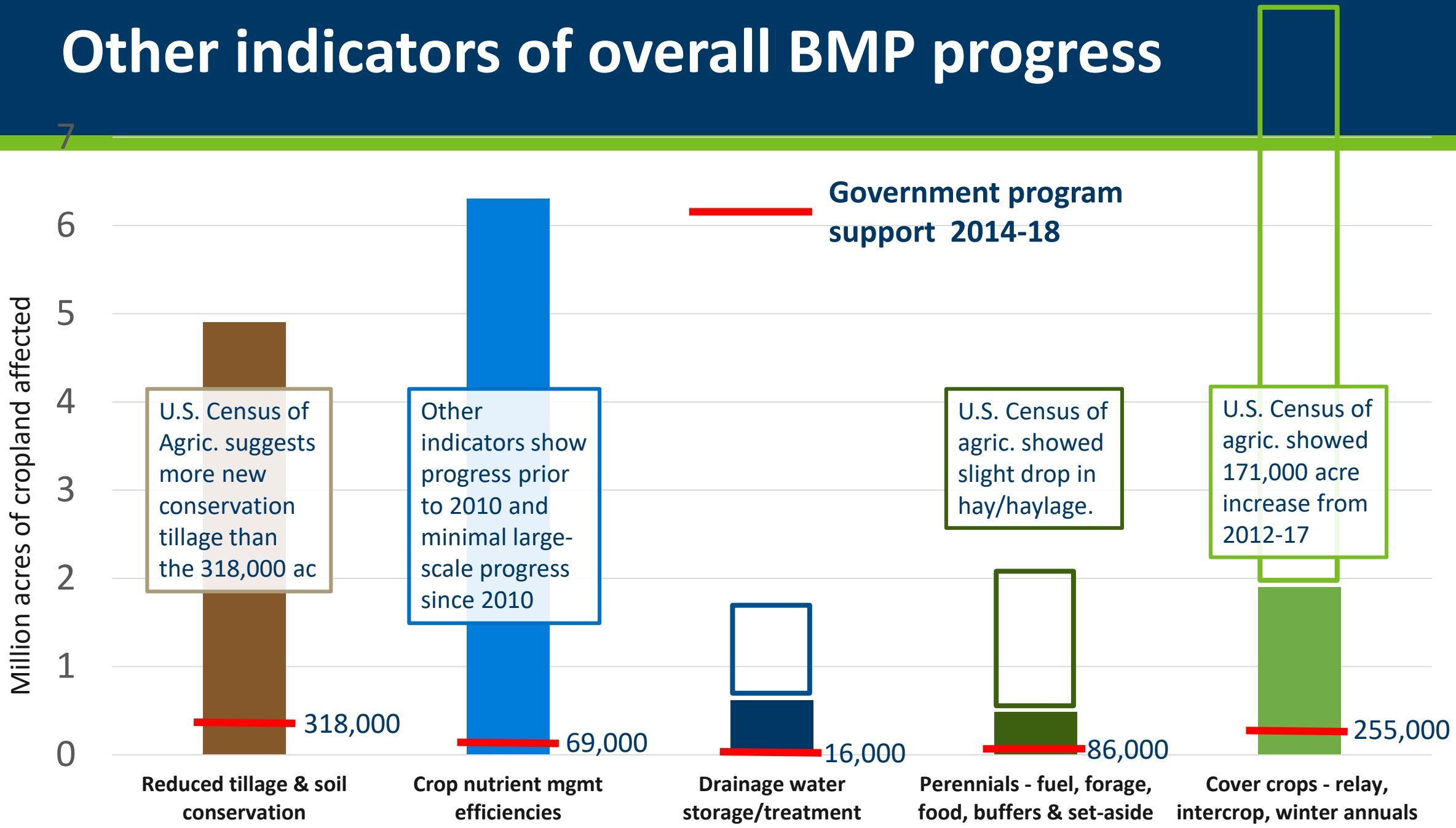
Cottonwood Watershed 2013-18 BMP #s

www.pca.state.mn.us/water/healthier-watersheds

New BMP acreages through government support 2014-18

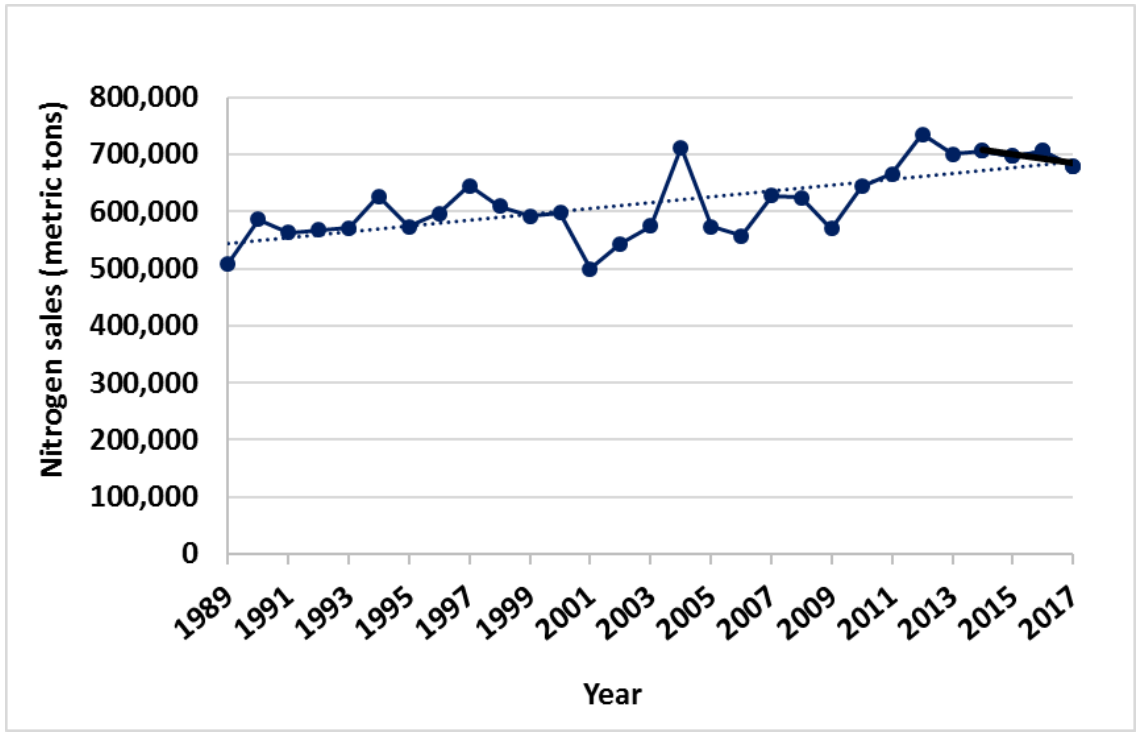


Other indicators of overall BMP progress

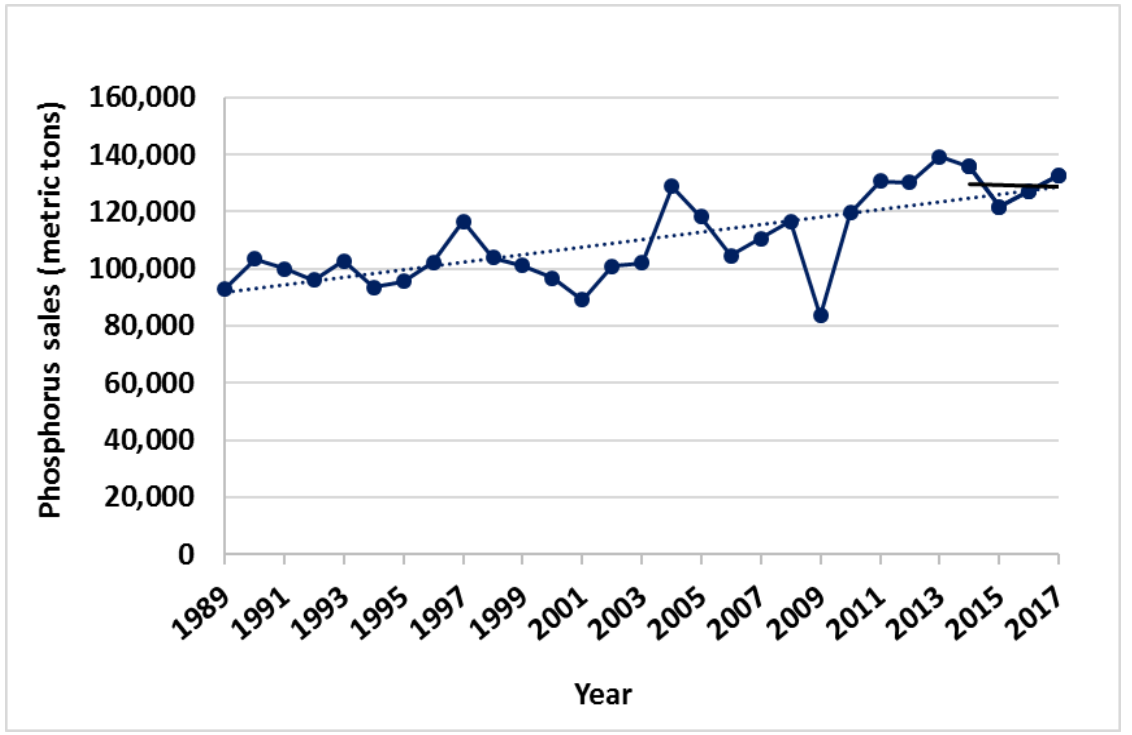


Fertilizer sales trends in Minnesota

Nitrogen



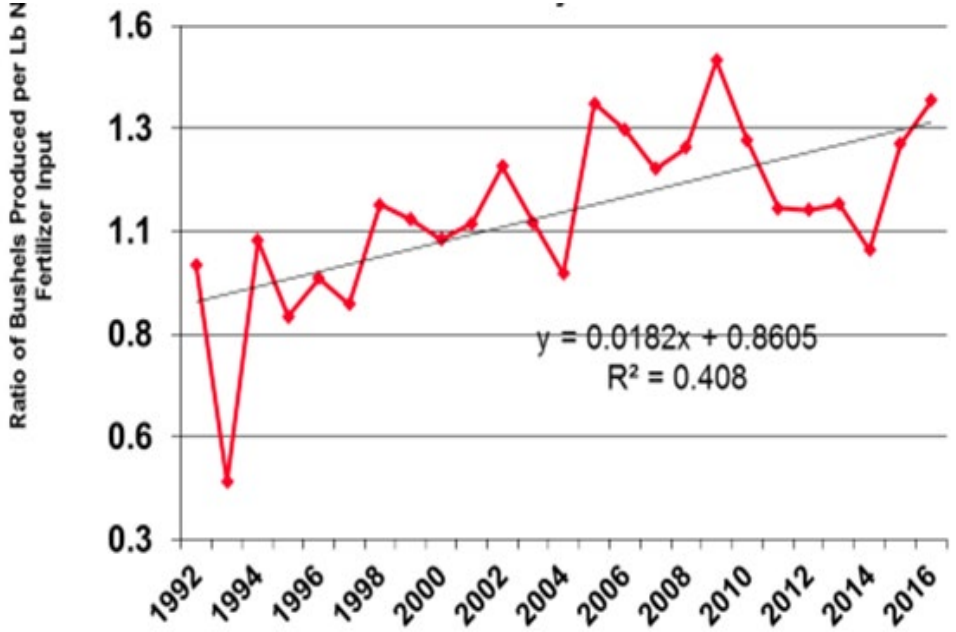
Phosphorus



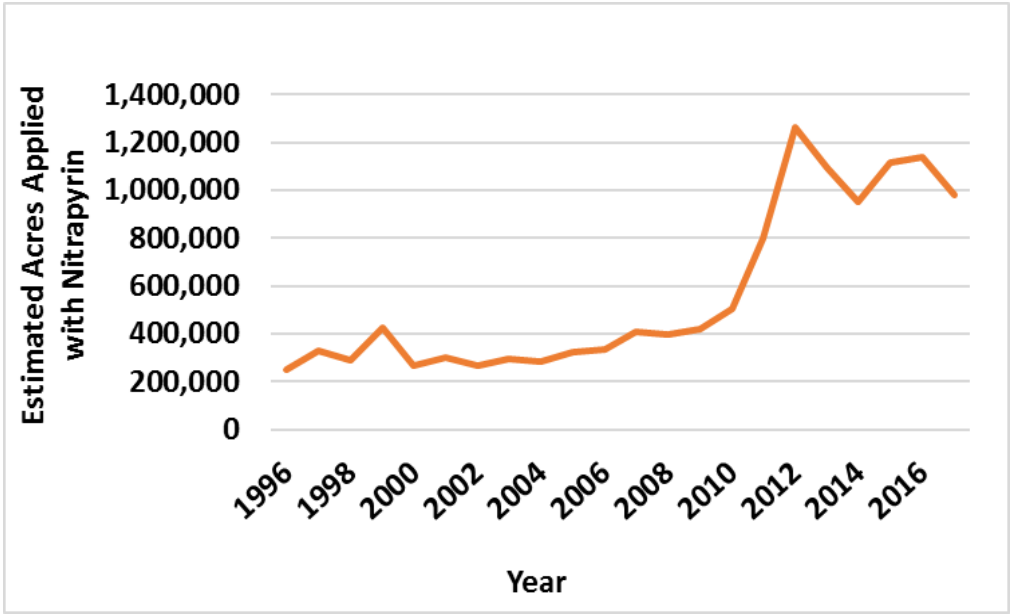
Source: MDA

Improvements 1990s to 2010

Nitrogen Use Efficiency on corn 1992-2016

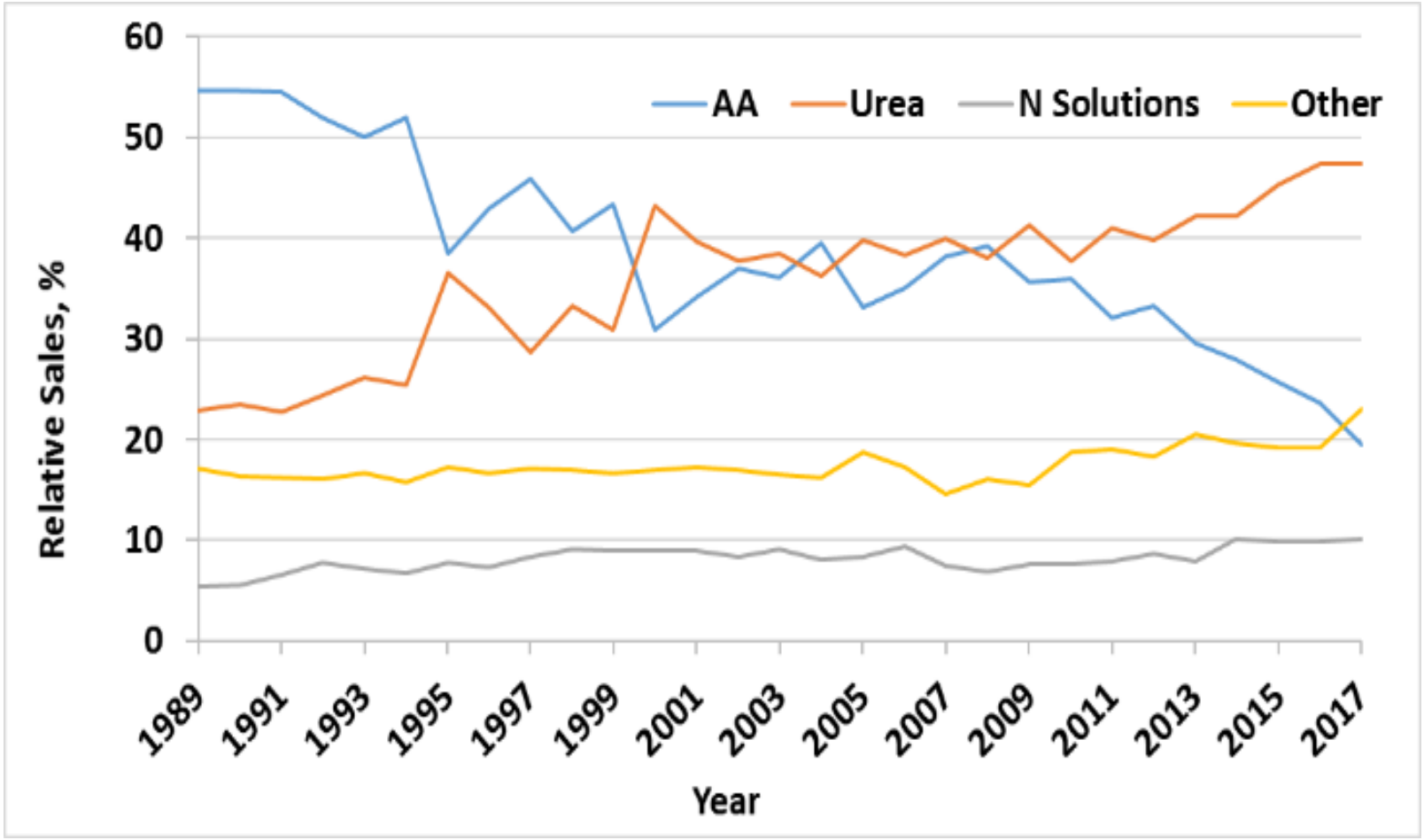


Nitrapyrin nitrification inhibitor use 1996-2017



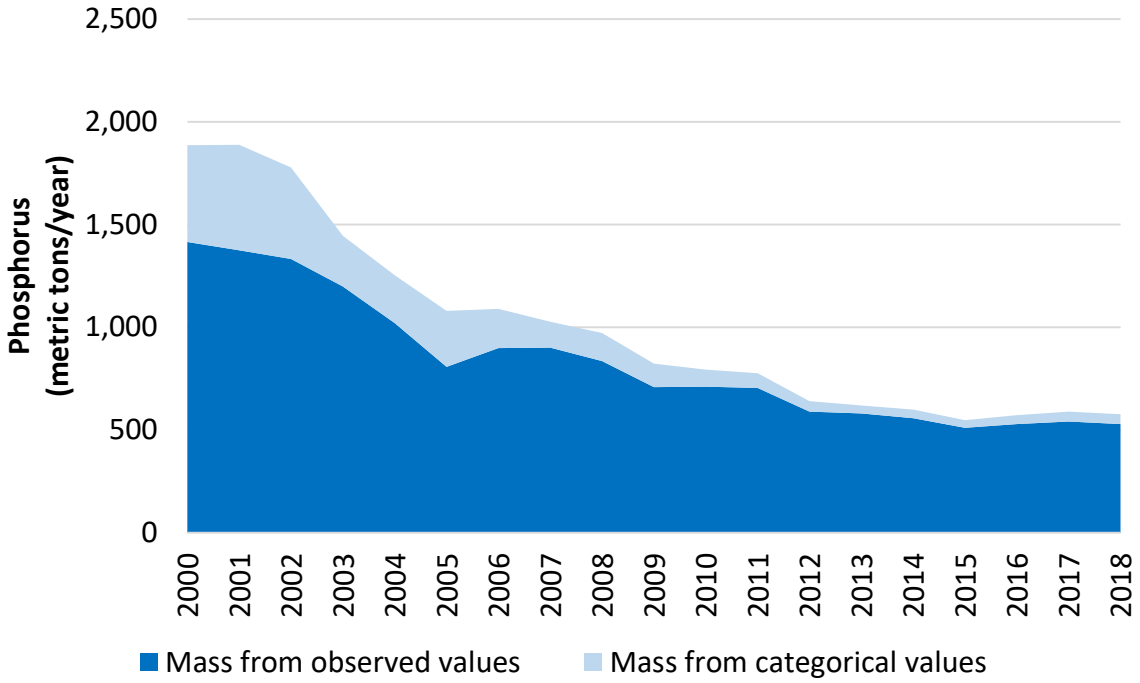
Source: MDA

Changing types of N fertilizer use

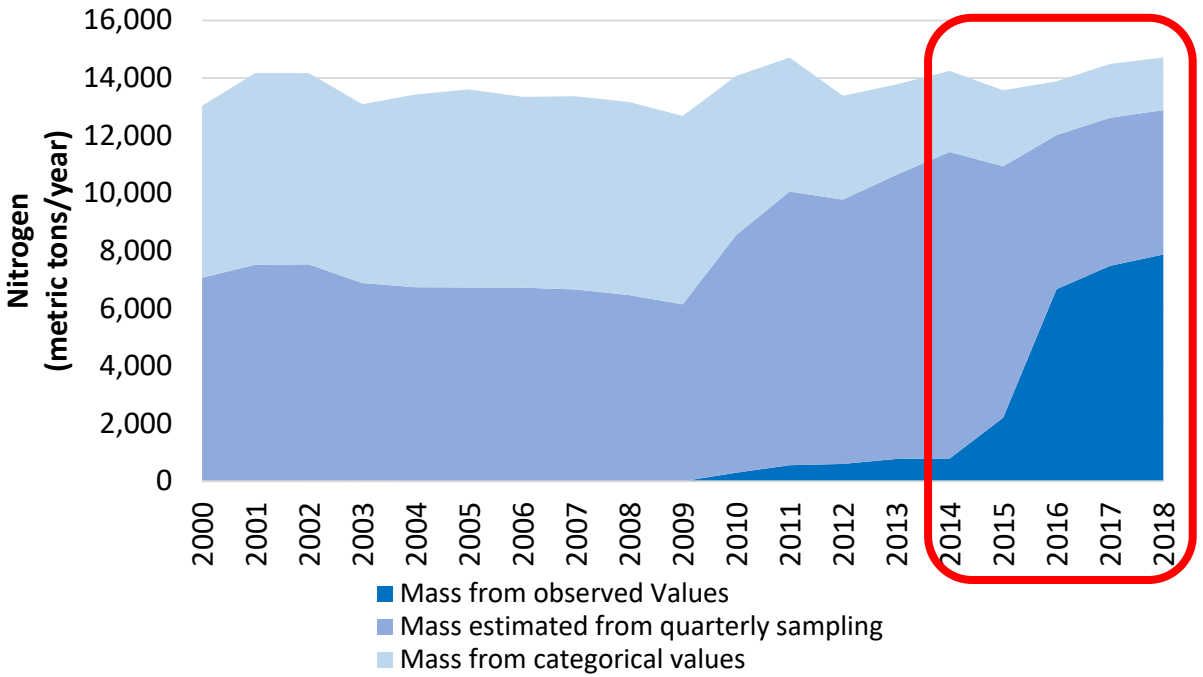


Municipal wastewater nutrient discharge trends

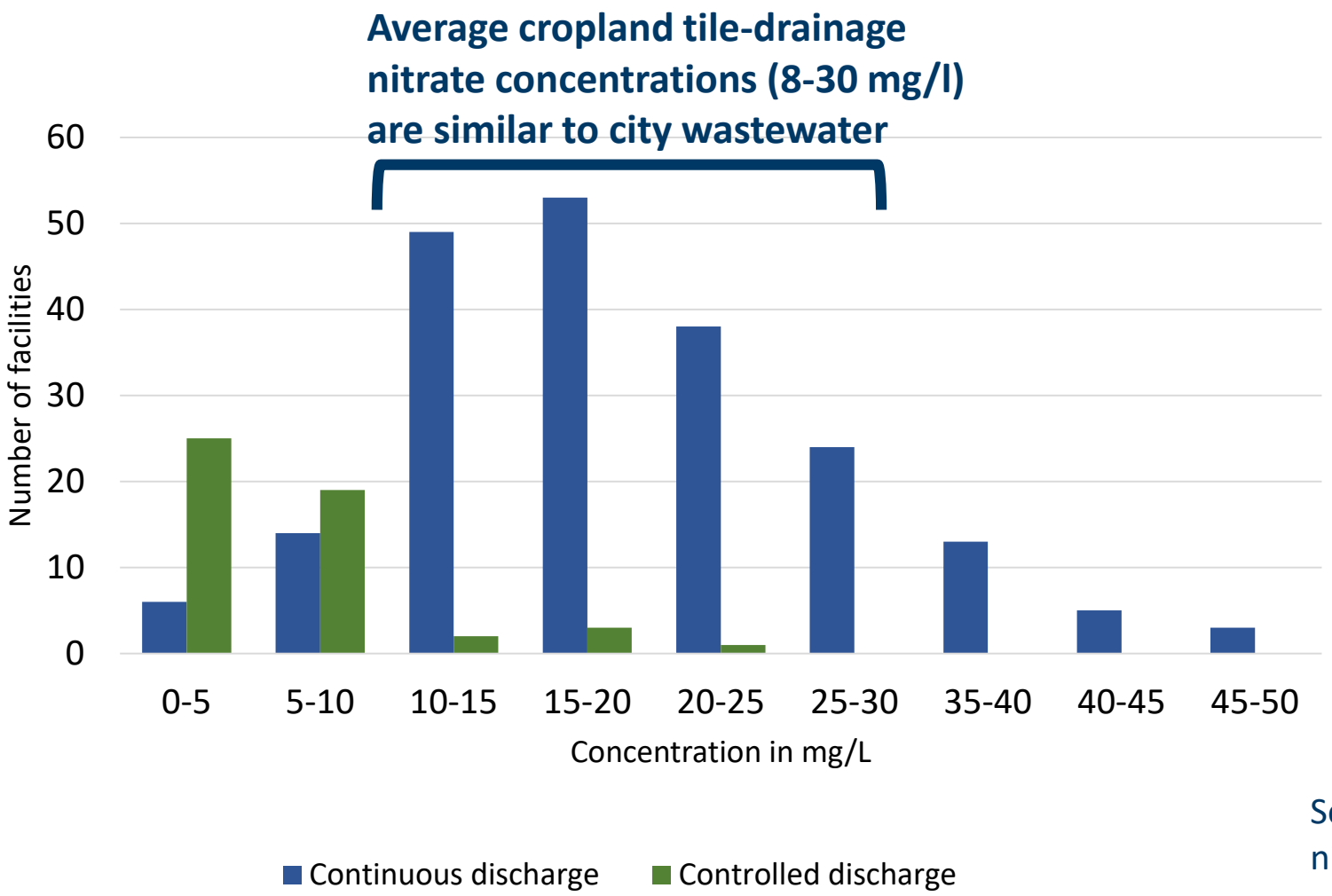
P



N



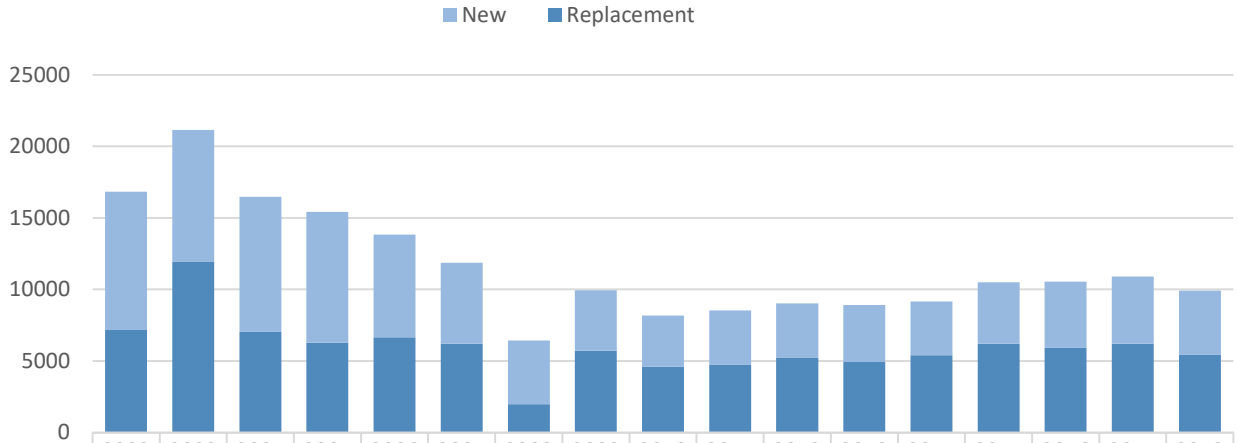
Wastewater nitrogen – typically 10-30 mg/l



Source of tile-drainage nitrate range (MDA monitoring of Discovery Farms & other sites)

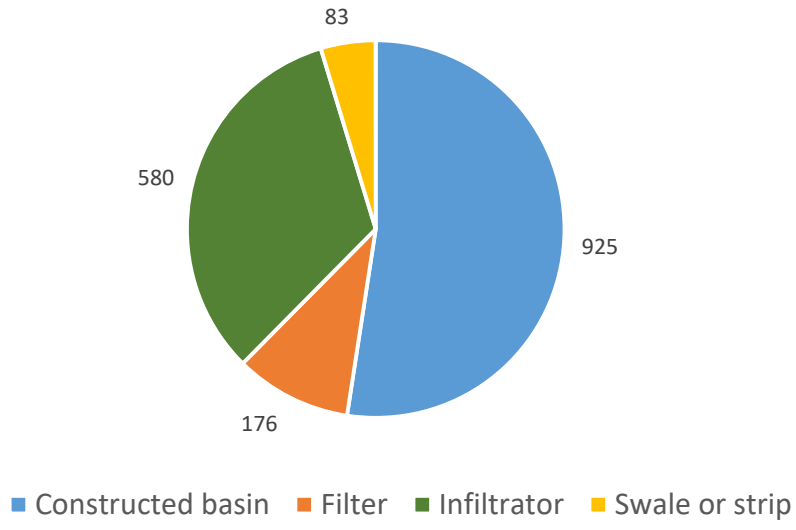
Septic & stormwater programs making progress

New & Replacement Septic Systems Over 17 Years



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
New	9650	9176	9434	9157	7185	5649	4446	4220	3575	3770	3795	3984	3767	4288	4639	4709	4483
Replacement	7168	11963	7039	6267	6659	6207	1992	5711	4599	4756	5238	4927	5393	6205	5917	6197	5436

Total number of structural Stormwater BMPs implemented (2014-2018) at 78 MS4s



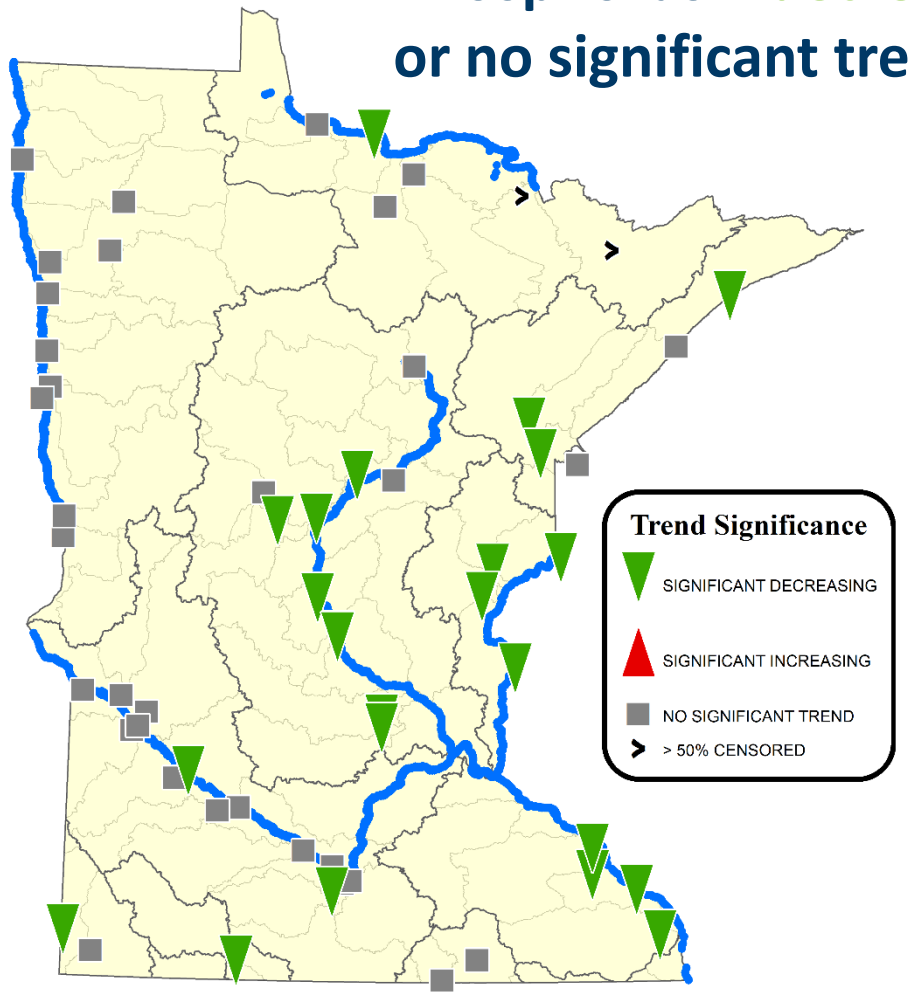
Summary of BMP adoption

1. **Are NRS strategies/programs in place?**
2. **How much progress are we making with BMPs (2014-18)?**
   - Historic conservation progress prior to the 2014 strategy
   - Some added acres since 2014 – about 5% of 2025 milestone scenario acres
   - Limited progress compared to scale of adoption needed
3. **Can we see nutrient improvements in water?**
4. **Next steps?**

10-year nutrient trends

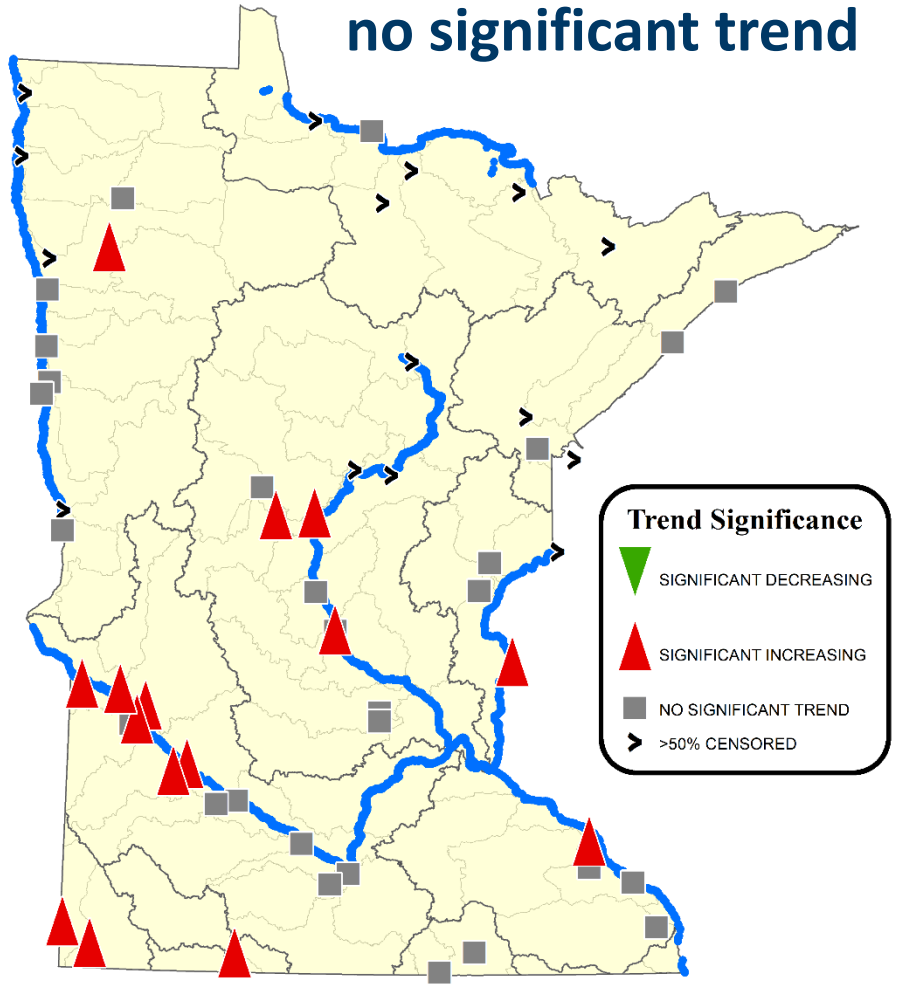
Total Phosphorus
2008-2017

Phosphorus – decreasing or no significant trend



Nitrate + Nitrite
2008-2017

Nitrate – increasing or no significant trend



Mississippi River phosphorus concentrations decreasing

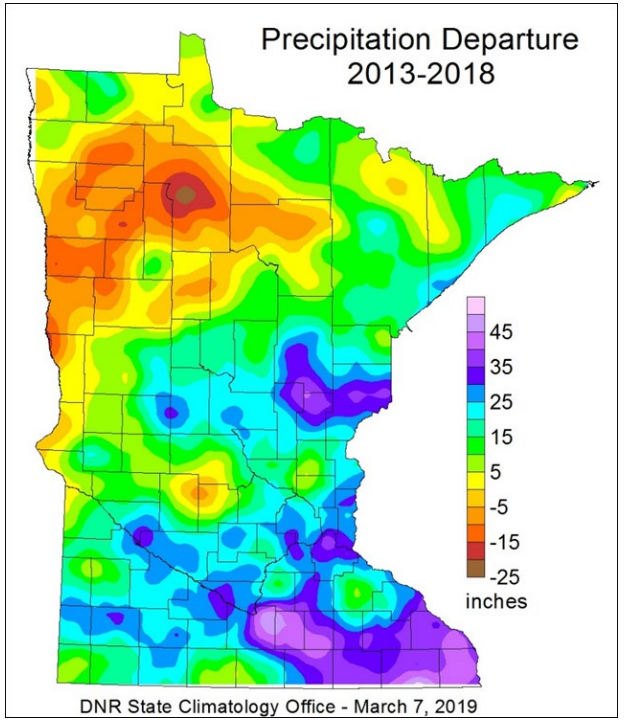
Phosphorus **Concentration** X **Flow** = Phosphorus **Load**

20 - 50%

40%

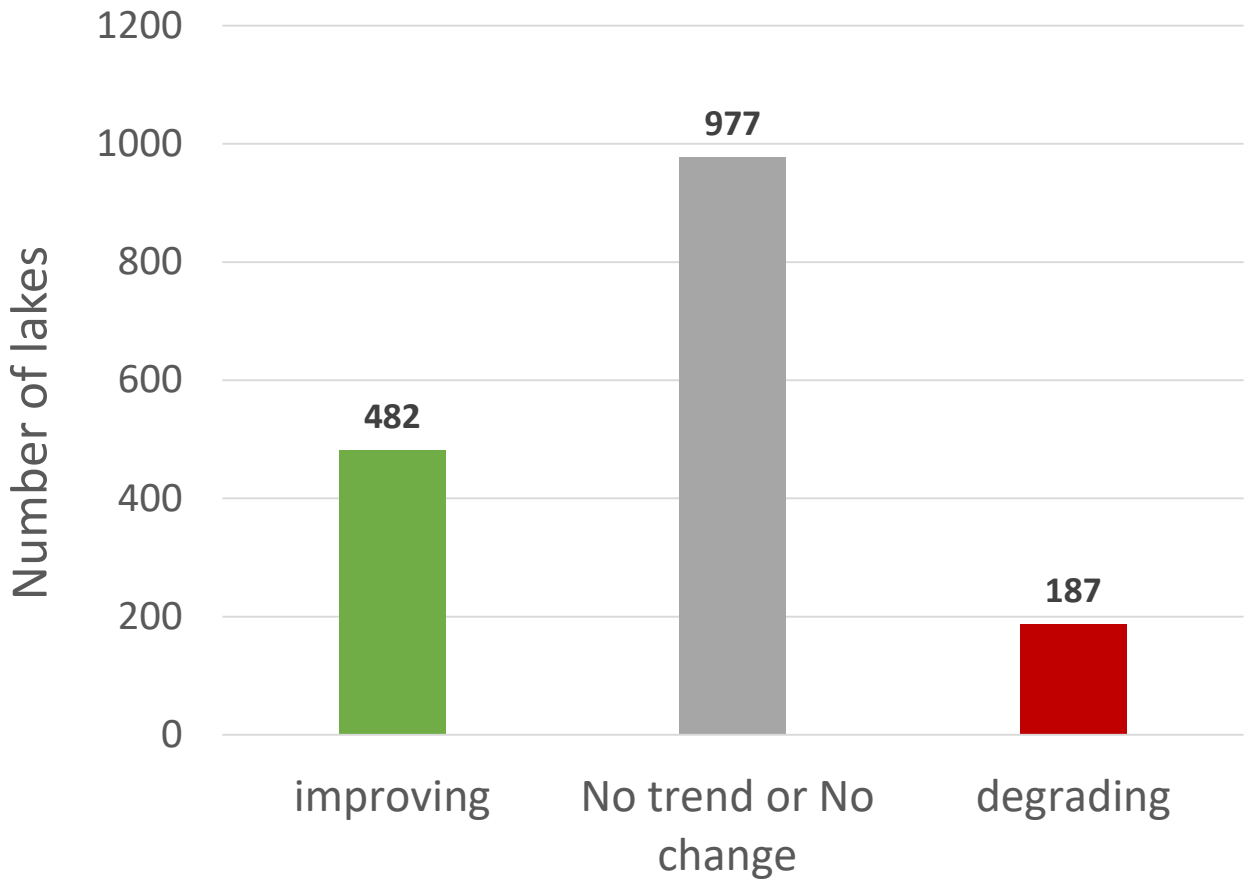
NS

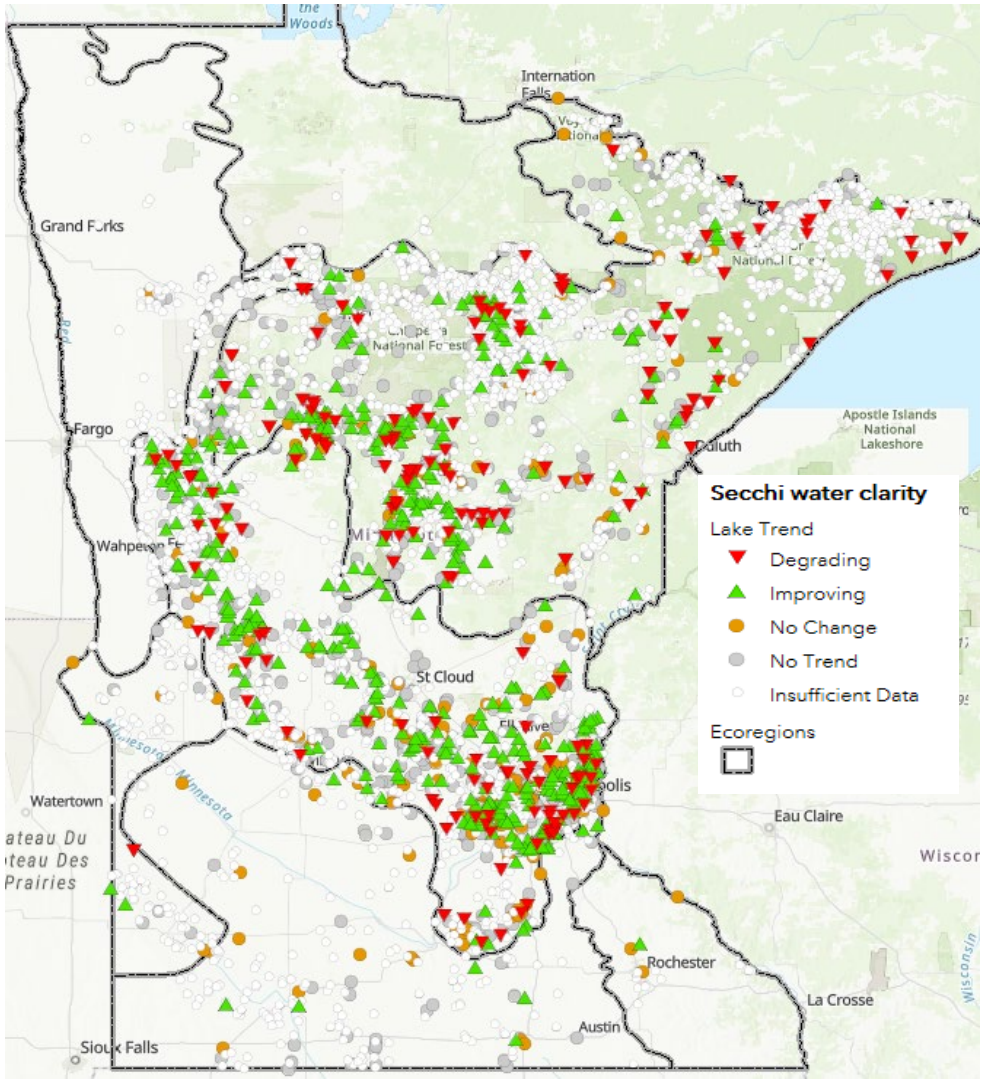
Non-significant trends



Recently averaging 4 to 7 inches more rain than normal in Southern MN

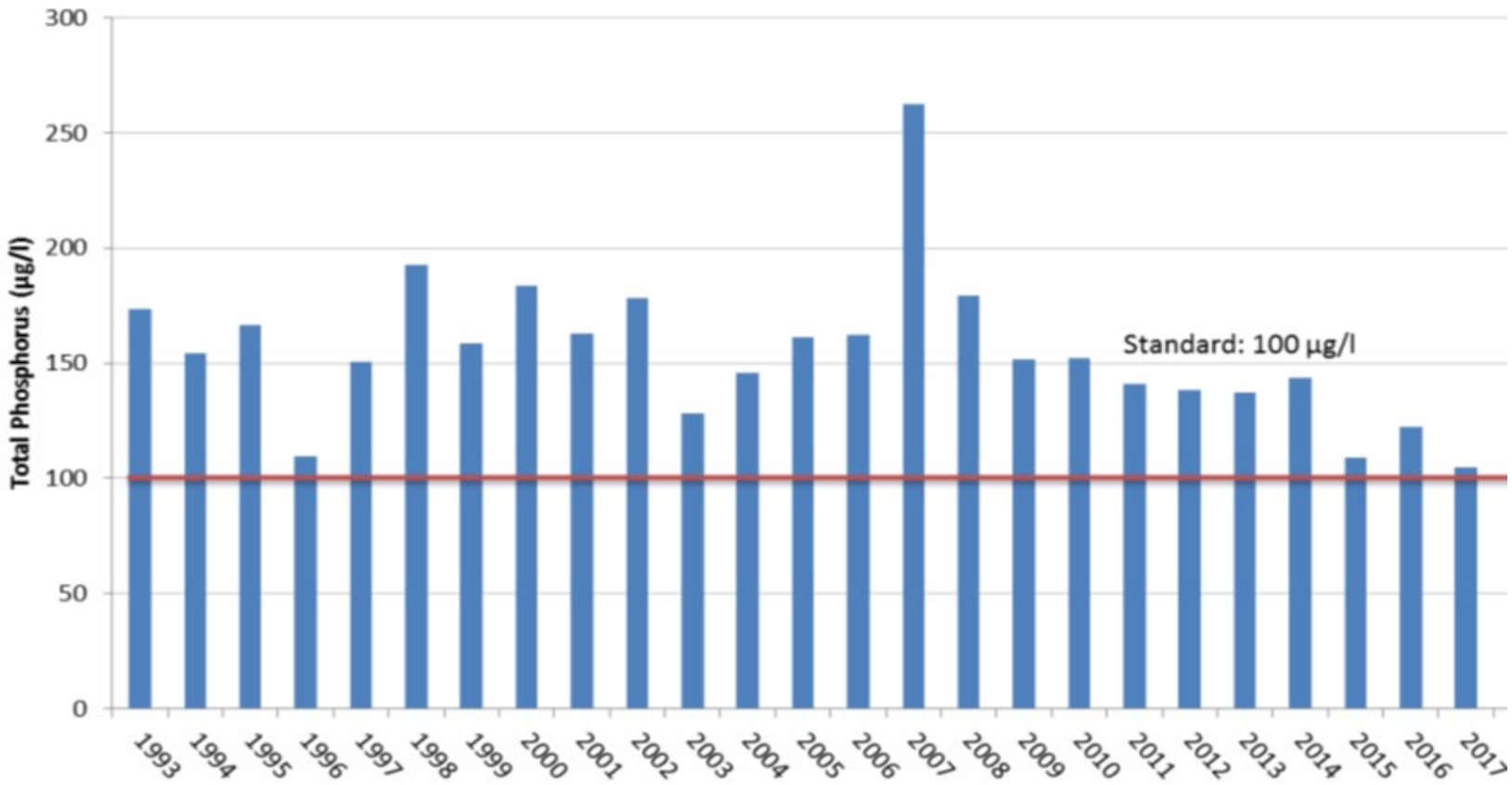
Lake clarity trends





Source: MPCA 2019

Lake Pepin phosphorus in-lake concentrations



Summary

1. **NRS strategies advanced?**
   - Greatly in all 18 focus areas… more time/development needed to fully implement
2. **BMPs adopted?**
   - Falling short of pace needed for goals
   - Currently about 5% of way to 2025 milestone scenario
3. **Improvements in water?**
   - River phosphorus concentrations improving or not significant in past 10 and 20 years (when corrected for flow variability)
   - River nitrate and total N increasing or not significant in past 10 and 20 years
   - Increasing river flows in southern Minnesota offsetting P reduction progress
4. **Next steps?**
   - Multi-agency report on progress

Next steps

- Steering Team discussion
- Complete draft progress report
  - By this spring
- Continue implementation and tracking 2020-25
- Update and republish Nutrient Strategy in 2025

Multi-agency steering team

Organization	Steering Team rep.	Compile, write, review
MPCA	Katrina Kessler Glenn Skuta	D. Wall, M. Graziani, L. Ganske, J. Jahnz, G. Johnson, R. Olmanson, M. Trojan, C. Robinson, D. Miller, Lisa Schreier, Lee Engel
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MDA	Dan Stoddard	J. Kjaersgaard, M. Wagner, B. Fitzgerald
U of MN	Mike Schmitt	J. Larson coordinating for multiple UMN contributors
Met Council	Sam Paske	J. Sventek, H. Wang, J. Mulcahy, M. Gail Scott
DNR	Steve Colvin	B. Weisman, J. Moeckel
EQB	Katie Pratt	
MDH	Tom Hogan	S. Robertson, M. Wettlaufer
Other contributing agencies	Jeff Freeman (PFA) Troy Daniel (NRCS)	R. Nustad (USGS); C. Spencer (NRCS); S. Carpenter (NRCS)
Consultant		Jennifer Olson & others from Tetra Tech

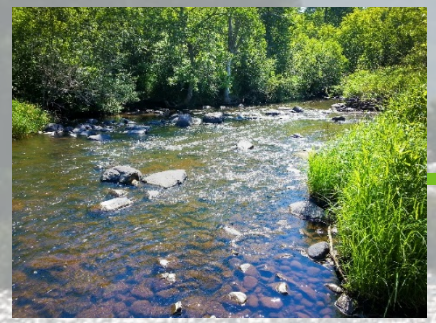
Questions?

www.pca.state.mn.us/water/nutrient-reduction-strategy

MINNESOTA POLLUTION CONTROL AGENCY

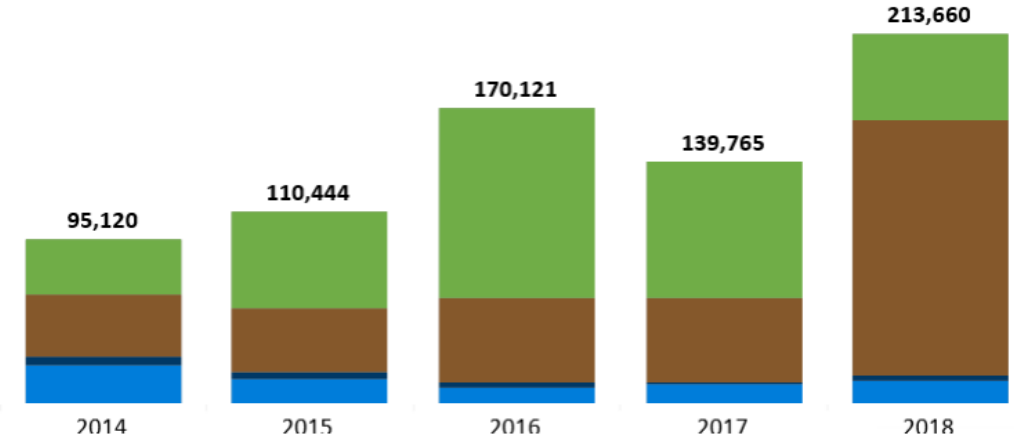
CLEAN WATER LAND & LEGACY AMENDMENT

If every local stream does its part with urban & ag sources, we will meet downstream goals



Government Program – reduced tillage & soil conservation

http://tableau/#/workbooks/6658/views



Living Cover (326,657 acres total)
Practices that reduce nutrient and soil loss by keeping plants growing continuously, including the Fall and Spring months. Common practices include cover crops and conservation cover.

Cropland Erosion Control (317,642 acres total)
Designed to reduce runoff and soil losses. This group consists primarily of farming practices that leave crop residue on the surface or structural practices that reduce or capture runoff and eroded soil.

Drainage Water Retention and Treatment (15,678 acres total)
Practices designed to slow down waters leaving tile-drained landscapes or otherwise treat tile-waters for nutrient removal prior to entering streams. Wetland restoration and controlled drainage management are the most common practices, but other emerging practices include saturated buffers and bioreactors.

Nutrient Management (69,134 acres total)
Managing the amount, form, placement, and timing of nutrient and soil amendments such that nutrients are used most efficiently by the crops, at the same time minimizing leaching and runoff to surface and ground water.

DRAFT