

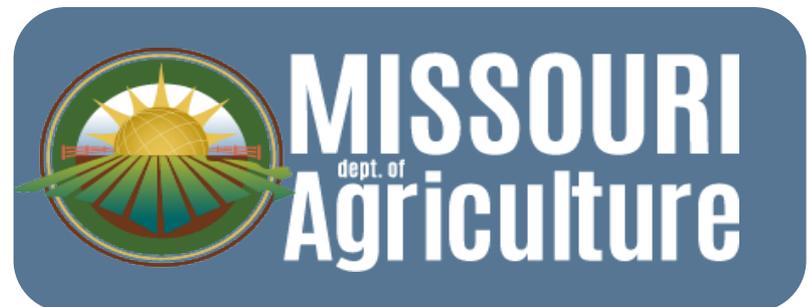
# Missouri Nutrient Loss Reduction Strategy

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Implementation Update April 2019



**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES





# State of Missouri

**Department of  
Natural Resources**

**Department of  
Agriculture**

**Division of  
Environmental  
Quality**

**Soil and Water  
Conservation Program**

**Water Protection  
Program**

# Missouri's Nutrient Loss Reduction Strategy (NLRS)

How it started: EPA Memo March 16, 2011,  
encouraging partnerships

## Guiding Principles:

- Solicit participation from federal, state, local, agricultural, natural resources, and environmental partners
- Use best available science
- Use adaptive management
- Identify successful strategies from other states and adapt to Missouri

# NLRS Actions

## Agriculture

- Manage Manure
- Sheet, Rill, and Gully Erosion Control
- Edge-of-Field Practice Installation
- Cover Crop Adoption
- 4R Nutrient Management
- Grazing Management Practices

## Municipal and Industrial Wastewater

- Monitor Point Source Nutrient Discharges
- Determine Feasible Nutrient Reduction Targets
- Establish Point Source Approaches
- Evaluate Funding Sources
- Municipal Integrated Planning
- Outreach and Education

## Urban Stormwater

- Review and Enhance Public Involvement and Education
- Structural and Non-Structural BMPs
- Program Compliance and Maintenance
- Other Opportunities

## Decentralized (Onsite and Cluster) Wastewater

- Improve System Management
- Develop a Statewide Inventory
- Improve Operations and Management
- Inspections and Monitoring
- Corrective Action
- Increase Education
- Increase Financial Assistance

## Other Actions

- Pilot Nutrient Trading System
- Community Services

# NLRS Actions

What have we accomplished?  
What is in process?



# Point Source Data Collection

## Voluntary Early Nutrient Monitoring Program

- Point Sources voluntarily sampled nutrient effluent data
- About 50 point sources participated



# Point Source Data Collection

## Effluent Regulation Sampling Requirements

- Facilities that typically discharge nutrients
- Frequency based on design flow of the facility:



Sample influent and effluent for:

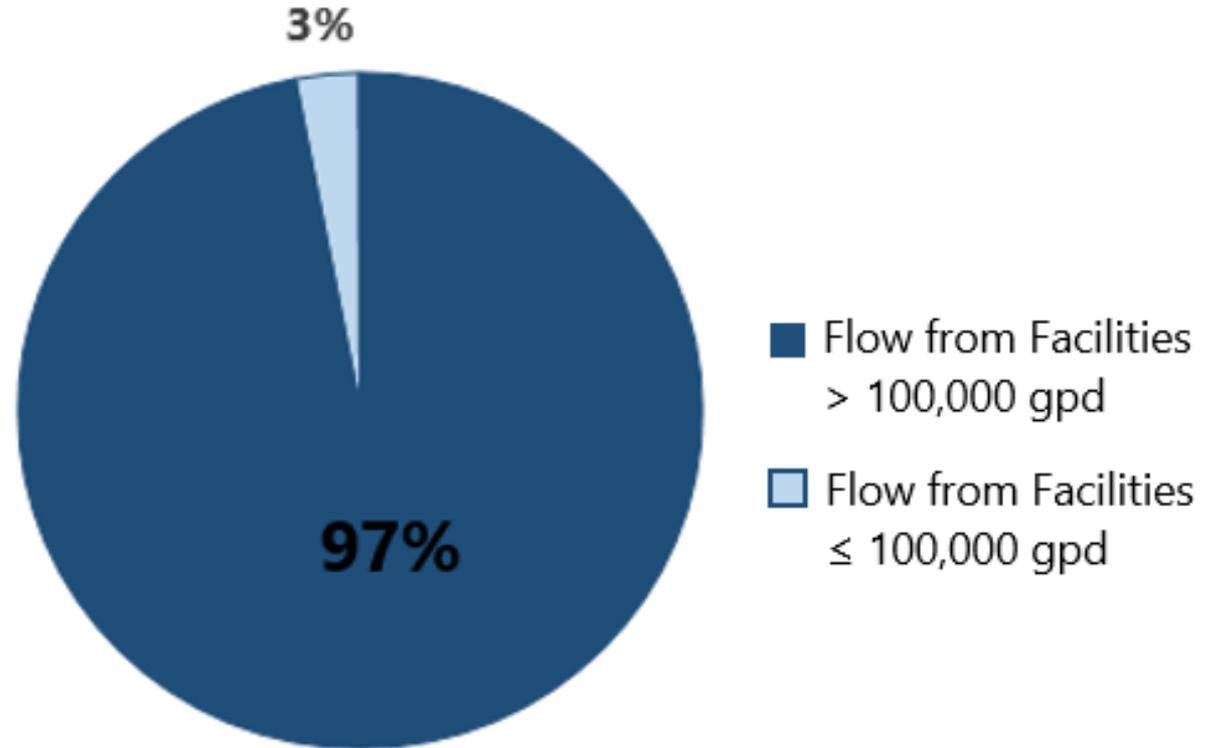
- Total Phosphorus
- Total Kjeldahl Nitrogen
- Nitrate plus Nitrite
- Total Ammonia Nitrogen

# Point Source Data Collection

## Effluent Regulation Sampling Requirements (continued)

Why 0.1 MGD?

- Small WWTFs are 82% in number, but...
- Small WWTFs are only 3% of the total flow



# Missouri Numeric Nutrient Criteria for Lakes

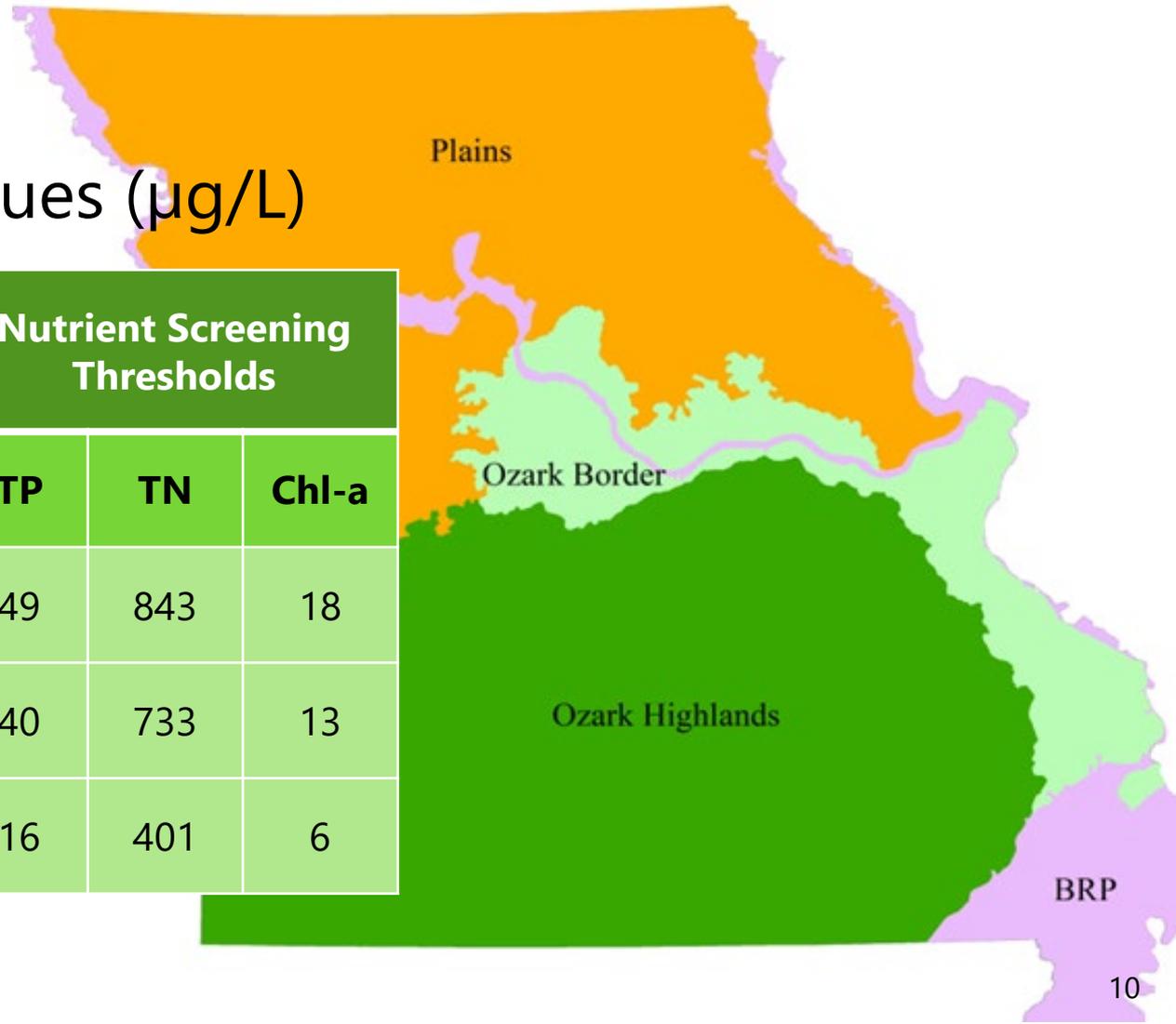
- Approved by EPA December 2018
- Missouri-specific data obtained through the University of Missouri Limnology Program
- Nutrient Criteria Implementation Plan: Assessment and Permitting



# Missouri Numeric Nutrient Criteria for Lakes

## Lake Ecoregion Values ( $\mu\text{g/L}$ )

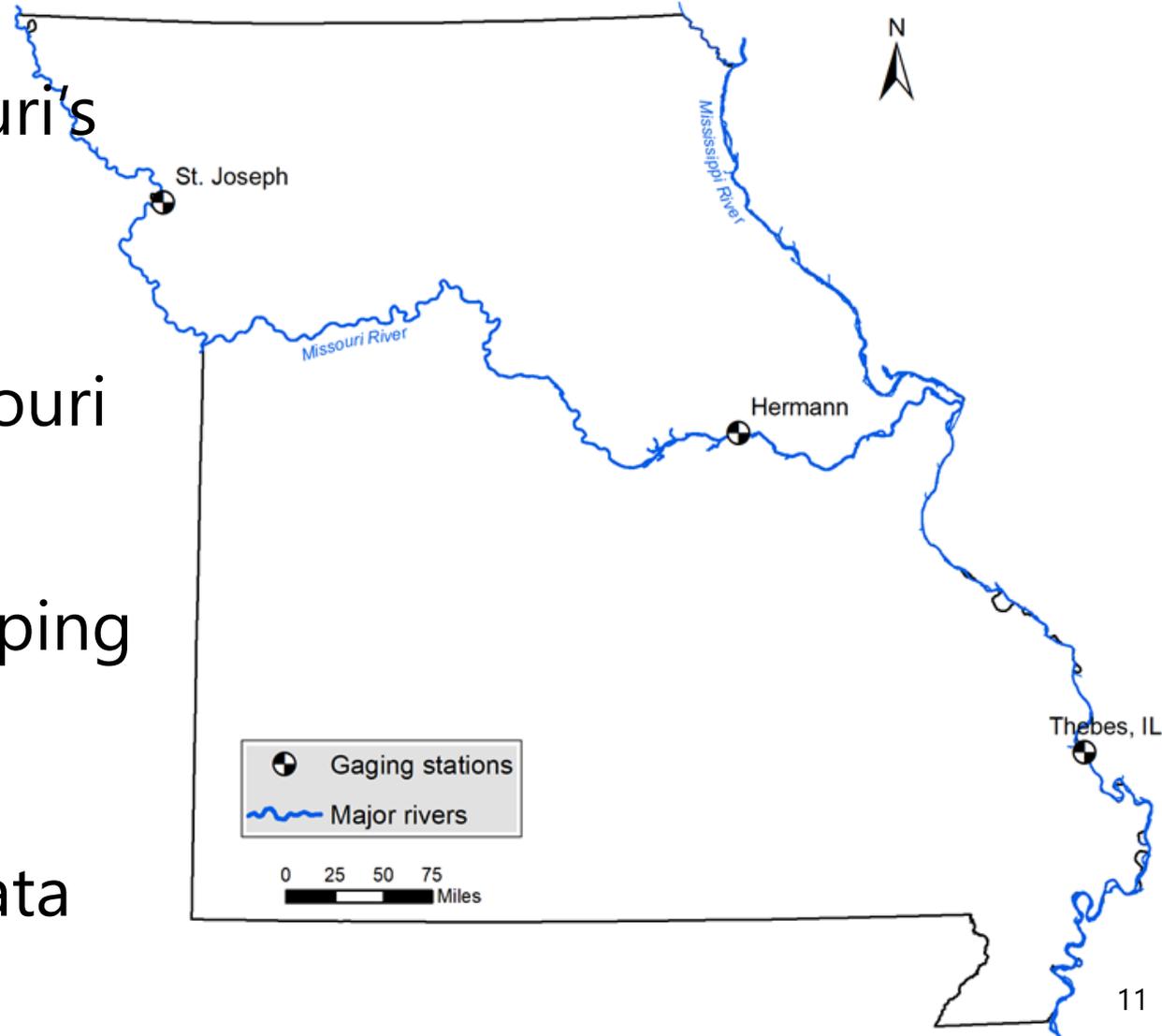
Lake Ecoregion	Chl-a Response Impairment Thresholds	Nutrient Screening Thresholds		
		TP	TN	Chl-a
Plains	30	49	843	18
Ozark Border	22	40	733	13
Ozark Highlands	15	16	401	6



# Nutrient Trends

We are starting to investigate Missouri's nutrient trends in rivers and lakes.

- 3 USGS gauge stations on Missouri and Mississippi Rivers
- Currently developing a strategy for evaluating and communicating nutrient trend data



# Statewide Nutrient Loading Baseline

## Point Source Analysis

- Digging through permit data from the 1980s
- Need to make assumptions because data is spotty

## Nonpoint Source Analysis

- Investigation of land use in GIS
- Review BMP cost share records
- Watershed modeling

# Soil and Water Conservation Program (SWCP)

## Funded through Parks, Soils and Water Sales Tax

- 1/10 of one percent of state sales tax
- First approved by voters in 1984
- Renewed in 1988, 1996, 2006 and 2016
- Half goes to Division of State Parks
- Half goes to SWCP



# Soil and Water Conservation Program (SWCP)

## Soil and Water Conservation Districts

- Locally operated sub-units of state government organized according to state law
- No regulatory or taxing authority, rely on volunteer participation of landowners to achieve goals
- Responsible to conserve soil and water resources
- Every Missouri county is governed by 5-member soil and water conservation district board of supervisors

# Soil and Water Conservation Program (SWCP)

Resource  
Concern  
Areas



Nutrient and Pest

Grazing



Sensitive  
Areas

Sheet,  
Rill and  
Gully



Irrigation

Woodland



Animal  
Waste

# Soil and Water Conservation Program (SWCP)

## What have we already accomplished?

### Cumulative Benefits

- 185 million tons of soil saved
- \$772 million to landowners
- More than 245,770 contracts
- 100+ watershed projects
- More than 5 million acres impacted

# Soil and Water Conservation Program (SWCP)

Resource Concern	Paid	# Contracts
Animal Waste Management	\$371,548	19
<b>Pilot Cover Crops</b>	<b>\$150,323</b>	<b>208</b>
Grazing Management	\$3,276,177	963
Irrigation Management	\$983,911	203
Nutrient & Pest Management	\$476,629	518
Sensitive Areas	\$1,289,283	325
Sheet and Rill/Gully	\$17,018,271	2912
Woodland Erosion	\$872,896	281
<b>TOTAL</b>	<b>\$24,439,038</b>	<b>5429</b>

2014 Cost-Share

Resource Concern	Obligated	# Contracts
Animal Waste Management	\$1,082,903	37
<b>Cover Crops</b>	<b>\$11,863,210</b>	<b>5032</b>
Grazing Management	\$5,834,997	1255
Irrigation Management	\$1,476,178	218
Nutrient & Pest Management	\$883,612	1014
Sensitive Areas	\$2,104,131	283
Sheet and Rill/Gully	\$19,292,905	2137
Woodland Erosion	\$913,262	254
<b>TOTAL</b>	<b>\$43,451,198</b>	<b>10230</b>

2019 Cost-Share to date

# Soil and Water Conservation Program (SWCP)

Stream Protection through livestock exclusion since 2009



Jasper County 3/2014



Jasper County 5/2016



# Missouri's 319 Program – Urban Focus Deer Creek Watershed Initiative



# Missouri's 319 Program – Urban Focus South Creek Restoration Project



Before Construction



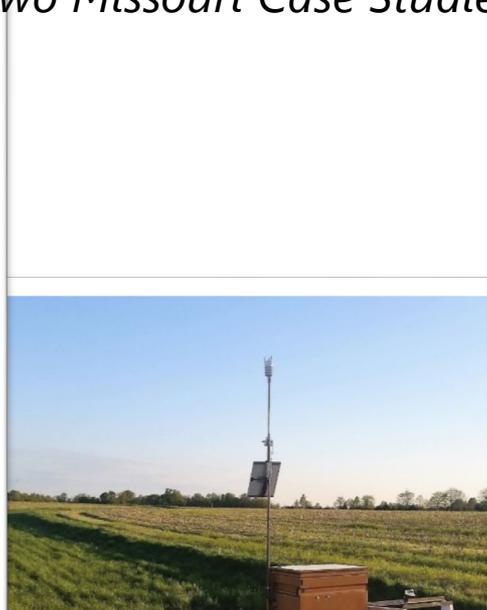
Restored Stream Channel

# Edge-of-Field Monitoring

## *Examining the Healthy Soil and Cleaner Water Nexus* **Measuring Effectiveness of BMPs**

*Does the data and science support observations and claims?*

*Two Missouri Case Studies*



# Edge-of-Field Monitoring



Equip box, weather station & solar panel

## Water Quality Monitoring Instrumentation

- H-style fiberglass flume,
- ISCO Autosamplers
- Campbell Scientific Data logger
- Pressure transducer (for depth reading),
- Cellular modem/telemetry
- Total weather station
- Solar Powered
- Data streamed daily to project server.



Autosampler, datalogger, modem



Photo from security camera



H Flume & pressure transducer

# Site # YOD 07/08 Shelby County,

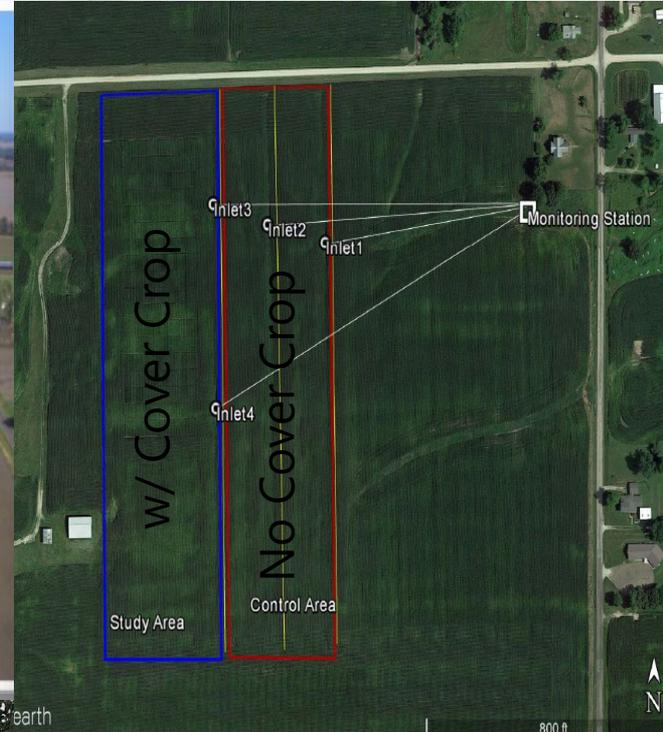
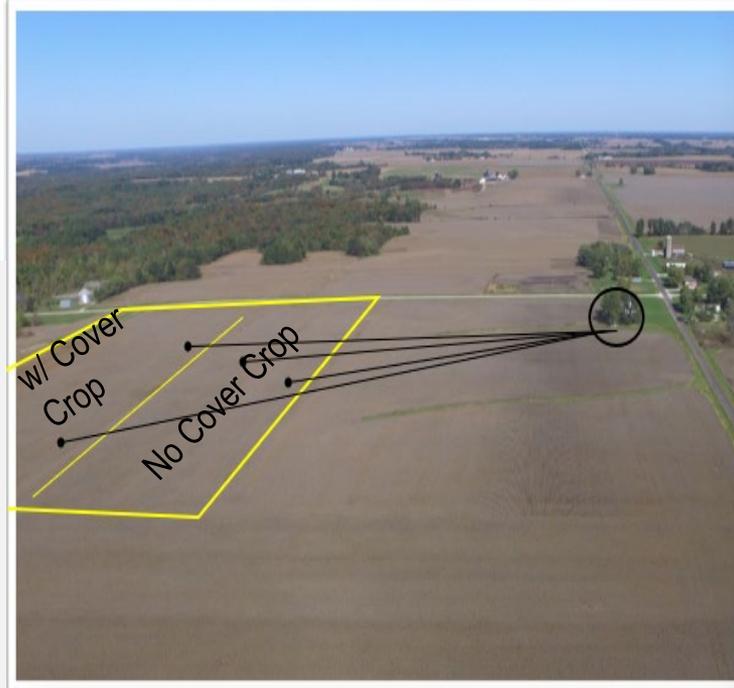
**Drainage: Tile-  
drained terraces  
(both)**

Crops:  
Corn/Soybean

Control Area: no  
cover crop.

Study Area: annual  
cover crop

Sampling point:  
Control: end of tile  
pipe.  
Study: end of tile  
pipe.



**Site # ALP  
01/02  
Cooper  
County, MO**

Crops:  
Corn/Soybean

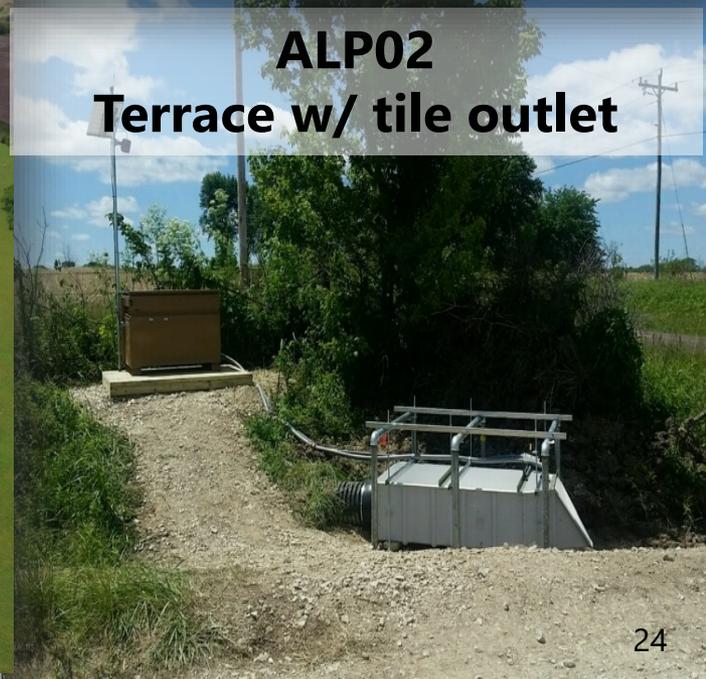
Control area: Terrace  
tile outlet, no  
waterway.

Study Area: Terrace  
with grass waterway.

Sampling point –

Control: Pipe outlet.

Study: grass  
waterway.



**2018 Total Runoff Volume:**

GOT05 = 14" (w/ CC & GW)

GOT06 = 21.5" (no CC or GW)

% Difference = 35%

**2018 Total Phos Loss:**

GOT05 = 3.5 lbs/ac (w/ CC & GW)

GOT06 = 7.2 lbs/ac (no CC or GW)

% Difference = 51%

**2018 TKN Nitrogen Loss:**

GOT05 = 6.0 lbs/ac (w/ CC & GW)

GOT06 = 17.5 lbs/ac (no CC or GW)

% Difference = 65%



# Edge-of-Field Practice Installment

- Research and education efforts to focus on conservation and BMPs specific to reducing nutrient runoff from agricultural lands



No-tillage vs. Conventional Tillage

- What practices are we looking to expand in Missouri?

# Edge-of-Field Practice Installment



Denitrifying Bioreactors

Photo Credit: Kent Heikens, USDA



Saturated Buffers

# Edge-of-Field Practice Installment



Cover Crops



Streambank Stabilization

# WQ Trading Framework

- Developed over 2 years through a workgroup process consisting of internal and external partners
- Approved by the Missouri Clean Water Commission October 5, 2016
- Basic policy for water quality trading in Missouri.
- Defines elements that need to be included in trading program proposals submitted to the DNR
- Provides references to key documents and definitions of the terms used throughout the Framework.

# Nutrient Trading

1

Rework our WQ Trading Framework to align with the recent EPA trading memo

2

Finalize procedures specific to trading nutrients

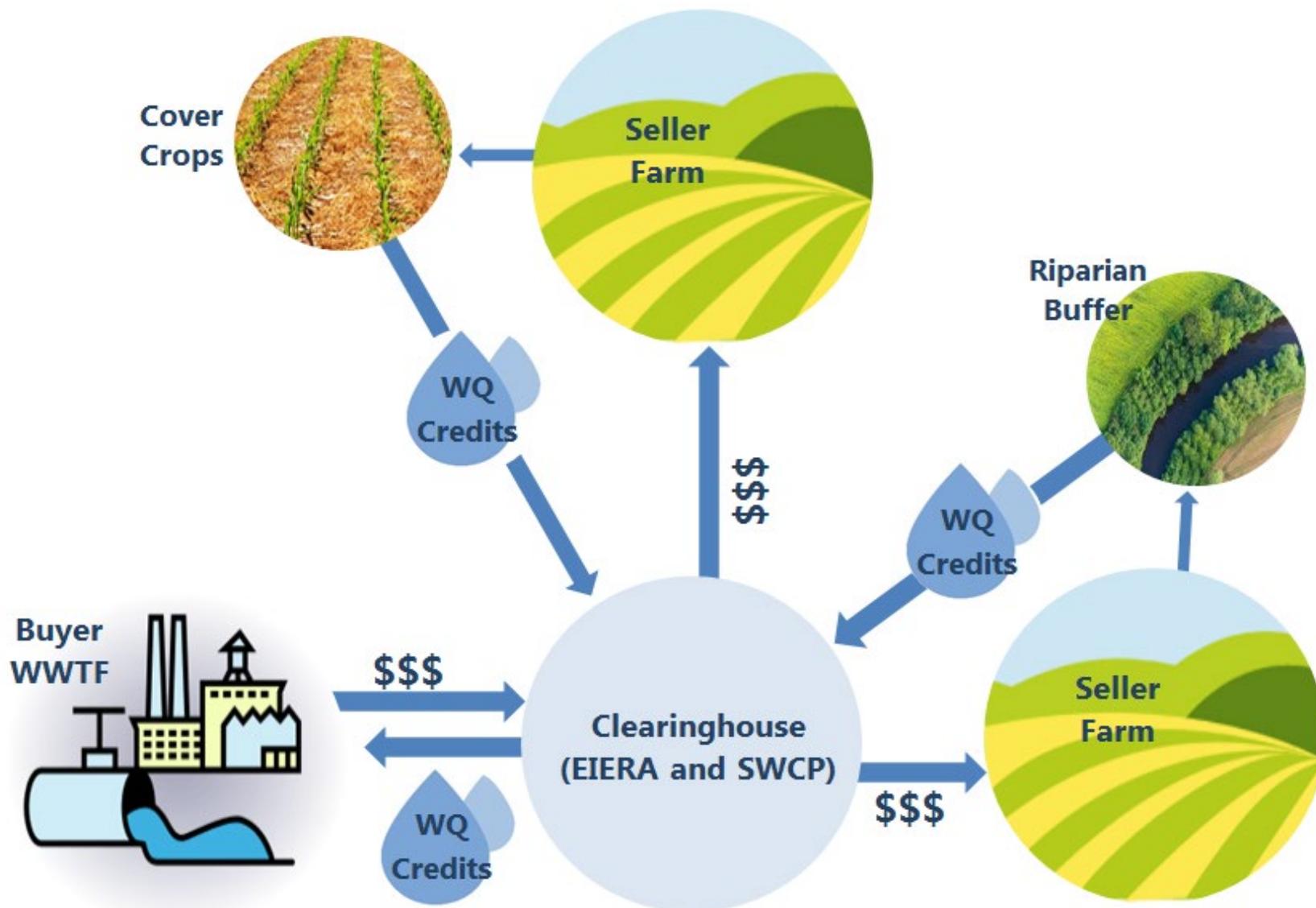
3

Establish resources and tools for internal and external use

4

Map process for our clearinghouse model (Nutrient Exchange Incentive System – NExIS)

# Clearinghouse Model – Nutrient Exchange Incentive System (NExIS)



# Nutrient Trading

## 6 Market-Based Principals for Missouri

1. Implement water quality trading on a watershed scale
  - 66 HUC-8s
2. Use models and verification practices to eliminate the need for trade ratios
3. Water quality credits may be banked for future use
  - Existing practices – “look back” credits
4. Simplicity and flexibility for baseline concepts
  - Current conditions for baseline
5. A single project may generate credits for multiple markets
6. Financing opportunities for deployment of nonpoint land use practices
  - Section 319 grants and SRF

# NLRS Actions Committee

The NLRS contains many recommended actions making it difficult to prioritize and focus resources.

This internal group will:

- Prioritize actions
- Track actions
- Improve coordination
- Improve communication
- Keep projects moving



# Biennial Update

## Missouri NLRS 2018 Update Publication

- Lists progress made toward the goals of the NLRS
- At-a-glance, not comprehensive
- Used for internal and public outreach
- New update every other year



# Questions?

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