



**Mississippi River
Gulf of Mexico
Watershed Nutrient
Task Force**

**Fall 2020
Hypoxia Task Force Public Meeting
October 1, 2020
Virtual Agenda**

Thursday, October 1

9:50am Eastern
(8:50am Central)

Attendees Join Webinar

10am Eastern
(9am Central)

Facilitator Introduction to the Virtual Meeting (10 minutes)

- Jason Gershowitz, Senior Facilitator, Kearns & West

Welcome (10 minutes)

- David P. Ross, Task Force Federal Co-Chair, United States Environmental Protection Agency
- Mike Naig, Task Force State Co-Chair, Iowa Department of Agriculture and Land Stewardship

10:20am Eastern
(9:20am Central)

Summary of HTF Workgroup Activities

- *Objective: Report on actions of both the new HTF workgroups charged at the February 2020 meeting and those ongoing HTF workgroups.*
- Anna Wildeman, Principal Deputy Assistant Administrator for Water, EPA

10:30am Eastern
(9:30am Central)

State Progress

Objective: Share progress and key status updates.

- Minnesota: Five-year Nutrient Reduction Strategy Report
 - Katrina Kessler, Minnesota
- Illinois: Illinois Nutrient Research and Education Council Report
 - Trevor Sample, Illinois
 - Julie Armstrong, Illinois Nutrient Research and Education Council
- Louisiana: Nutrient Reduction and Management Strategy
 - Harry Vorhoff, Louisiana
- Iowa: Advancing Water Quality Wetland Implementation
 - Matt Lechtenberg, Iowa

11:50am Eastern
(10:50am Central)

Partner Updates

Objective: Highlight opportunities for HTF and partners in advancing HTF goals.

- HTF Collaboration on Basin-Wide Water Quality Trends, Ted Kratschmer, National Great Rivers Research and Education Center
- Industry Partner Program: Payments to Farmers for Practices with Carbon and Water Quality Benefits, Dr. Jeff Seale, Bayer

12:10pm Eastern
(11:10am Central)

Lunch Break

1:00pm Eastern
(12:00pm Central)

Federal Agency Contributions (10 minutes each)

Objective: Highlight federal actions in support of the states.

- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- NOAA
- U.S. Department of the Interior
- U.S. Army Corps of Engineers

1:50pm Eastern
(12:50pm Central)

Public Comment Session

Objective: Hear comments from interested members of the public.

2:20pm Eastern
(1:20pm Central)

Closing Comments

Objective: Identify meeting achievements and explore any opportunities and challenges for implementation.

- David P. Ross, Task Force Federal Co-Chair, United States Environmental Protection Agency
- Mike Naig, Task Force State Co-Chair, Iowa Department of Agriculture and Land Stewardship

2:30pm Eastern
(1:30pm Central)

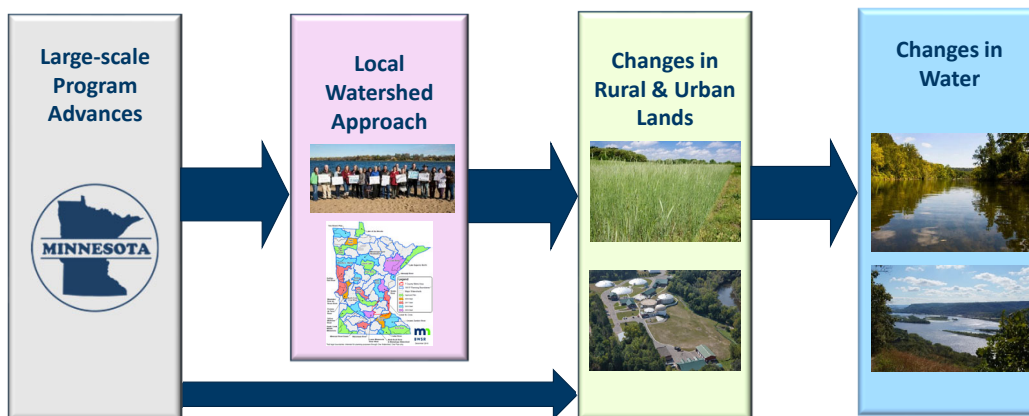
Adjourn

Minnesota's Nutrient Reduction Strategy

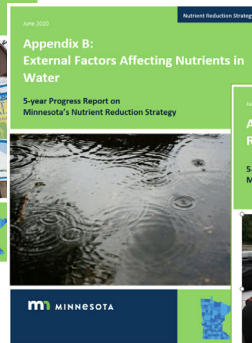
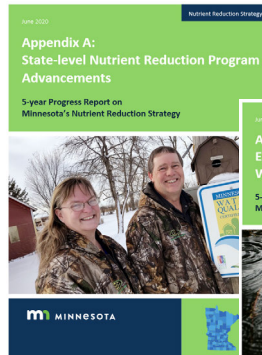
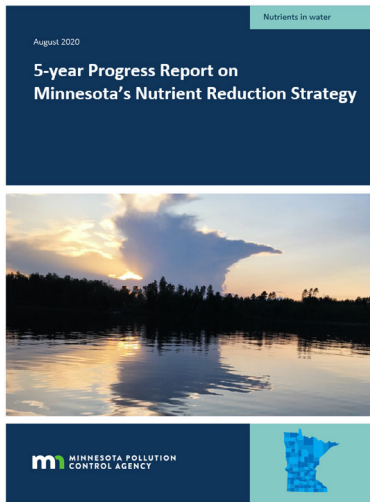


Tracking Progress in the Mississippi Headwaters State

Strategy implementation to reduce nutrients in water

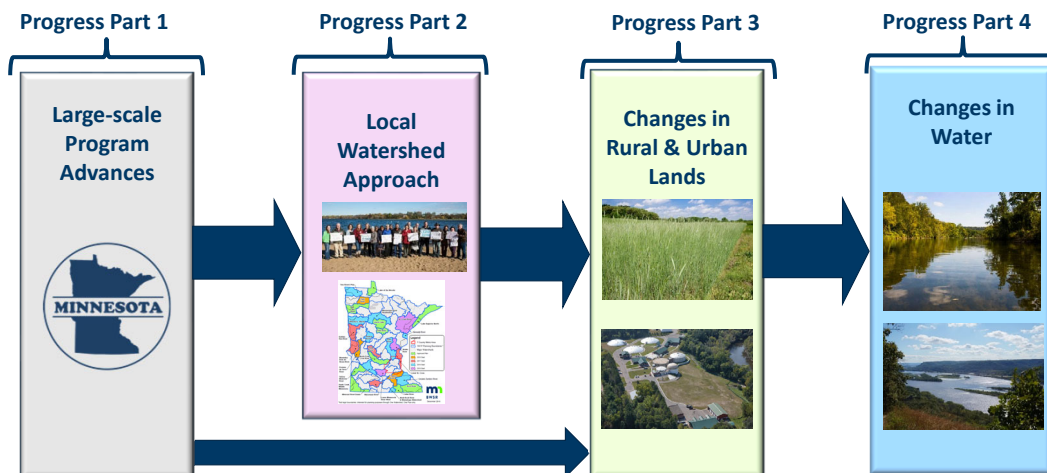


Nutrient Reduction Strategy 5-year Progress Report

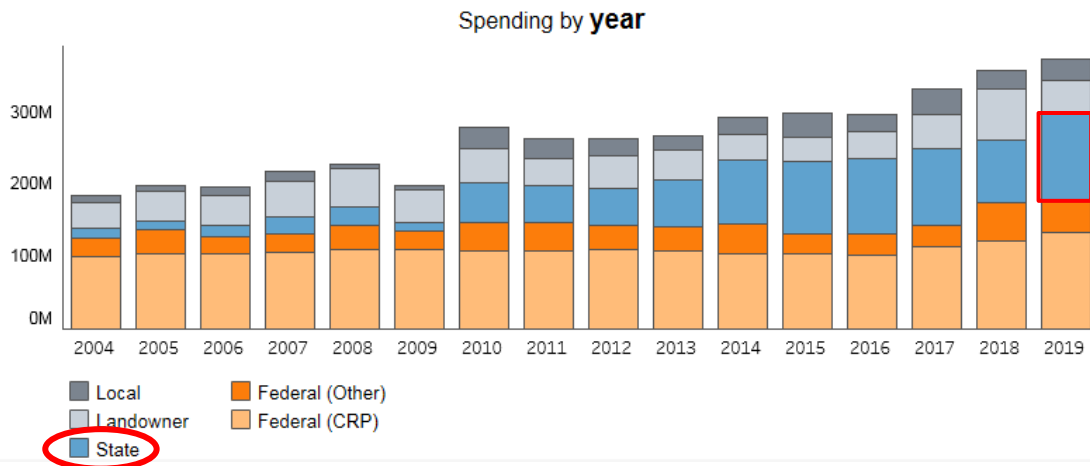


<https://www.pca.state.mn.us/water/nutrient-reduction-strategy>

Presentation Outline



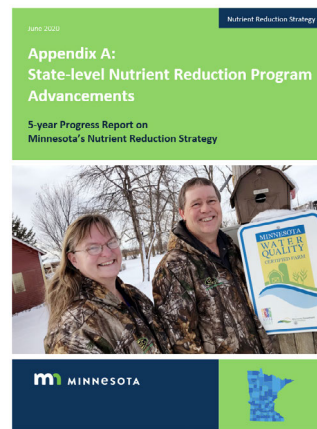
Minnesota Clean Water Fund – boosted state BMP \$\$



More than 30 program advances since 2014

Education, Outreach and Research	Voluntary Programs	Regulatory Programs	Watershed Partnerships and Tools
<ul style="list-style-type: none"> Nitrogen Smart training for farmers and farm-advisors Annual nutrient management and conservation tillage conferences Forever Green Initiative Discovery Farms Minnesota Office of Soil Health Guidance manuals for agricultural best management practices, drainage, urban stormwater management Conservation professionals training and certification Nutrient Management Initiative Center for Changing Landscapes 	<ul style="list-style-type: none"> Minnesota Agricultural Water Quality Certification 4R Certification led by private industry (cropland nutrient management) Red River Basin Initiative and Red River Valley Drainage Water Management Minnesota Conservation Reserve Enhancement Program Board of Water and Soil Resources Cover Crop Demonstration Program Clean Water Fund – increases for BMP implementation Point – nonpoint trading Reinvest in Minnesota Multi-purpose drainage water management 	<ul style="list-style-type: none"> Municipal and Industrial Wastewater Program Groundwater Protection Rule (Nitrogen Fertilizer) Minnesota Riparian Buffer Law Feedlot and land application of manure rules and program Urban Stormwater Runoff Program Subsurface Sewage Treatment Program 	<ul style="list-style-type: none"> Watershed Restoration and Protection Strategies (WRAPS) in over 50 HUC-8 watersheds One Watershed, One Plan (1W1P) Program Groundwater Restoration and Protection Strategies Watershed Conservation Planning Initiative Small focus watersheds – Federal Section 319 Program (20 watersheds) Guidance on Lake Protection for WRAPS and 1W1P National Water Quality Initiative and Mississippi River Basin Healthy Watershed Initiative Watershed-based Funding Implementation Program Root River Field to Stream Partnership

All 30+ programs described in:



<https://www.pca.state.mn.us/water/nutrient-reduction-strategy>



Minnesota Agricultural Water Quality Certification



Photo from MDA

Voluntary Partnership:

- Producers
- Government agencies
- Private sector

WQ certified farmers get:

- 10 yrs of regulatory certainty
- Priority \$ for new practices
- Community recognition

Growth since 2015:

- 900+ farms
- 600,000+ acres
- 1800+ new practices
- 46,000+ lbs P reduced

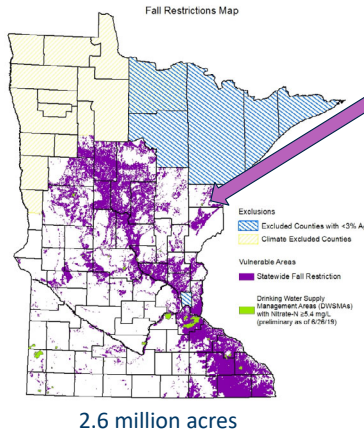
Forever Green Program



- Developing new cropping systems for continuous living cover
 - plant breeding
 - agronomic systems
 - food science
 - economics
- Supply Chain Development
- Market Development

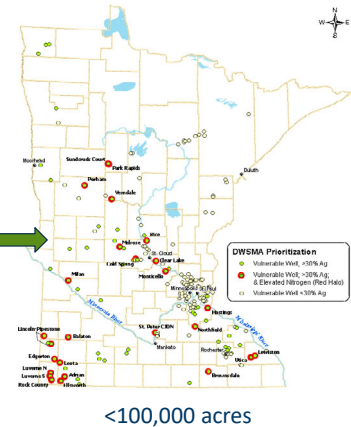


MN Groundwater Protection Rule Nitrogen fertilizer restrictions adopted in 2019



Fall N fertilizer restrictions in vulnerable areas

BMPs can phase from voluntary to regulatory in drinking water supply management areas, depending on nitrate levels/trends & BMP adoption rates

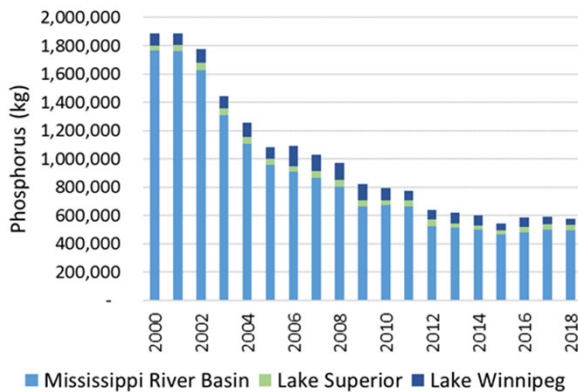


<https://www.mda.state.mn.us/nfr>



Wastewater Permitting Program - Phosphorus

P

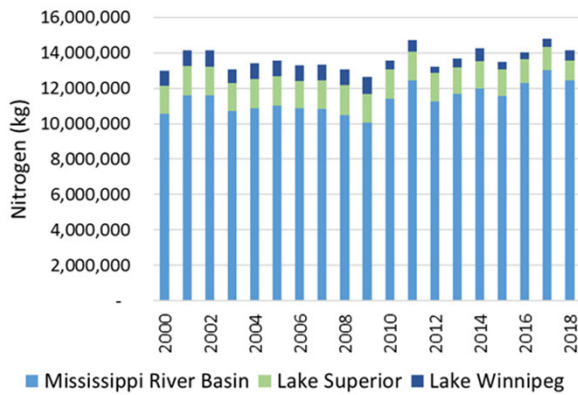


Over 70% reduction from:

- **2000** - 1 mg/L effluent performance standard for new/expanded plants
- **2008** - Lake Eutrophication Standards & wastewater rules
- **2014** - River Eutrophication Standards
- **2014** - Nutrient Reduction Strategy

Wastewater Permitting Program – Nitrogen (N)

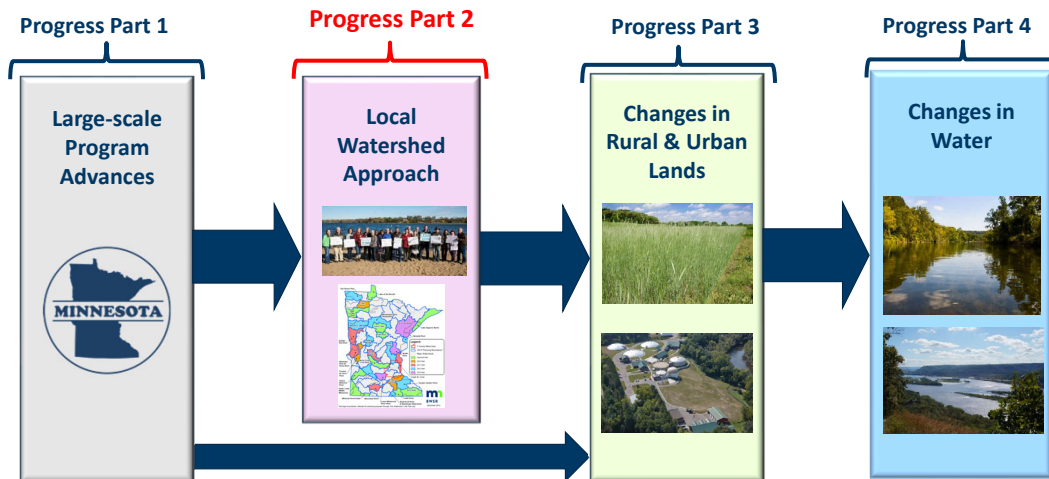
N



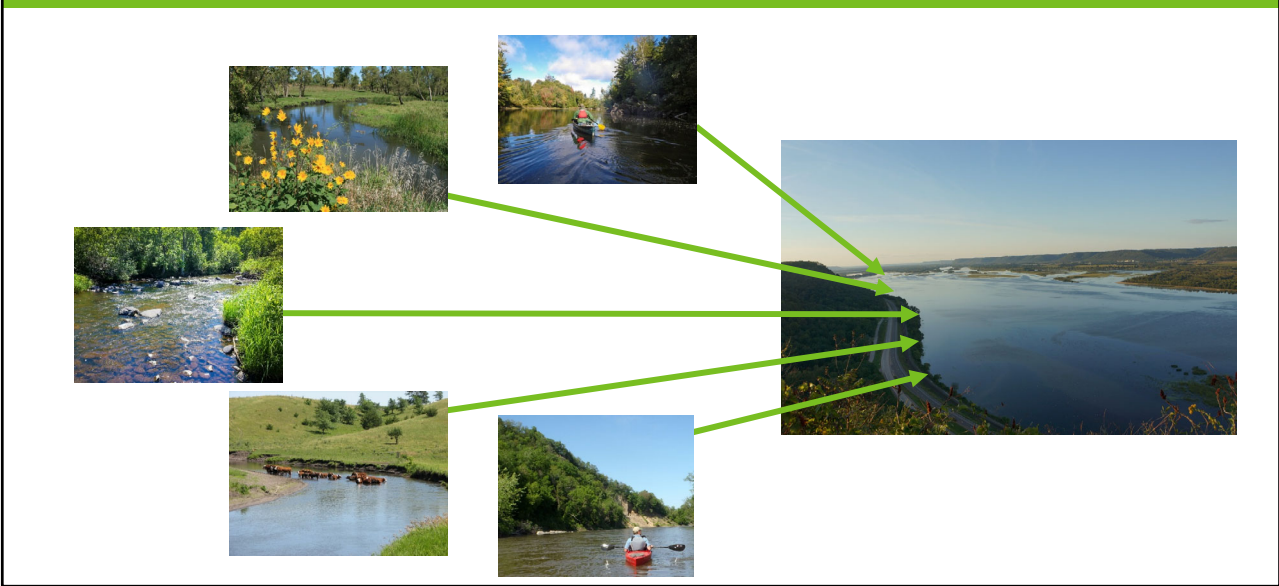
Wastewater N strategy - steps:

1. Monitor influent & effluent nitrogen
2. Evaluate N reduction optimization
3. Develop N management plan templates
4. Encourage voluntary N removal when upgrading facility
5. Establish N effluent limits – after nitrate water quality standards developed
6. Develop point/nonpoint trading options

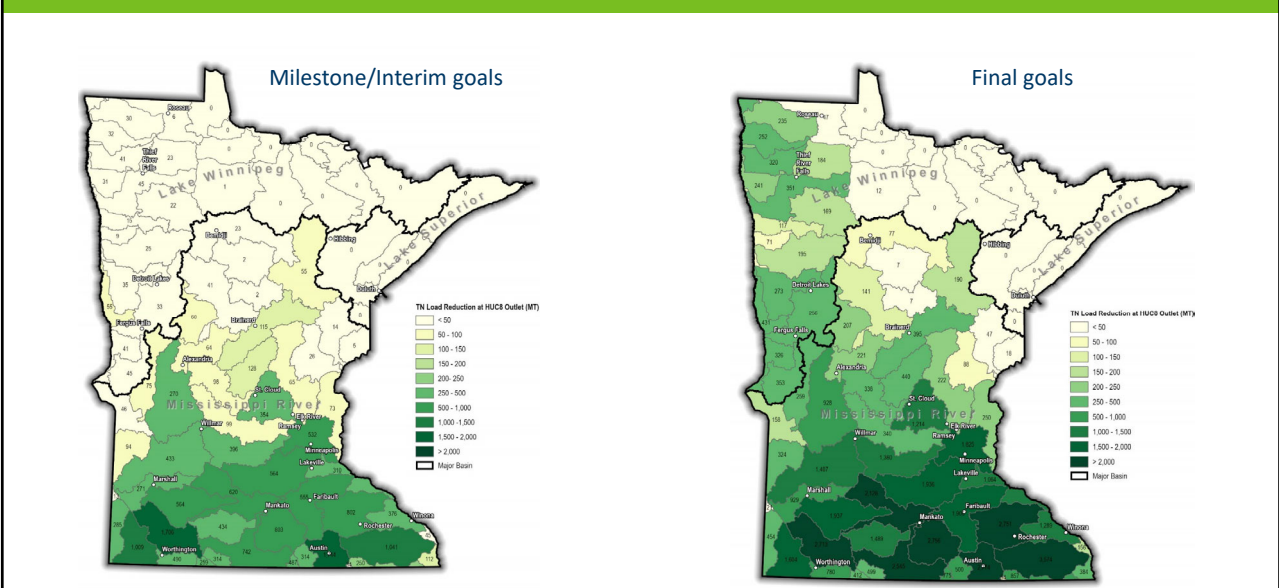
Presentation Outline: Progress with our watershed approach



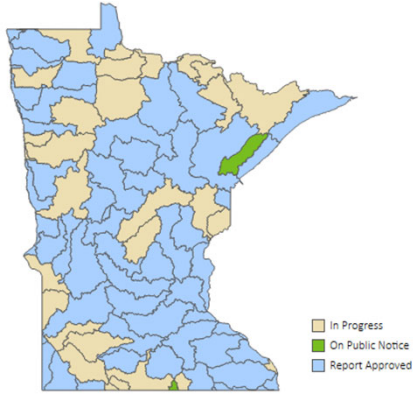
Minnesota's watershed approach aims to meet local & downstream needs



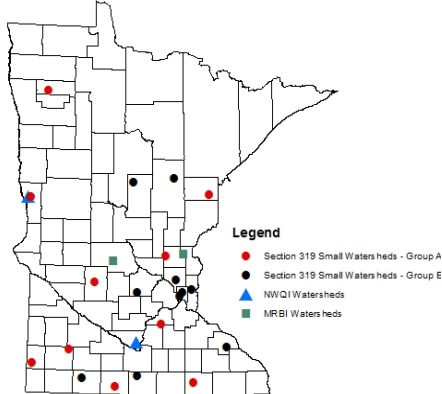
Watershed load reduction targets – to collectively achieve downstream load reduction goals



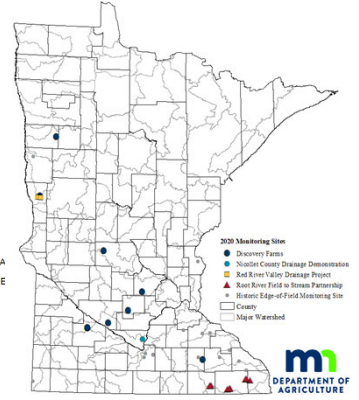
Minnesota's watershed approach works at multiple scales



Watershed science informing local planning across the entire state



Smaller-scale focus watersheds



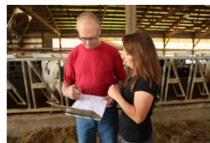
Farm and field-scale implementation & monitoring

New private-public collaborative watershed partnerships developing

Cannon River Agricultural Collaborative



Headwaters Agricultural Sustainability Partnership (central Minnesota)

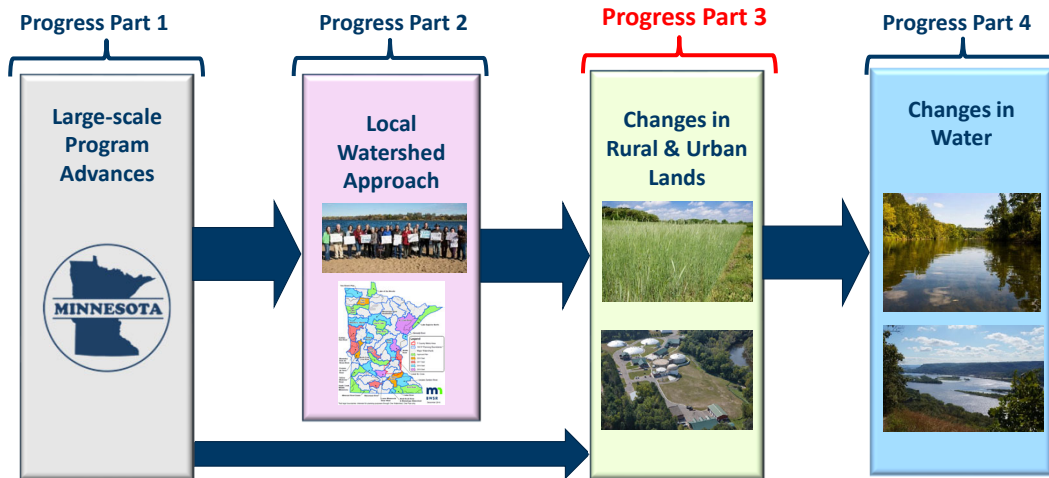


Cedar River Watershed Partnership



	Central Farm Service		MN Dept. of Agric. MAWQCP
	Hormel Foods		Mower County SWCD
	Land O'Lakes SUSTAIN		Environmental Initiative

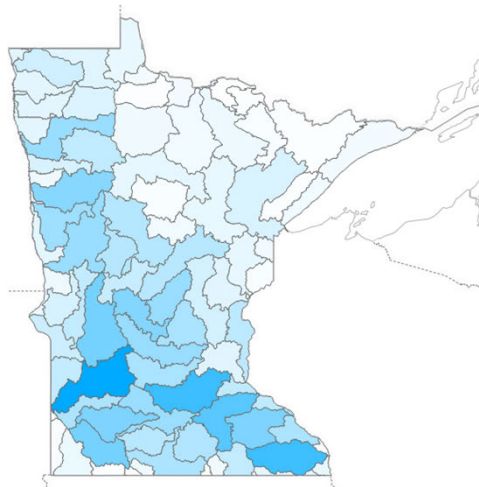
Presentation Outline: progress with BMP adoption



New on-line BMP tracking System at multiple scales subwatersheds to statewide

BMPs adopted through Gov't Programs

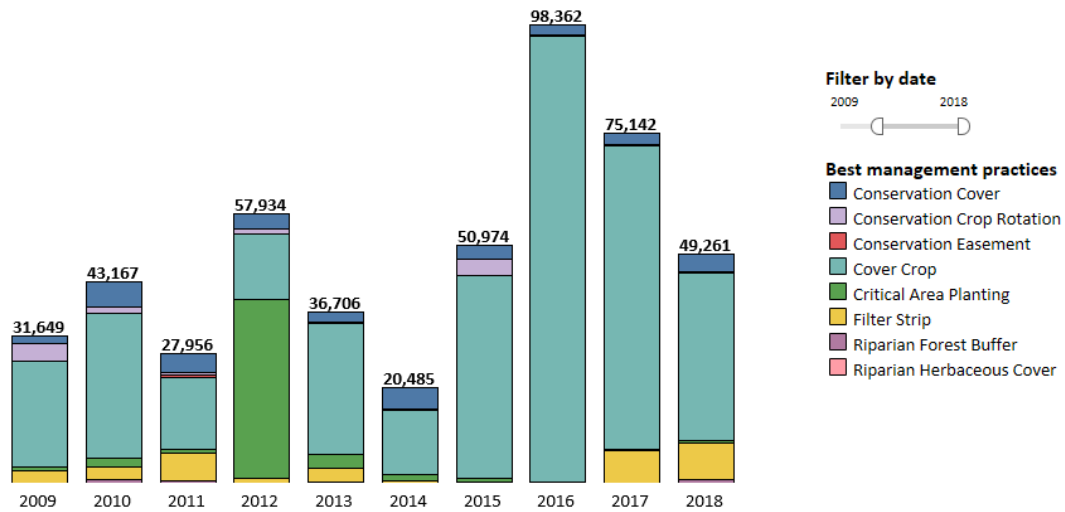
- **NRCS** - federal EQIP, CSP, RCPP
- **BWSR** - eLINK tracks state cost-shared BMPs
- **BWSR** - CREP and RIM tracking
- **MDA** - Ag BMP Loan Program, Ag Water Quality Certification
- **MPCA** - Clean Water Partnership & 319 program



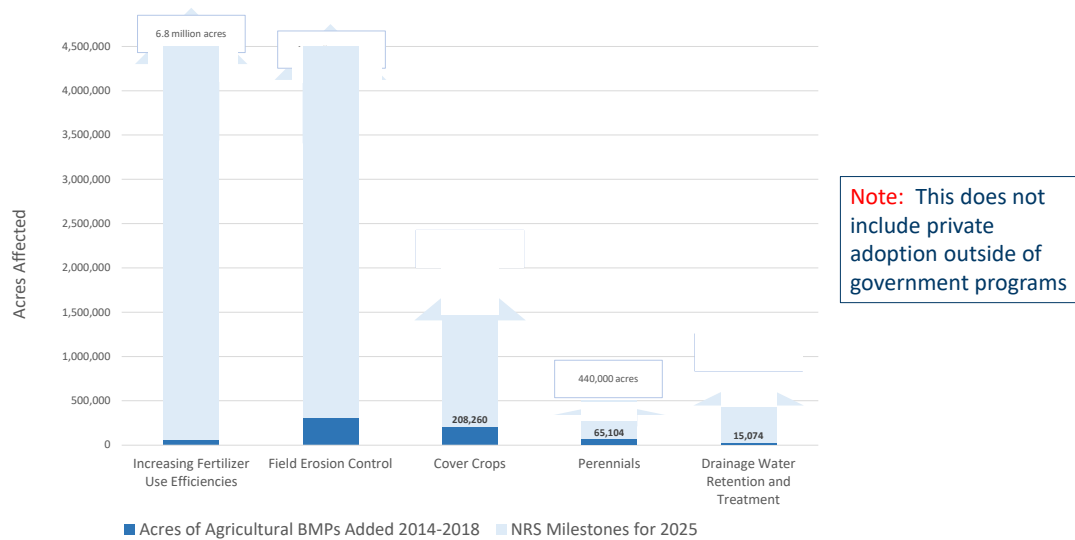
<https://www.pca.state.mn.us/water/nutrient-reduction-strategy>
www.pca.state.mn.us/water/healthier-watersheds

BMPs Installed 2004-2018	BMP Count
Tillage/residue management	11,382
Designed erosion control & trapping	10,236
Nutrient management (cropland)	9,992
Septic System Improvements	7,874
Converting land to perennials	7,696
Open tile inlet & side inlet improvements	7,136
Stream banks, bluffs & ravines protected/restored	6,073
Buffers and filters - field edge	5,348
Add living cover to annual crops in fall/spring	4,508
Habitat & stream connectivity management	4,026
Pasture management	3,087
Drainage ditch modifications	2,715
Agricultural tile drainage water treatment/storage	1,184
Urban Stormwater Runoff Control	1,114
Changing rotations to less erosive crops	455
Feedlot runoff controls	173
Forestry Management	138
Wetland restoration/creation	104
In Lake Management	4
Other	51,878
Grand Total	135,123

Statewide tracking example: New acres of living cover added each year through gov't programs



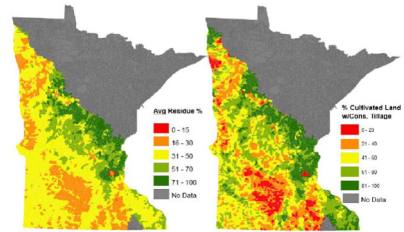
Government Program BMP adoption 2014-18 compared to scale of adoption goals for 2025



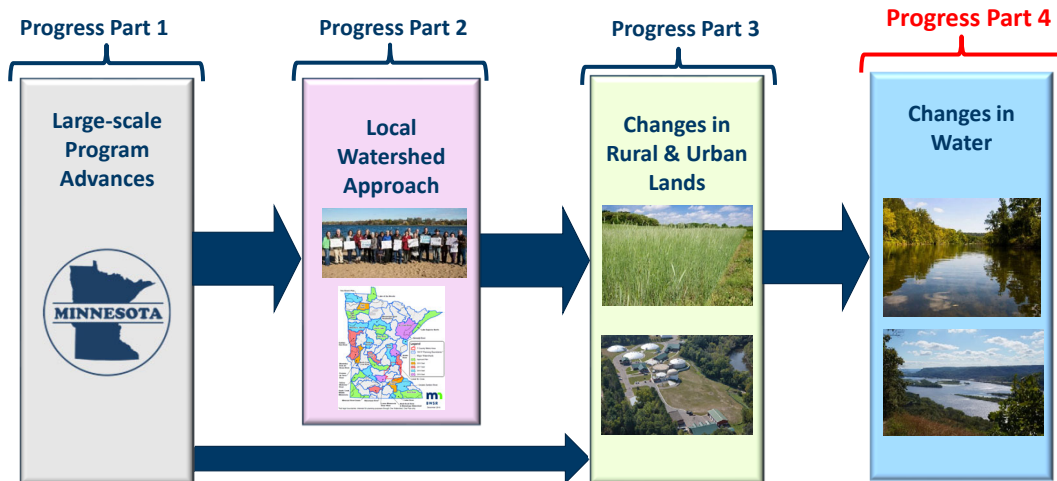
How can we tell if practices are being adopted at needed scales?

- A. Adoption through government support programs (previous 3 slides)
- B. Indicators of broader overall adoption
 1. Census of Agriculture and surveys
 2. Satellite imagery
 3. Fertilizer sales
 4. Nutrient use efficiency trends
- C. Permitting – reporting & inspections

In combination indicates MN is falling short of Nutrient Strategy BMP scenarios



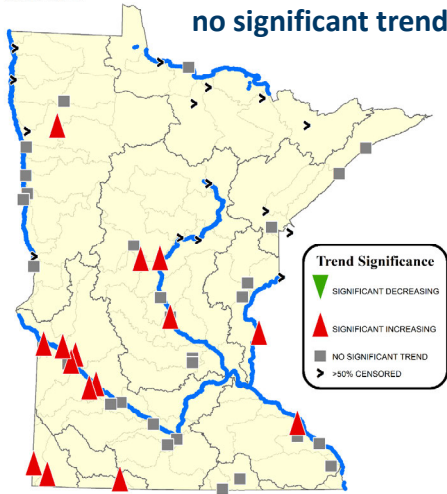
Presentation Outline: trends in the water



10-year nutrient concentration trends

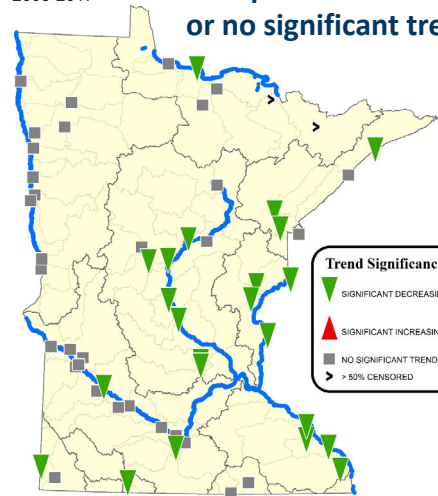
Nitrate + Nitrite
2008-2017

**Nitrate – increasing or
no significant trend**



Total Phosphorus
2008-2017

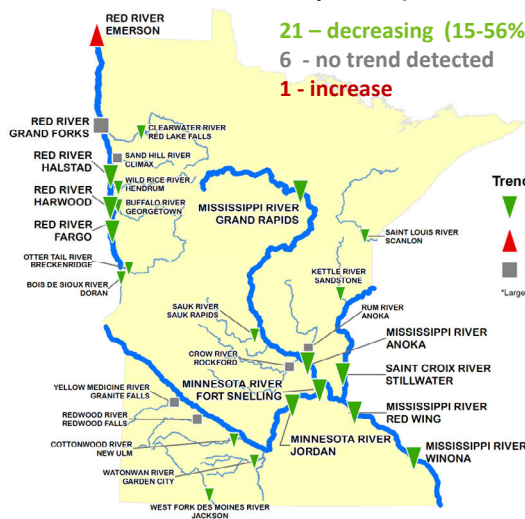
**Phosphorus – decreasing
or no significant trend**



20-year nutrient concentration trends

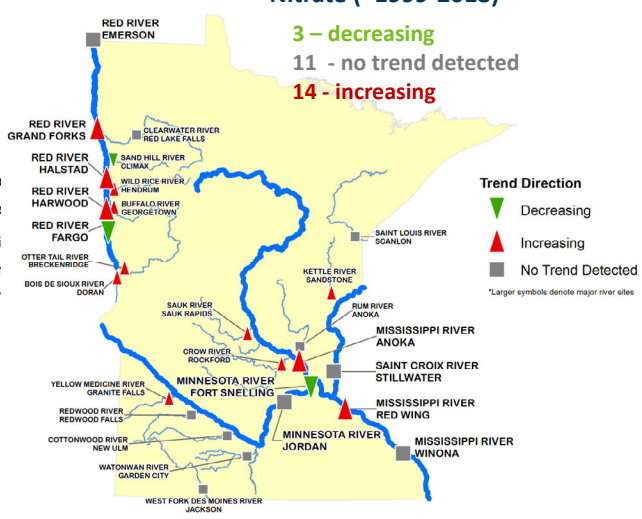
Phosphorus (~1999-2018)

21 – decreasing (15-56%)
6 - no trend detected
1 - increase



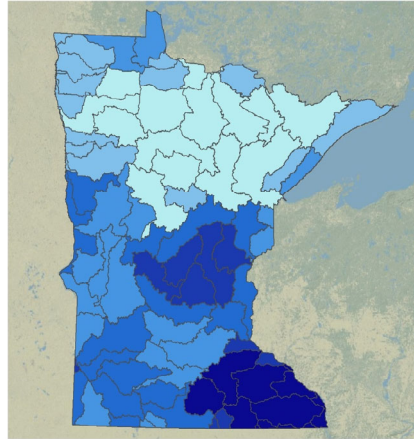
Nitrate (~1999-2018)

3 – decreasing
11 - no trend detected
14 - increasing

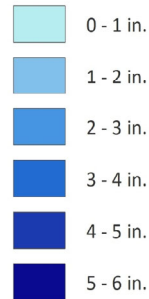


More precipitation leading to higher nutrient loads

Annual Precipitation Departure, 2000 - 2019



Difference from 20th Century



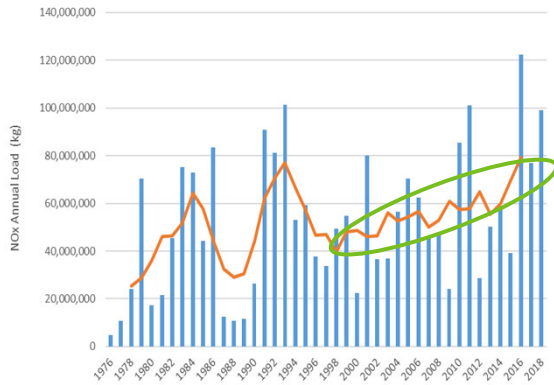
Source:

DNR State Climatology Office and the DNR Watershed Health Assessment Framework

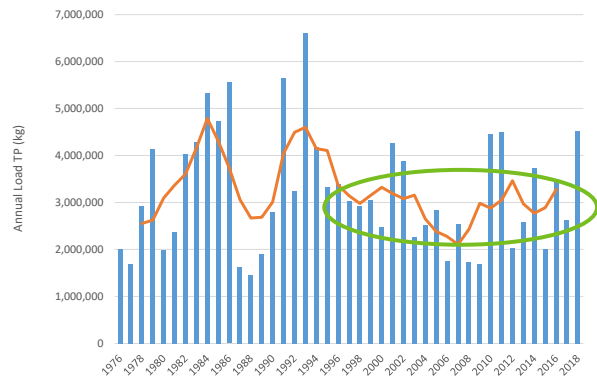


Nitrate and phosphorus loads Mississippi River at Red Wing

Nitrate loads increasing since late 1990's

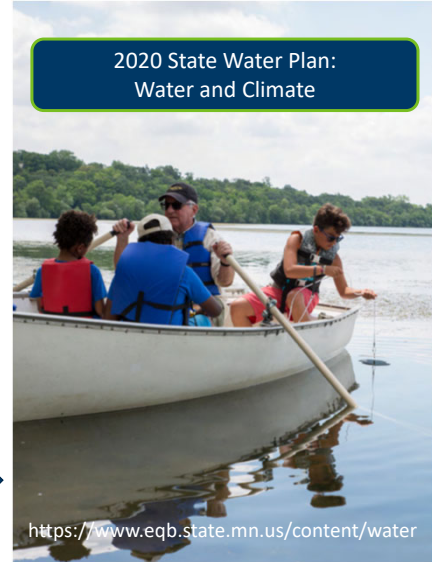


Phosphorus loads with no detected trend since late 1990's



In Conclusion

- **5-year progress report recently completed** - found at:
<https://www.pca.state.mn.us/water/nutrient-reduction-strategy>
 - Advanced 30+ large-scale programs affecting nutrients
 - Agricultural BMP adoption not keeping pace with scenarios outlined in nutrient strategy
 - Wastewater – over 70% reduction in phosphorus; nitrogen is now highly-monitored
 - River phosphorus concentrations decreased 20-50% (20 yrs) – but increasing river flow offsetting load reductions
 - River nitrogen concentrations and loads increasing by over 25% (20 yrs)
- **New in September 2020 – 10-year Minnesota State Water Plan**
 - Combining nutrient & climate change practices to reduce and mitigate effects of climate change



Thank You!

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





From Peer-Reviewed Science to BMP's for On-Farm Adoption

Who is Illinois NREC?



**Created in 2012
through state statute**



**Funded by \$.75/ton
assessment on
fertilizer sold in
Illinois**



**Collaboration
between ag,
environmental
groups, and state
agencies**

- Pursue nutrient research & educational programs
- Ensure adoption and implementation of practices that
 - Optimize nutrient use efficiency
 - Ensure soil fertility
 - Address Environmental concerns regarding fertilizer

Who is Illinois NREC?

- 13 Member Council (9 voting and 4 advisory)
- Voting Members
 - 3 Farmers (ILFB, ICGA, ISA)
 - 3 Members from Fertilizer Industry
 - CCA
 - Specialty Fertilizer
 - Illinois Department of Ag
- Advisory Members
 - 2 Environmental Organizations (Sierra Club & Environmental Law Policy Center)
 - State/Federal Ag Research Station Representative
 - Illinois EPA

Illinois NREC Research Funding



Solicit proposals that focus on

Improved nutrient efficiency
Enhanced crop production
Protect water quality



Council, Research Committee, and Independent Peer Review Team review applications



Projects are ranked on merit and availability of funds

Funding and Progress to Date

- Since 2013
 - Over \$26M invested in research projects
 - Four NREC publications: Turf Guide, Cover Crop Guide 1.0, Guide to MRTN, and Cover Crop 2.0
 - Annual Reports, Investment Insights, Field Notes, and videos, Research Forum
 - More than a dozen papers published in Professional Journals written by NREC-funded researchers
 - Many opportunities for collaboration on research and outreach projects

NREC and Illinois' Strategy

 Work in parallel (but independently) with the strategy

 Evaluate removal rates for BMP's already in strategy

 Provide peer-reviewed research for BMP's not already in strategy

 Serve on Policy Working Group, and Ag Water Quality Partnership with support to Science Advisory Team

 Fund bi-annual USDA-NASS Survey re: NLRs awareness and adoption



4R Nutrient Management

- Ongoing N-rate trials to support the MRTN
- Impact of timing on tile nitrate levels
- The role of mineralization and nitrate loss from 0 nitrogen trials
- 4R Nutrient research focus is both agronomic, economic and environmental
- Precision Ag for N-Management
- N placement
- Using stable isotopes to understand sources and cycling of nitrates



RIGHT SOURCE
Matches fertilizer type to crop needs.



RIGHT RATE
Matches amount of fertilizer type crop needs.



RIGHT TIME
Makes nutrients available when crops need them.



RIGHT PLACE
Keep nutrients where crops can use them.



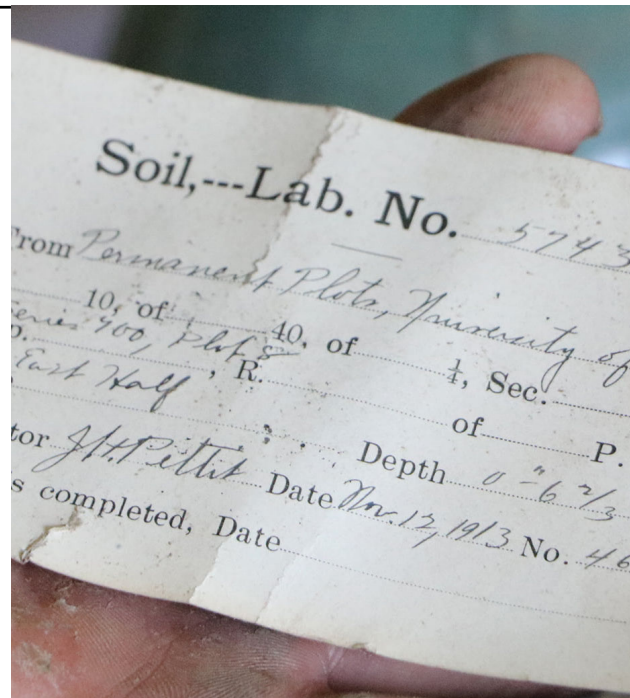
Cover Crop Research

- Long-term paired watershed research
- N application timing and cover crops impact on Fate and Availability of N Fertilizer
- Extended rotation with cover crops
- Insect management in cover crop systems
- Utilizing cover crops in Southern Illinois for P and N loss
- Modeling projects to evaluate the suitability and benefits of cover crops
- Integrating grazing into cover crop systems



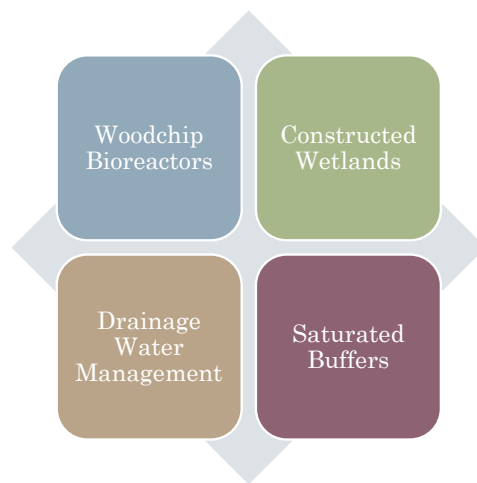
Phosphorus Research

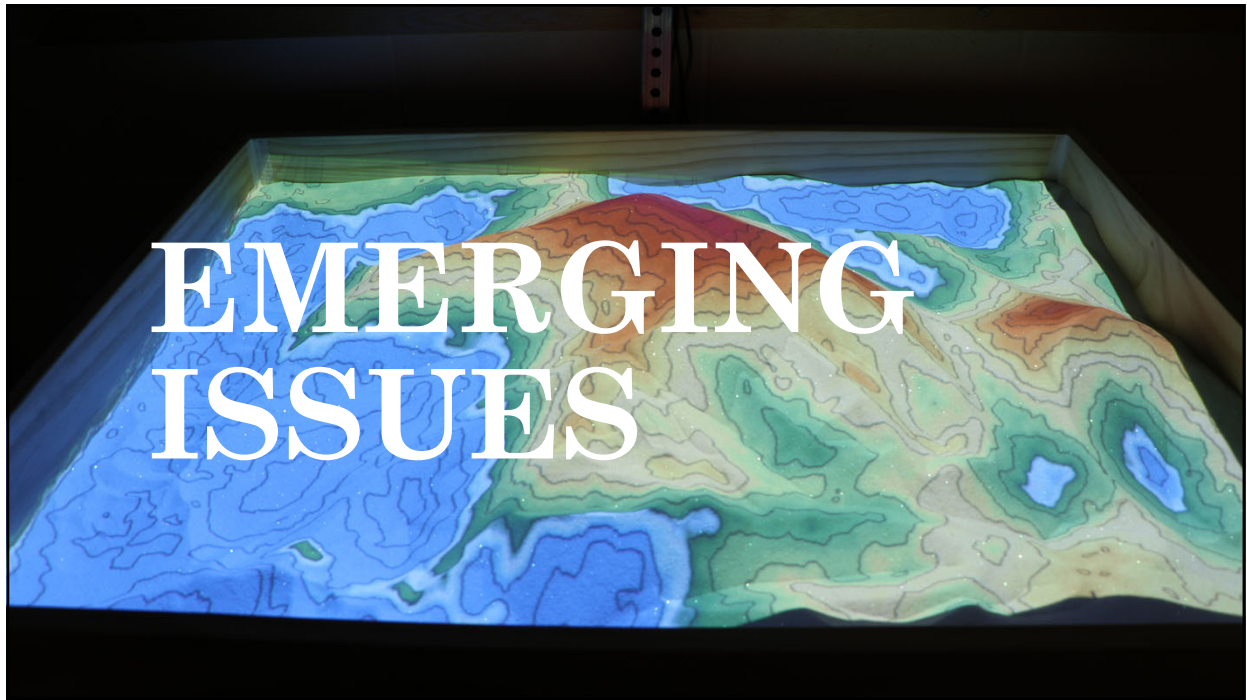
- Struvite made from recycled P from wastewater treatment facilities as an alternative P Source
- Edge of Field P Filters:
- Freeze/Thaw Cycle Impact on P Loss in Cover Crops
- Designer BioChar for P removal
- The role of legacy P and utilizing 150 years of soil samples
- Evaluation of WASCOB's P Removal Potential
- Role of Gypsum in managing P losses





Edge of Field Practices





Novel Research

- Dissimilatory Nitrate Reduction to Ammonium for Nitrate Retention in Agricultural Soils
- Tile Depth and Spacing
- White paper research related to P loading in Illinois River watershed
- Maize microbiome research
- Fragipan busting with annual ryegrass

Where can I get more info?

- **Website:** illinoisnrec.org
- **Twitter:** @IllinoisNREC
- **Facebook:** @IllinoisNREC
- **Email:**
Julie.Armstrong@illinoisnrec.org

Hypoxia Task Force Louisiana Update

Harry Vorhoff

LOUISIANA GOVERNOR'S OFFICE OF COASTAL ACTIVITIES

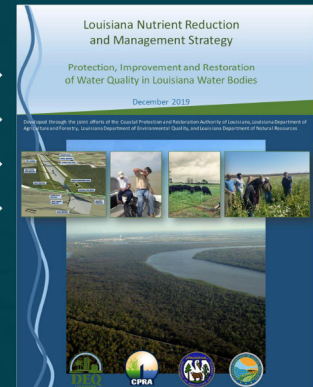
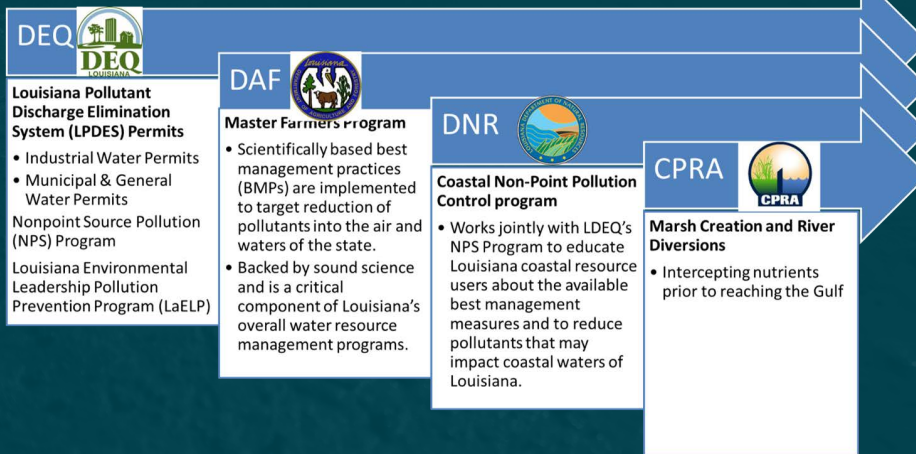


UPDATES

- I. Louisiana's Nutrient Reduction and Management Strategy
- II. Governor's Second Term Coastal Priorities



Louisiana's Nutrient Reduction and Management Strategy



Approaches

- ✓ Nutrient monitoring & science development
- ✓ Identifying high priority watersheds for BMP implementation
- ✓ Cooperative and innovative efforts for nonpoint source reduction

NUTRIENT MONITORING & SCIENCE

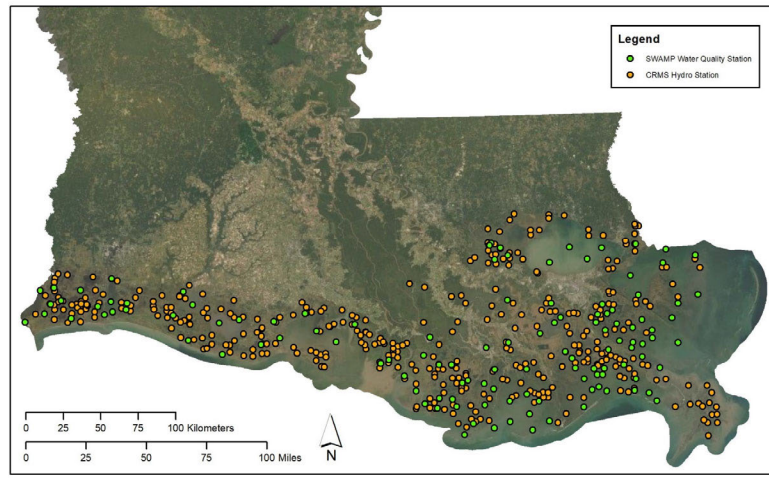
Hypoxia Task Force Grant

Louisiana received \$100,000 in 2019 and additional \$70,000 in 2020.

Funded Projects

1. Nonpoint Source Program Monitoring
 1. Establish current water quality conditions in watersheds, to identify geographic areas for targeting BMP locations, and track changes in water quality over time from BMP implementation in watersheds.
 2. Nutrient monitoring (N/P) and flow measurements.
 3. Monitoring in 4 southern LA watersheds at an additional 85 sites.
2. Coastal Transect Monitoring
 1. Cooperative effort between DEQ and CPRA – continues previously established monitoring effort for water quality data collection from inshore to offshore waters of Barataria Bay. Fills critical gap on nutrients in coastal area.

CRMS & SWAMP Water Quality Monitoring



LDEQ Ambient Water Quality Long-term Nutrient Trends



TKN, NO₃NO₂, & TP

Period of record 1978-2014, monthly monitoring at 21 long-term sites

Majority of trends decreasing (73%)

- All 21 sites had decreasing trend for TKN
- 12 sites showed decreasing trend for NO_x
- 13 sites showed decreasing trend for TP
- Only 1 site showed increasing trend for NO_x

•Basins with Ag showed nutrient water quality improvement (either decreasing or no observable trends in nutrients)



RESTORE Act Center of Excellence



Research Grants Program

“Multiple Tools for Determining the Fate of Nitrate in Coastal Deltaic Floodplains”

Lead Investigator (Institution): Robert Twilley (Louisiana State University)

Goal: Study how nitrogen moves through the water column and is transformed by wetlands, plants, and microbes in the deltaic floodplain.

“Determining the Influence of Surface Water Diversions on Physical and Nutrient Characteristics of Wetland Soils”

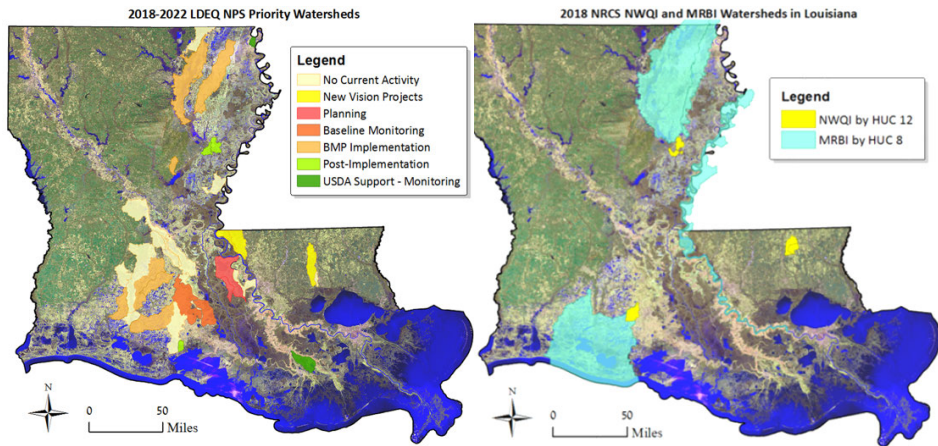
Lead Investigator (Institution): John White (Louisiana State University)

Goal: Determine impact of Davis Pond Diversion on soil properties, including nutrient content.

9

PRIORITY WATERSHEDS

Priority Watersheds



NONPOINT SOURCE INNOVATION & COLLABORATION

Watershed Nutrient Management Plans

- I. Project Description: LSU AgCenter will develop producer-specific masters programs and watershed nutrient management plans.
- II. Intent: Reduce excessive nutrient pollution from farm practices through enhancing existing NRCS practices.
- III. Funding: Mosaic Beneficial Environmental Project (BEP) Consent Decree through LDEQ.
- IV. Project Period: July 2019 to June 2022.

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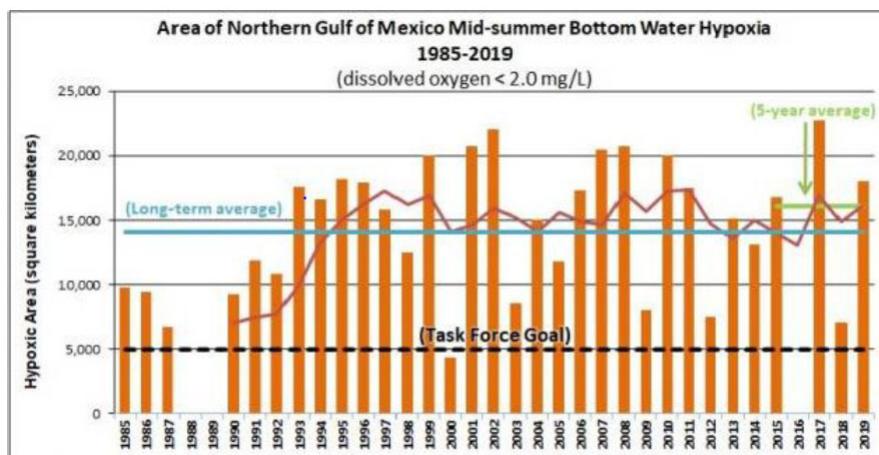
Water Quality Trading Program

- I. Project Description: Trading as market-based, cost effective means to achieve water quality goals for point and nonpoint source pollution.
- II. Project Timeline
 - I. 2017: Louisiana State Legislature authorized creation of program, which allowed for both point and nonpoint sources to participate.
 - II. October 2019: Water Quality Trading regulations finalized and published.
 - III. Current Progress: Working with stakeholders interested in participation.

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GOVERNOR'S SECOND TERM COASTAL PRIORITIES

Largest Hypoxic Zone in the U.S.



Area of the Northern Gulf of Mexico Mid-summer Bottom Water Hypoxia from 1985 to 2019

(Source: Nancy N. Rabalais, LUMCON, and R. Eugene Turner, LSU)

Local Impacts: Seafood & Fishing Industries

Burdens:

- Competition among vessels
- Higher fuel costs
- Increased bycatch

(Jordan 2018; Marohn 2018)

Over 53,000 jobs in the state are related to the seafood and recreational fishing industries (USDC et al. 2018).

The Louisiana Shrimp Association and Louisiana Oyster Task Force have passed resolutions to support Hypoxia Task Force goals.

17

Louisiana's Role in a Watershed-Scale Problem



In its unique position at the mouth of the Mississippi-Atchafalaya River Basin, Louisiana faces the aggregate effects of nutrients introduced to the system in each up-river state.



Coastal Priorities

Governor Edwards's Priorities for Second Term:

- Integrate the goals of flood protection, ecosystem restoration, navigation, water quality, and fisheries habitat.
 - **Renewed commitment to reducing nutrient pollution in the Mississippi River**
- Manage the Mississippi and Atchafalaya Rivers more holistically
- Establish a task force on the future management of the Atchafalaya Basin
- Promote and maintain a thriving oyster resource and industry in Louisiana
- Establish Climate Initiative Task Force and Resilience Initiative
- Innovation and Collaboration Hub at The Water Institute of the Gulf

2020 WRDA – Work in Progress

House Bill, Section 128. Harmful Algal Bloom Demonstration Program.

Secretary shall carry out a demonstration program to determine the causes of, and implement measures to effectively detect, prevent, treat, and eliminate, harmful algal blooms associated with water resources development projects.

Specifies the coastal and tidal waters of the State of Louisiana as a focus area.

House Bill, Section 210. Lower Mississippi River Comprehensive Study.

Secretary shall conduct a comprehensive study of the Lower Mississippi River Basin, from Cape Girardeau, Missouri, to the Gulf of Mexico, to identify actions to be undertaken by the Corps for comprehensive management of the basin for the purposes of flood risk management, navigation, ecosystem restoration, water supply, hydropower, and recreation.

Specifies consideration of Union and Ama diversions, Manchac Landbridge Diversion, increase Atchafalaya flow to Terrebonne, and natural features and nature-based features including levee setbacks and instream and floodplain restoration.

2020 WRDA – Work in Progress (cont.)

Section 308. Upper Mississippi River System Environmental Management Program.

Would increase funding authorization long-term resource monitoring, including research on water quality issues affecting the Mississippi River (including elevated nutrient levels) and the development of remediation strategies.

Oyster Management & Rehabilitation Strategy

Lead agency: Louisiana Department of Wildlife and Fisheries

Issue: Oyster resources at all-time lows on public oyster areas

Action: \$132 million strategy (still in draft form)

\$25.6M of NRDA approved in August 2020 for oyster-related projects

- 2 brood reefs (10-acres each) in St. Bernard Parish
- 2 new public oyster reefs (200 acres each) in Mississippi Sound and Terrebonne Parish
- Production of at least 500 million oyster larvae to be distributed across Louisiana's public oyster areas

Hypoxia Commitments

- Recommit to supporting and following the science
- Raise as a priority in Louisiana
- Increase coordination and collaboration
- Foster innovative policies
- Identify needs and secure resources

Thank You

Questions?

Harry.Vorhoff@la.gov (GOCA)

Angelina.Freeman@la.gov (CPRA)

Amanda.Vincent@la.gov (DEQ)

joey_b@daf.state.la.us (DAF)

Charles.Reulet@la.gov (DNR)

Wetlands

Wetlands are strategically located and designed to remove nitrate from tile-drainage water from cropland areas.

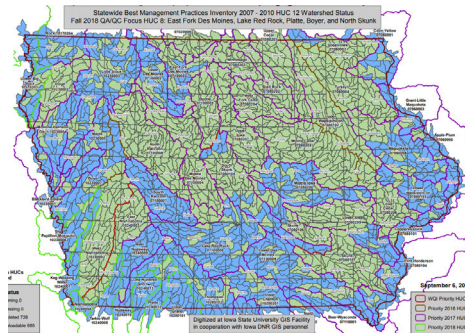
The larger the wetland, the greater the percentage of N removal; nitrate concentration reduction averages 52%. Wetlands also provide improved habitat for Iowa wildlife.



Source: CleanWaterIowa.org

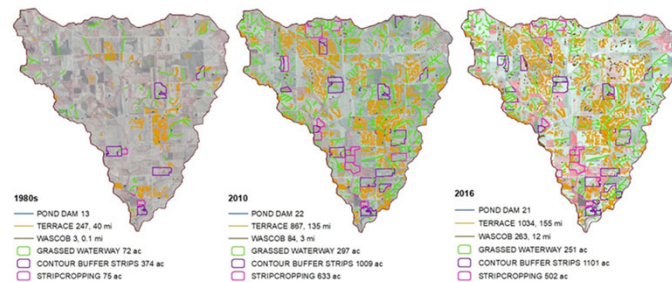
BMP Mapping

- Select BMPs identifiable w/ available data
- 2007-2010 Benchmark
- Documentation
- Historical
- WS Modeling



Statewide Practice Summary			
Pond Dams (number)	Grassed waterways (ac)	Terraces (ft)	WASCOS (number)
114,423	327,904	469,257,556	246,139

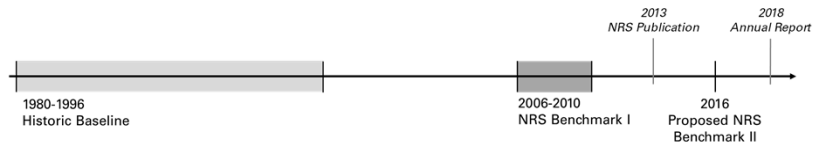
Estimated >\$6B in investment based on today's costs.



Learn more at <https://www.gis.iastate.edu/gisf/projects/conservation-practices>

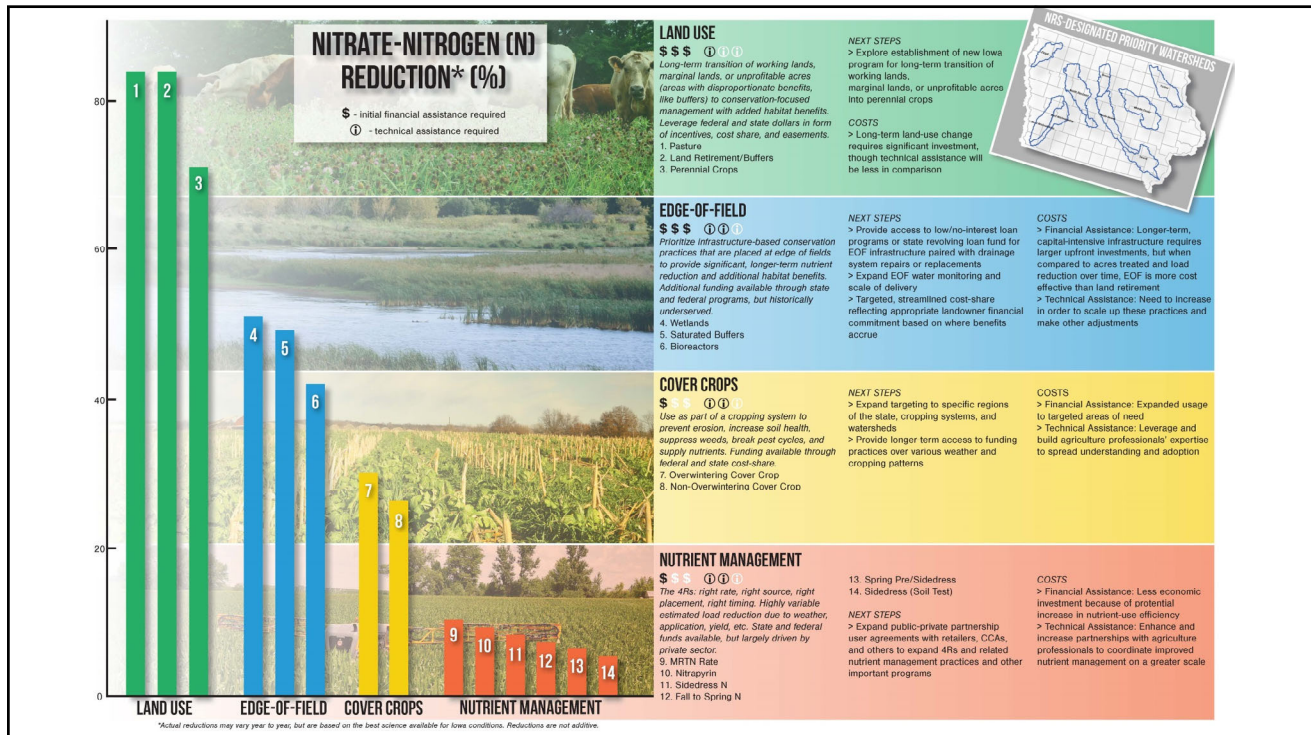
Updated Baseline Assessment

- NPS
- Historical progress on P loss from cropland
- Nitrogen needs more emphasis

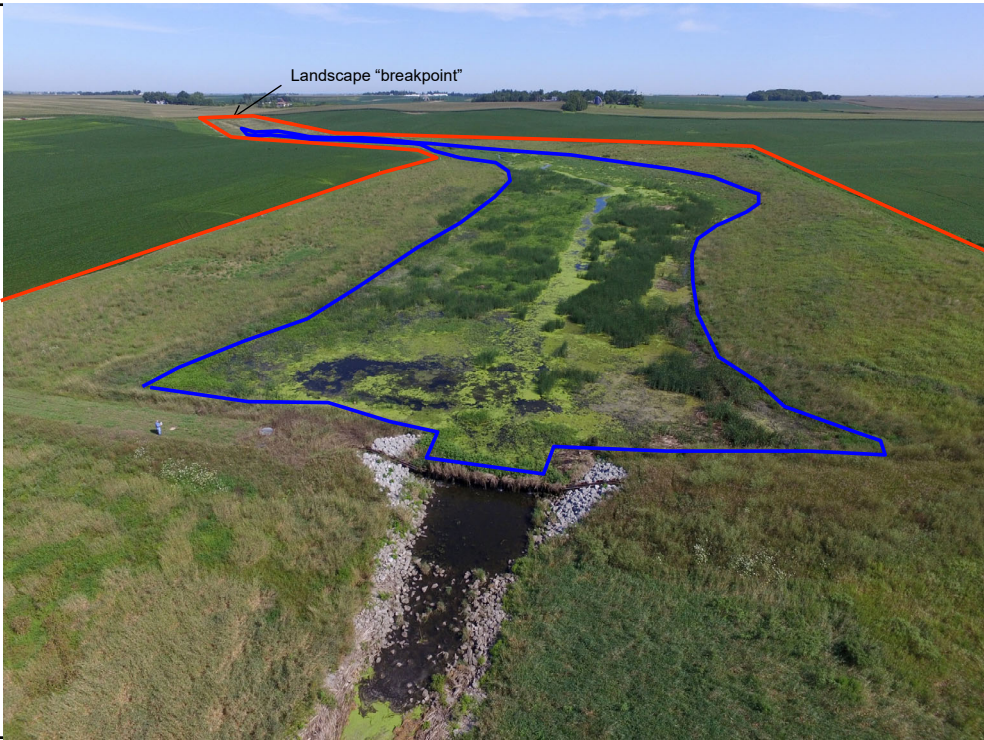
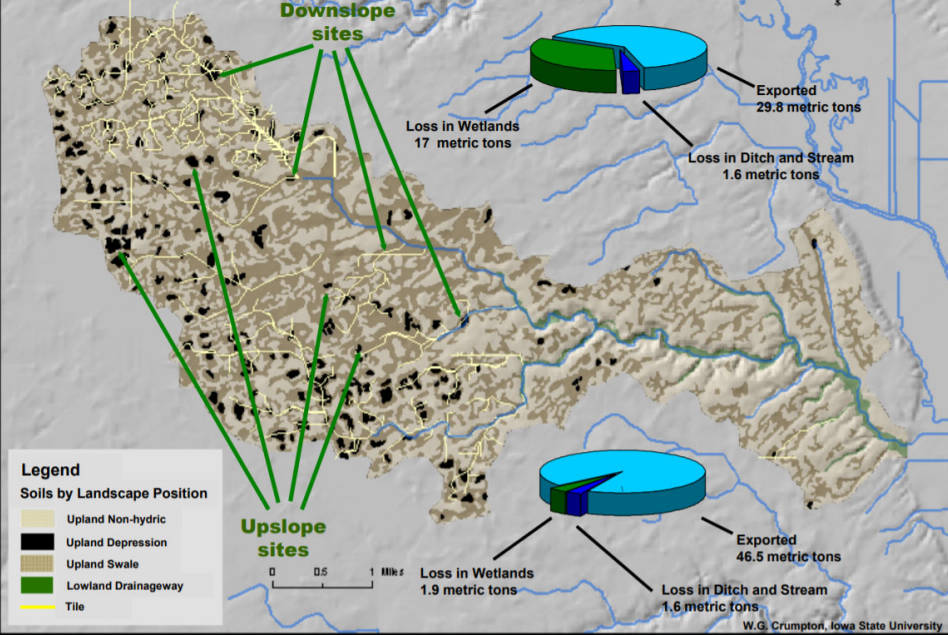


		1980-96 Baseline Load (tons)	2006-10 Benchmark Load (tons)	Change, 1980-96 to 2006-10		Major cause of change
Nitrogen	NPS	278,852*	293,395	5.2%	Increase	Land use change
	PS	13,170	14,054	6.7%	Increase	Flow increase
	Total	292,022	307,449	5.3%	Increase	
Phosphorus	NPS	21,436	16,800	21.6%	Decrease	Reduced tillage and soil test P
	PS	2,386	2,623	9.9%	Increase	Flow increase
	Total	23,822	19,423	18.5%	Decrease	

*The method used to derive the total nitrogen estimate of 292,022 tons indirectly reflected the point source contributions.



The Importance of Targeting Restorations

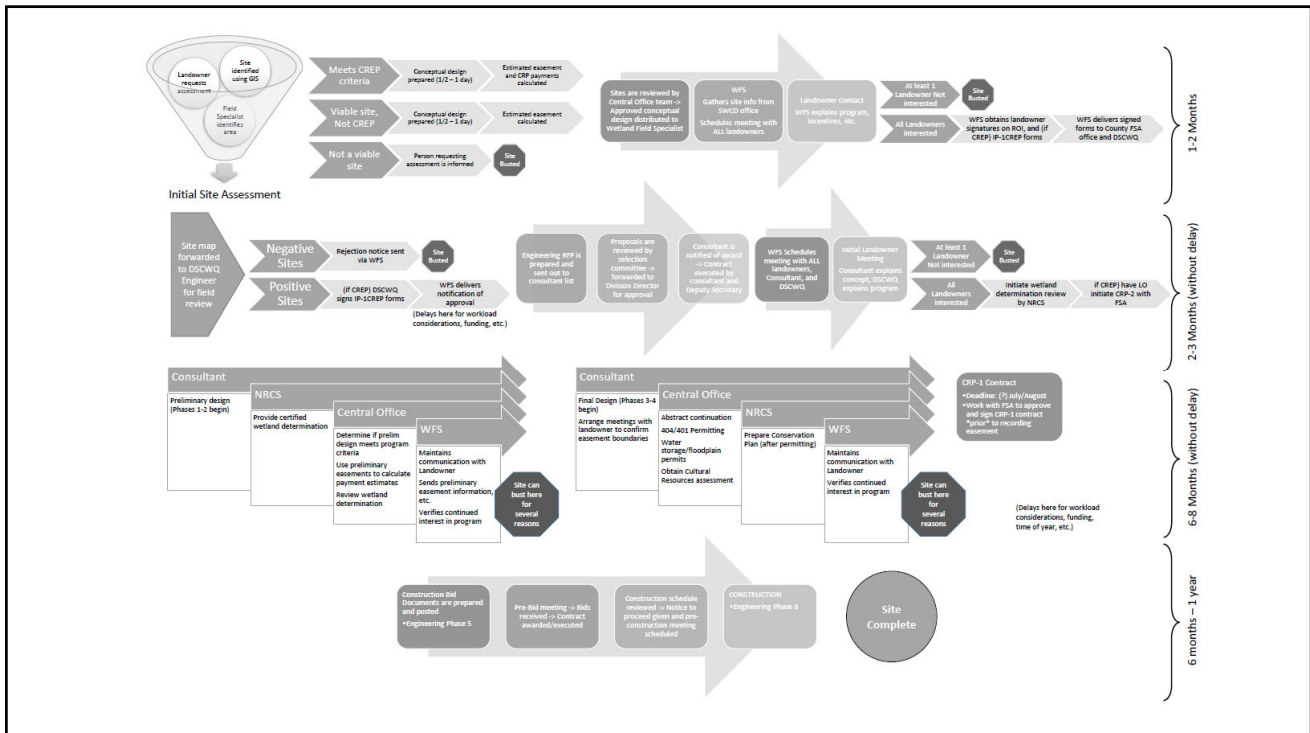


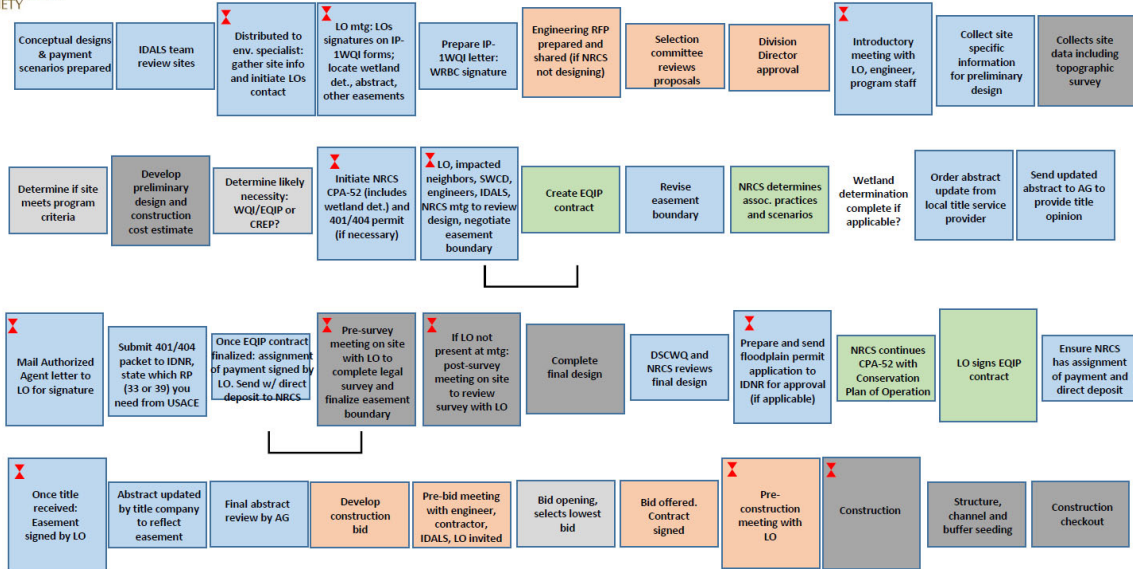
Program options

- Iowa CREP – limited to 37 counties
- NRCS-EQIP – RCPP/MRBI
- WQI (IDALS)
- CRP – CP-39
- EPA – Gulf of Mexico Program Funding
- Private funding – DU, IPPA, TNC, etc.
- Others

*Often combine these sources to support projects and provide full funding package to landowners.

Typical timeframe is 18-24 months from interest to construction completion (experience w/ CREP).





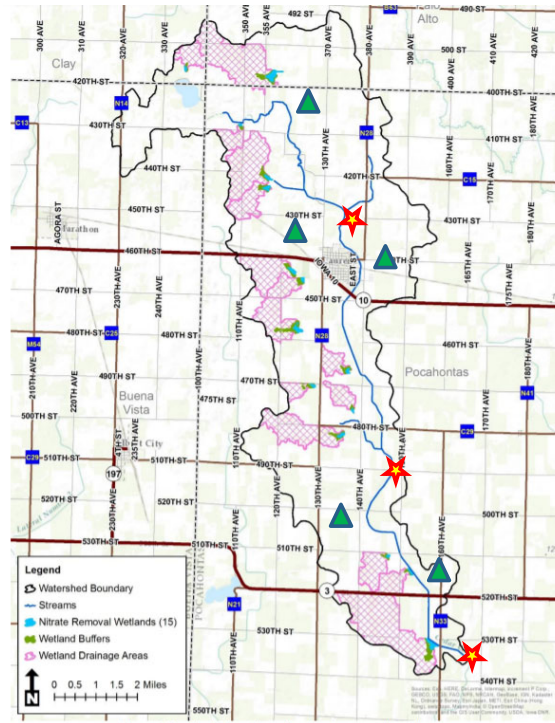
Wetland Opportunities and Challenges options

- Breakpoint (traditional)
- Created/Excavated or “Tile Zone”
- Floodplain
- Build off of current understanding from monitoring existing sites translated to new site concepts
- Pros and cons to navigate through all of these types of sites:
 - Advantages: costs (easements, construction, etc.), improved performance, habitat value
 - Challenges: permitting, costs, private landowners, time
- Focus on expanding opportunity, not one vs. the other

Wetland Opportunities and Challenges

options

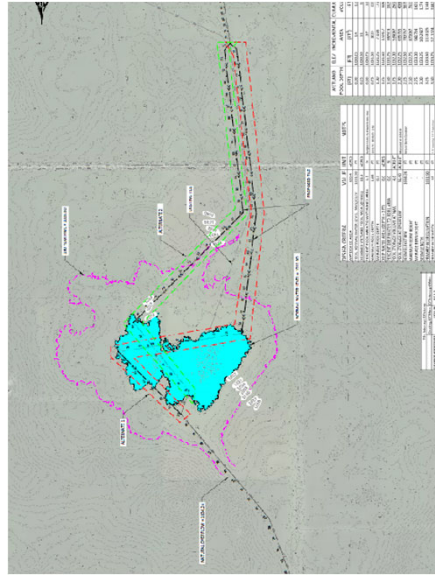
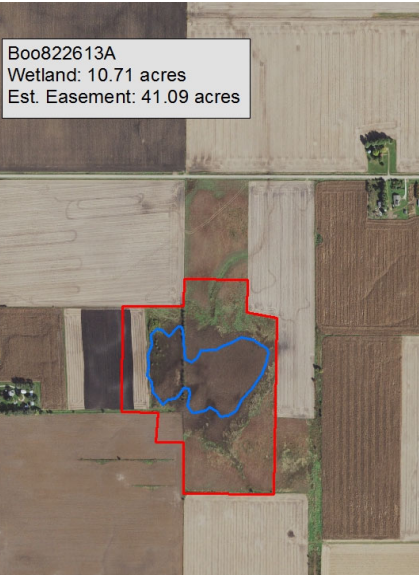
- Expands the number of sites feasible in the basin:
 - Conceptual watershed
 - 13 breakpoint sites
 - + 5 potential TZ sites
 - + 3 potential floodplain sites





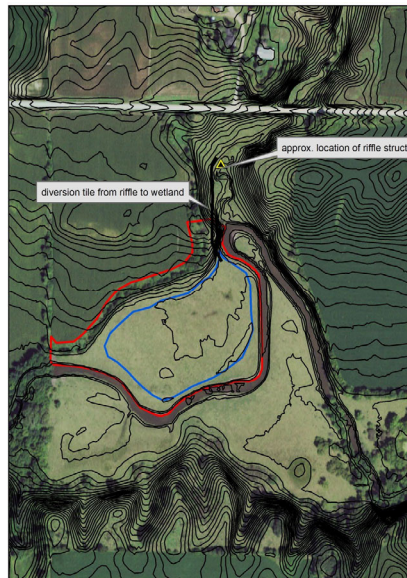
WQ Wetlands

Expanding Opportunities – "Tile Zone"



WQ Wetlands

Expanding Opportunities – “Floodplain” and “Created”



Expanded Capacity in Iowa to Advance Wetlands

- **Expanded Delivery Partnerships**
 - Ducks Unlimited
 - Iowa Nutrient Research and Education Council (INREC)
- **Expanded Funding Opportunities:**
 - Regional Conservation Partnership Program (RCPP) – Iowa Systems Approach to Conservation Drainage, Midwest Agriculture Water Quality Partnership Project, etc.
 - Mississippi River Basin Healthy Watersheds Initiative (MRBI)
 - Private sector (DU, TNC, IPPA, others)





Great Lakes to Gulf
VIRTUAL OBSERVATORY

Great Lakes to Gulf: Supporting the HTF on measuring progress through analyzing trends in watersheds across the MARB

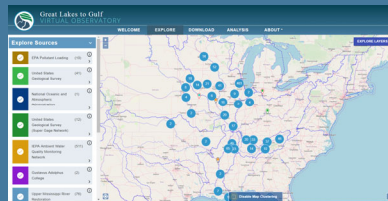
Ted Kratschmer, Dick Warner, Ellen Gilinsky, Jong Sung Lee
National Great Rivers Research and Education Center
National Center for Supercomputing Applications
October 1, 2020



Great Lakes to Gulf
VIRTUAL OBSERVATORY

What is the Great Lakes to Gulf Virtual Observatory?

- The GLTG Virtual Observatory is a web-based geospatial application that integrates water quality data and analytical tools from multiple sources allowing a user to visualize and understand nutrient pollution and water quality conditions in the Mississippi River watershed.
- The online interactive application provides users with tools to explore, analyze and compare water quality data from the Mississippi River and its tributaries.





Data to Decision Support

- Support states and other stakeholders “where they are” through narratives, visual tools, and analyses

Nutrient Reduction Progress Tracking Journey



How Great Lakes to Gulf Supports Nutrient Reduction Efforts by Federal Government, States and NGOs

Work with collaborators to:

- Add value to existing data, projects and efforts
- Provide context for efforts
- Provide a tool for non-scientists
- Provide a tool to support decision making
- Provide a framework for collaboration



Summaries, Model Outputs and Analyses

Provide users with information on “what the data mean” through:

- Narrative storyboards
 - Gives background and explanation
 - Tells a “story” based on the data
- Annual Statistics
- Trends
- Model outputs
- Piecing data and projects together into coherent story



HTF Trends Workgroup Collaboration

- Progress tracking through analysis/visualization/interpretation of water quality trends
- Met with members of work group on “site criteria” to choose trend sites:
 - Within MARB
 - Nitrate, Total Nitrogen, Total Phosphorus, Orthophosphate
 - ~15 year trends going backward from 2017
 - Weighted Regression on Time Discharge and Season (WRTDS)
- Narrative Storyboards



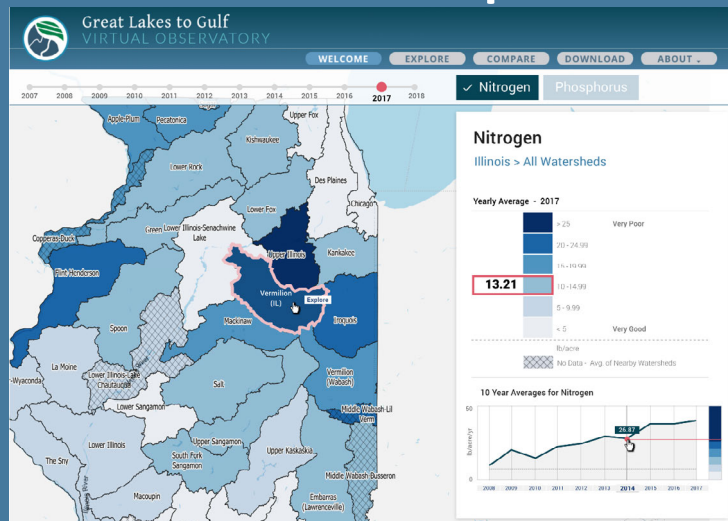
HTF Trends Workgroup Collaboration

- Progress and timeline
 - Set criteria that site data must meet - *complete*
 - “Data harmonization” – *in progress* (thankful for help from EPA via TetraTech)
 - Demonstrate trend analysis on two sites – *October 2020*
- Live mockup of the trend dashboard – *complete & ongoing*
- Full trend site list to workgroup for review – *End of 2020*
- Analysis complete and dashboard fully live – *April 2021*
- Narrative Storyboards – *ongoing, 2021*



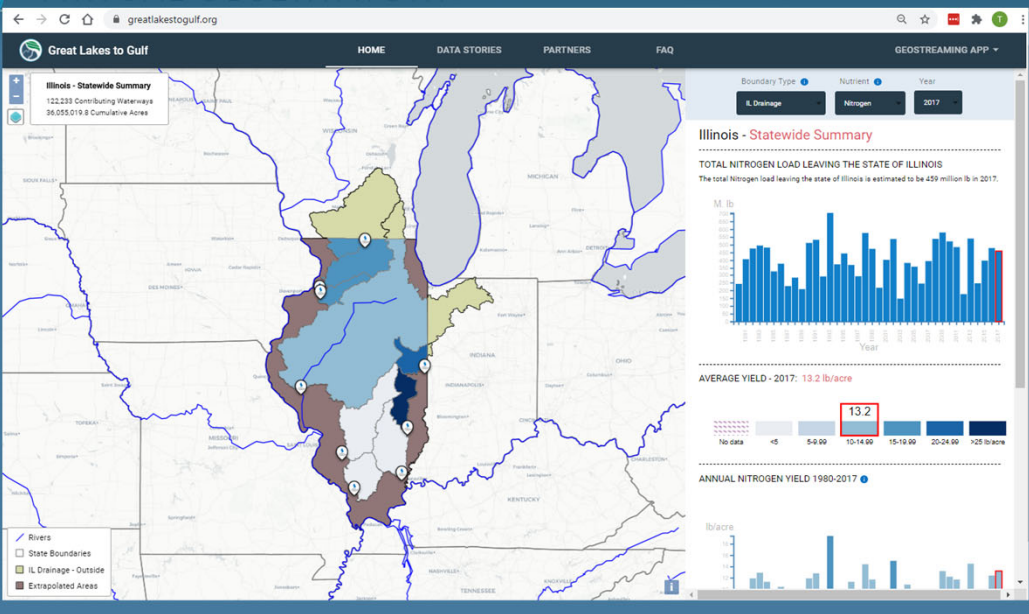
Collaboration with IL – NLRS as an example

- Collaborating with IEPA in support of Illinois Nutrient Loss Reduction Strategy
- Geospatial data support for analyses on N/P changes over time

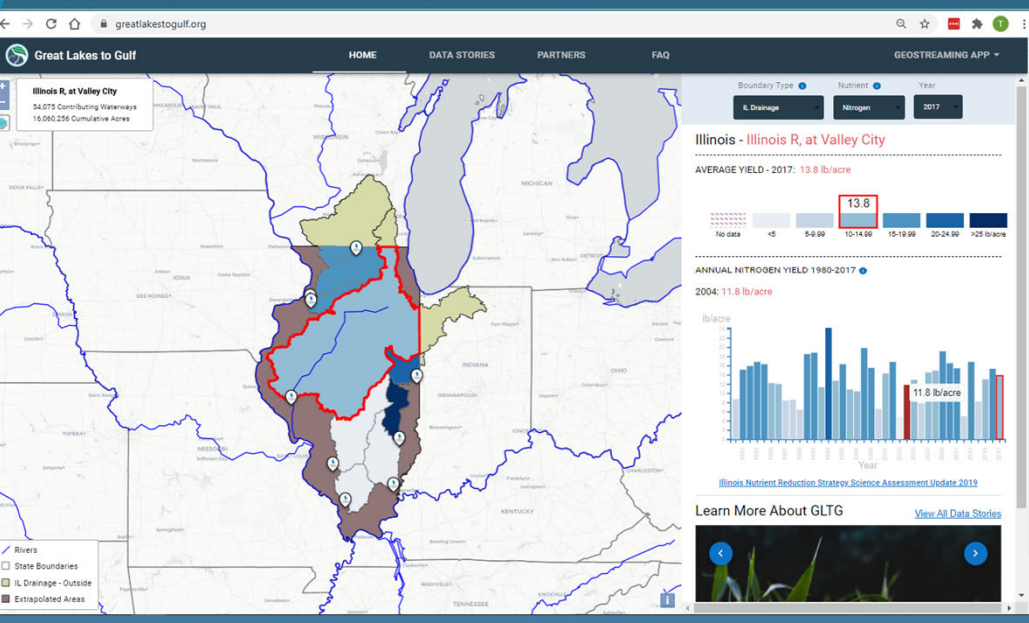




Great Lakes to Gulf VIRTUAL OBSERVATORY



Great Lakes to Gulf VIRTUAL OBSERVATORY





Great Lakes to Gulf VIRTUAL OBSERVATORY

greatlakesgulf.org

HOME DATA STORIES PARTNERS FAQ

MISSISSIPPI RIVER BASIN - Nutrient Load to Gulf of Mexico

Boundary Type: Trend Watersheds Nutrient: Nitrogen Year (Wk):

Mississippi River Basin - Nutrient Load to Gulf of Mexico

ANNUAL NITRATE LOAD

Learn More About GLTG [View All Data Stories](#)

Illinois Nutrient-Load Reduction Strategy



Great Lakes to Gulf VIRTUAL OBSERVATORY

greatlakesgulf.org

HOME DATA STORIES PARTNERS FAQ

ILLINOIS R. at Valley City

54,075 Contributing Watersheds
16,000,256 Cumulative Acres

Boundary Type: Trend Watersheds Nutrient: Nitrogen Year: 2017

Mississippi River Basin - Illinois R. at Valley City

ANNUAL NITRATE LOAD

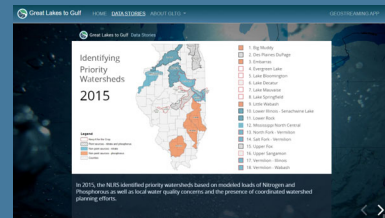
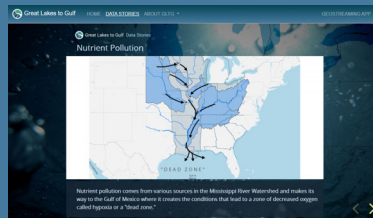
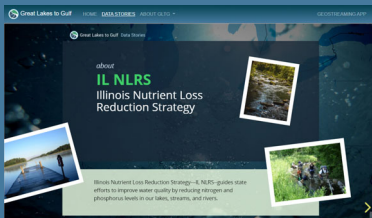
AVERAGE YIELD - 2017: 13.8 lb/acre

ANNUAL NITROGEN YIELD 1980-2017



Narrative / Storyboard

- Capability to develop and house short presentations that explain what is seen in trends



Great Lakes to Gulf
VIRTUAL OBSERVATORY

greatlakesgulf.org

HOME DATA STORIES PARTNERS FAQ

Geostreaming App

15-10 00 20-24 00 >25 to now

View All Data Stories

Great Lakes to Gulf Data Stories

Illinois Nutrient-Loss Reduction Strategy

Nutrient Pollution

Nutrient pollution comes from various sources in the Mississippi River Watershed and makes its way to the Gulf of Mexico where it creates the conditions that lead to a zone of decreased oxygen called hypoxia or a "dead zone."

DEAD ZONE

Rivers State Boundaries

Geospatial v3.1.0

Great Lakes to Gulf
VIRTUAL OBSERVATORY

greatlakesgulf.org

HOME DATA STORIES PARTNERS FAQ

Evaluating Nitrogen and Phosphorus Loads in Mississippi

Minnesota River at Marquette, MN
Iowa River at Wapella, IA
Illinois River at Florence, IL

These Sentinel Sites were chosen because they have the characteristic of measuring upstream watersheds mostly contained within a single state. The data from these sites, when analyzed in the same way, allow for comparison of each state's nutrient reduction efforts.

GeoAnalytics v.1.1.0

Great Lakes to Gulf
VIRTUAL OBSERVATORY

Thanks to all our collaborators and funders

THE
MCKNIGHT
FOUNDATION

The
WALTON FAMILY
FOUNDATION

The National Great Rivers
Research & Education Center

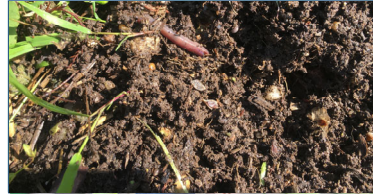
NCSA



United States Department of Agriculture

Hypoxia Task Force Meeting

Under Secretary Bill Northey
USDA Farm Production and Conservation



FARM PRODUCTION AND CONSERVATION
FSA | NRCS | RMA | Business Center



United States Department of Agriculture

Mississippi River Basin Initiative

- **2010 to 2019:**
\$307M obligated
for voluntary
conservation
contracts
- Provided
treatment on over
1.46 million acres
- Resulted in
several delistings

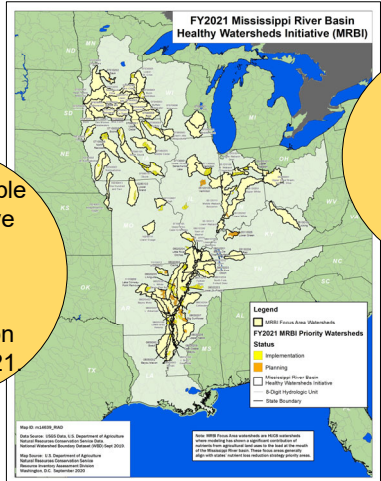


FARM PRODUCTION AND CONSERVATION

FSA | NRCS | RMA | Business Center

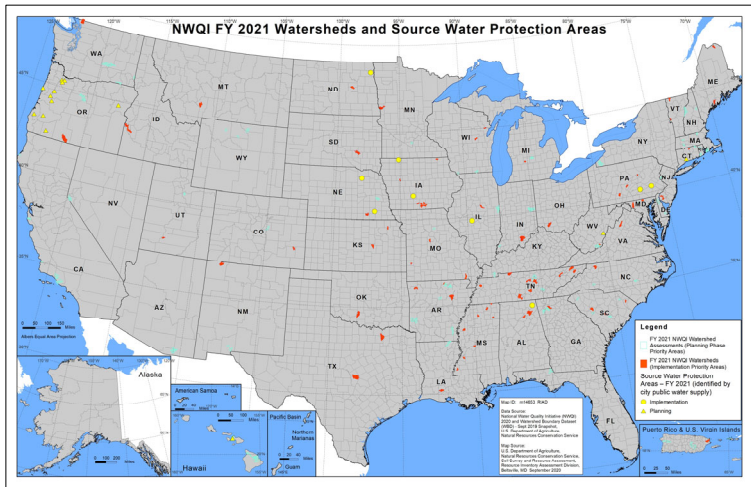
Announcing New Focus Areas and Watersheds in FY21

All MRBI eligible states will have at least one project in the planning or implementation phase for FY21



Focus areas align with state nutrient reduction strategy priorities.

NWQI FY21 New Watersheds, Source Water Protection Areas

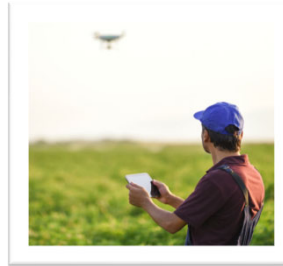




United States Department of Agriculture

USDA Agriculture Innovation Agenda (AIA)

- Increase U.S. production by **40%** while cutting environmental footprint **in half by 2050**
 - 1) Identify Ready-To-Go technologies
 - 2) Develop internal capacity to expedite adoption of technologies
 - 3) Deliver innovation to farmers
- August: USDA and EPA announce Next Gen Fertilizer Challenges
 - Environmental and Agronomic Challenge



FARM PRODUCTION AND CONSERVATION

FSA | NRCS | RMA | Business Center



United States Department of Agriculture

MRBI's Nexus with the Ag Innovation Agenda

- One AIA goal - **reduce nutrient loss by 30%**
- Consistent with interim metrics for the HTF action plan.
- MRBI will be an AIA focus, highlighting projects that use:
 - Novel prioritization
 - Targeting
 - Partner engagement
 - Innovative technologies



FARM PRODUCTION AND CONSERVATION

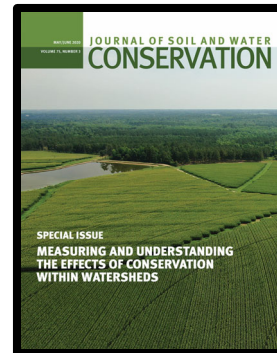
FSA | NRCS | RMA | Business Center



United States Department of Agriculture

Conservation Effects Assessment Project (CEAP) Watersheds

- Quantifying effects of conservation practices
- Journal of Soil and Water Conservation Special Issue on CEAP watersheds:
 - 15 years of results in 34 watersheds
 - Majority have quantifiable water quality benefits from conservation



With new...

- *precision conservation assessment and planning tools*
- *innovative practices*
- *accelerated conservation delivery*
- **...we can now do even more!**

FARM PRODUCTION AND CONSERVATION

FSA | NRCS | RMA | Business Center



United States Department of Agriculture

CEAP Watersheds – Applying Insights

- NRCS program design
 - Priority watershed approach
 - Small watershed scale
- Program delivery approaches
 - Precision conservation approaches
 - Watershed assessment basis
- Program guidance
 - Critical source areas
 - Planning ACT practice systems
 - Screening and ranking criteria
- Locally-driven watershed conservation strategies
 - One-on-one technical assistance
 - Leveraging Farmer-to-farmer networks
- Outcome estimation procedures and reporting



FARM PRODUCTION AND CONSERVATION

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United States Department of Agriculture

It Takes Partnerships

- Nonpoint Source Progress Workgroup
 - NRCS provides annual applied practice data
 - Assisting with development of progress tracking framework
- Collaboration with EPA on NWQI
- Partnering with USGS on legacy nutrients
- NOAA Runoff Risk Index
 - Delivering with USDA AgOpt Tool



FARM PRODUCTION AND CONSERVATION

FSA | NRCS | RMA | Business Center



United States Department of Agriculture

USDA Is Here for You



FARM PRODUCTION AND CONSERVATION

FSA | NRCS | RMA | Business Center

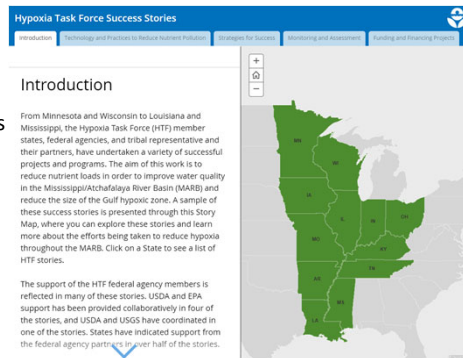
EPA Support to HTF Member States

October 1, 2020

Fall 2020 Virtual HTF Public Meeting

HTF Success Stories Story Map

- EPA has supported the HTF state members by publishing a [new interactive Story Map of success stories](#)
 - Updates previous webpage of success stories from within the Mississippi/Atchafalaya River Basin (MARB).
- The Story Map highlights efforts state efforts to reduce nutrient loss throughout the MARB and hypoxia in the Gulf.
- It is organized into four themes and can be updated regularly.
 - Technology and Practices to Reduce Nutrient Pollution
 - Strategies for Success
 - Monitoring and Assessment
 - Funding and Financing Projects



<https://www.epa.gov/ms-htf/success-stories-hypoxia-task-force-htf>

EPA Memo to State & Tribal Env. Agencies:
EPA Financing Available to Support Market-Based Water
Quality Improvement Programs

- EPA has strongly encouraged states and authorized tribes to adopt market-based approaches for water quality improvement, including water quality trading, to supplement traditional regulatory programs and financing opportunities.
- The February 2019 memo, “Updating the EPA’s Water Quality Trading Policy to Promote Market-Based Mechanisms for Improving Water Quality,” ID’d six broad market-based principles.
- One principle is identifying financing opportunities that can assist in increasing adoption of nonpoint conservation practices and systems.
- A Sept 30, 2020 memorandum describes EPA financing available to support state and tribal adoption of market-based water quality improvement programs.
- Information may be found at the HTF webpage:
<https://www.epa.gov/ms-htf>.


Financial Support to States and State Partners

- In 2019 and 2020, EPA has funded \$2.4M in grants to the 12 HTF states to support their [nutrient reduction strategies](#).
 - These resources supplement support for states via “base” program investments in nonpoint source management (CWA Section 319 grants), state Revolving Loan Fund programs, and state water quality management programs (CWA Section 106 grants)
- EPA has awarded more than \$9.5 million in grants to fund farmer-led projects that improve water quality, habitat and environmental education in the Gulf of Mexico watershed.
 - Next RFA closes on October 16, 2020, to fund up to \$10 million in new projects. [See Farmer to Farmer grant Story Map](#).

NOAA Updates and Announcements

Dr. Steven Thur
NOAA
National Ocean Service

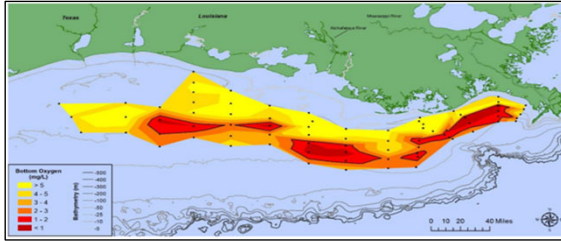
Hypoxia Task Force
Meeting
September 2020

 SCIENCE SERVING COASTAL COMMUNITIES

Outline

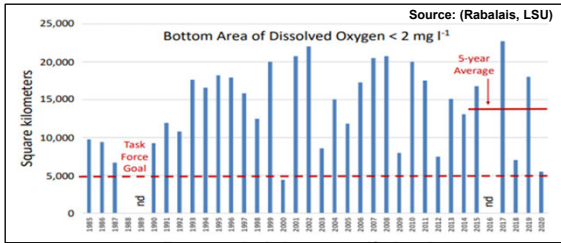
- 2020 Hypoxia monitoring cruise and retrospective analysis
- Newly funded project on emerging technologies for hypoxia monitoring
- Runoff Risk update and new collaborative effort with USDA Agricultural Research Service (ARS)

Hypoxic Zone Monitoring Results and Outreach



Predicted Size = 17,353 km²
 Measured Size = 5,480 km²
 5-Year Average = 14,004 km²

3rd Smallest Measured
 (impacts from Hurricane Hanna)

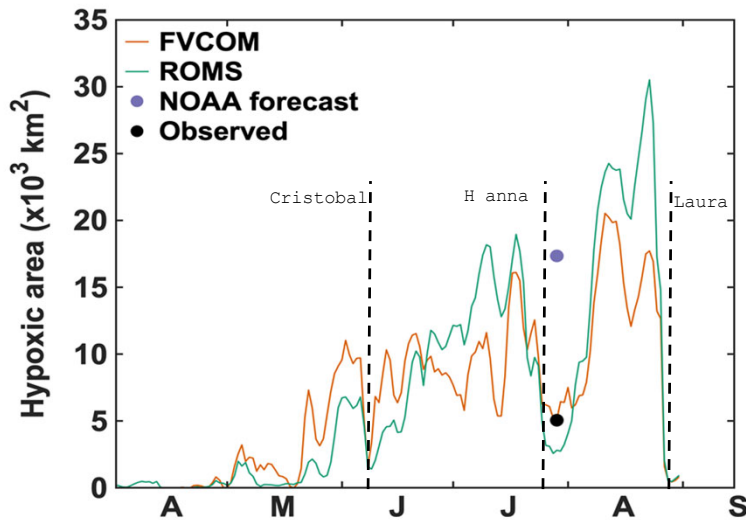


Mid-summer extent of hypoxic zone – metric to assess progress toward HTF Coastal Goal

Outreach Efforts

Two Press Releases
 Media teleconference held with the Hypoxia Task Force Co-Chairs
 Over 185 news articles written as a result

Retrospective Analysis



Source: (Fennel, Dalhousie; Justic, LSU)

Rapid intensification of hypoxic zone after Hurricane Hanna

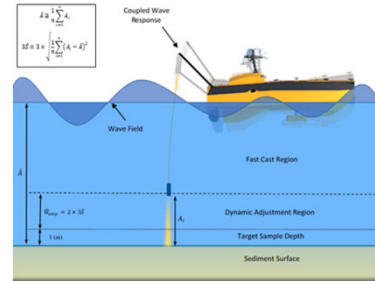
Model agreement with cruise data

Large August peak

Storms continue to pose challenges with monitoring

New project to support hypoxia monitoring

- **Purpose:**
 - Develop cost-efficient technology to sample hypoxic zone using autonomous surface vehicles
- **Capabilities:**
 - Utilize a winch driven system to sample within 1m of bottom
 - Can measure in waters from 5m to 50m
 - Data transmitted in real time and made publically available
- **Funding:**
 - Support provided by the NOAA IOOS OTT Program with 3-yr award to the University of Southern Mississippi (\$1,161,017)
 - Intended partners include L3Harris, Integral Consulting Inc, Texas A&M Univ, GCOOS, EPA and NOAA



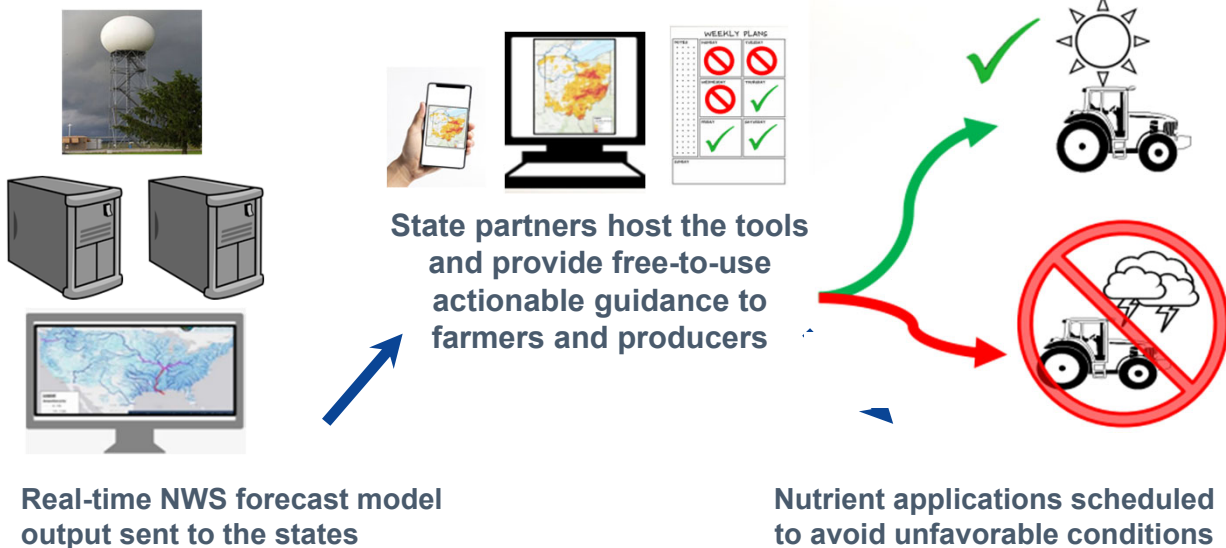
Autonomous Winch Controller Concept



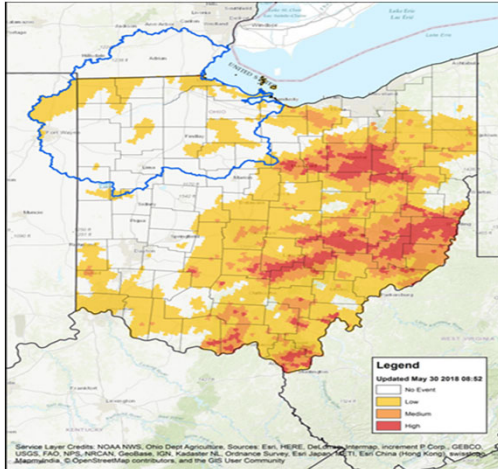
Picture Credits: L3Harris | ASV

<https://ioos.noaa.gov/project/ott-asv-hypoxia/>

NOAA Runoff Risk Decision Support Tools



Runoff Risk - Current Status



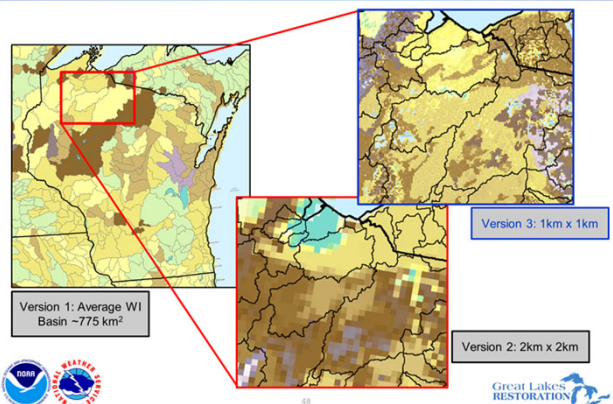
Graphic showing runoff risk potential for Ohio (May 2018, Quick Link to tools (Courtesy of WI): runoffrisk.info

- Runoff Risk (version 2) tools active in MI, MN, OH, and WI
 - Tailored to fit the needs of states
 - States maintain and distribute forecasts
- Very early stages in IN and NY
- Current version will be upgraded in winter 2020-21
- Future implementation nationally on the NWS National Water Model (~2023, based on version 3)

Runoff Risk - Comparison of v2 and v3

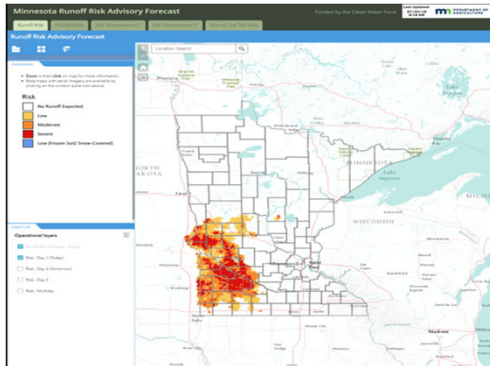
- Runoff Risk v3 will leverage the spatial and temporal scale and processing power of the NWM
- Resolution will be reduced from 2 km down to 1 km
- Use of the NWM platform offers the opportunity to expand outside the Great Lakes footprint

NWM-Version 3 Moving to Finer Resolution



NOAA and USDA Runoff Tools

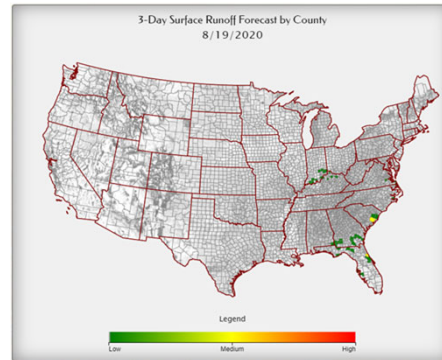
Runoff Risk Advisory Forecast



State Based
 Maintained by NWS & State Partnerships
 Gridded land-surface & runoff models
 WRF-Hydro Modeling System



Agricultural Operational Planning Tool (AgOPT)




Nationally Based
 Maintained by USDA/ARS/NRCS
 Incorporates watershed models
 SWAT/CEAP Modelling System

Emerging NOAA and USDA Collaboration

- Workshop was held in Jan of 2020 to explore avenues and options for collaboration between the two groups with several follow on meetings
- Areas of mutual interest
 - Comparison of the two approaches to learn their strengths and weaknesses
 - Incorporation of key data streams, parameters, and processing to ensure consistency across platforms and efficiency of tool provision
 - Pursue opportunities for leveraging of critical elements toward an interchangeable and integrated platform
- Quarterly meetings and an annual workshop planned for 2021
- **Ultimate Goal:** Enhanced ability to predict nutrient export events across the Mississippi River watershed



Thank you



SCIENCE SERVING COASTAL COMMUNITIES

Recent Hypoxia Research Efforts and Publications

Several publications have come out with implications for hypoxic zone monitoring, forecasting, economic impacts and management targets.

Ren, L., Rabalais, N.N. & Turner, R.E. (2020) Effects of Mississippi River water on phytoplankton growth and composition in the upper Barataria estuary, Louisiana. *Hydrobiologia* 847, 1831–1850.

Rahman, Md, K., Richard, Vázquez, O., Khan, I., Thomas, P. (2020) Molecular characterization and expression of arginine vasotocin V1a2 receptor in Atlantic croaker brain: Potential mechanisms of its downregulation by PCB77 *Journal of Biochemical and Molecular Toxicology* v34

Kim, Jongsun & Chapman, Piers & Rowe, Gilbert & Dimarco, Steven. (2020). Categorizing zonal productivity on the continental shelf with nutrient-salinity ratios. *Journal of Marine Systems*. 103336.

Kim, Jongsun & Chapman, Piers & Rowe, Gilbert & Dimarco, Steven & Thornton, Daniel. (2020). Implications of different nitrogen input sources for potential production and carbon flux estimates in the coastal Gulf of Mexico (GOM) and Korean Peninsula coastal waters. *Ocean Science*. 16. 45-63. 0.

Recent Hypoxia Research Efforts and Publications

Several publications have come out with implications for hypoxic zone monitoring, forecasting, economic impacts and management targets.

Grüss, Arnaud & Rose, Kenneth & Justić, Dubravko & Wang, Lixia. (2020). Making the most of available monitoring data: A grid-summarization method to allow for the combined use of monitoring data collected at random and fixed sampling stations. *Fisheries Research*. 229. 105623. 3.

Tian, Hanqin & Xu, Rongting & Pan, Shufen & Yao, Yuanzhi & Bian, Zihao & Cai, Wei-Jun & Hopkinson, Charles & Justic, Dubravko & Lohrenz, Steven & Lu, Chaoqun & Ren, Wei & Yang, Jia. (2020). Long-Term Trajectory of Nitrogen Loading and Delivery From Mississippi River Basin to the Gulf of Mexico. *Global Biogeochemical Cycles*. 34. e2019GB006475.

Yao, Yuanzhi & Tian, Hanqin & Shi, Hao & Pan, Shufen & Xu, Rongting & Pan, Naiqing & Canadell, Josep. (2020). Increased global nitrous oxide emissions from streams and rivers in the Anthropocene. *Nature Climate Change*. 10. 1-5.

Recent Hypoxia Research Efforts and Publications

Several publications have come out with implications for hypoxic zone monitoring, forecasting, economic impacts and management targets.

- Diversions of Mississippi River into adjacent estuarine waters should be considered in relation to expected and, possibly, unexpected changes in phytoplankton communities to the receiving waters and coastal ecosystems (**Ren et al., 2020**)
- Salinity/nutrient relationships in the Gulf of Mexico varied systematically with distance from the two rivers in winter but not in summer. This is because boundaries of the different regions vary with river flow, overall nutrient flux, and grids of stations at the regional spatial scale (**Kim et al., 2020**).
- Model scenario results suggest that overall oxygen demand in the Gulf of Mexico will increase approximately 21% if we fail to reduce riverine N input, likely increasing considerably the area affected by hypoxia (**Kim et al., 2020**).
- The model results indicate that total nitrogen export during 2000–2014 was twofold larger than that in the first decade of twentieth century: Dissolved inorganic nitrogen export increased by 140% dominated by nitrate; total organic nitrogen export increased by 53% (**Tian et al., 2020**)

Federal Actions in Support of the States

Randy Holder
U.S. Army Corps of Engineers
MR&T Environmental Program Manager
Lower Mississippi River Environmental
Program Manager
Mississippi Valley Division



Agenda

- USACE Mission
- USACE Civil Works Mission
 - Navigation
 - Flood Risk Management
 - Ecosystem Restoration
- Lower Mississippi River Conservation Committee (LMRCC)
- Planning Assistance to the States Program



Federal Actions in Support of the States

The U.S. Army Corps of Engineers Mission:

Deliver vital public and military engineering services; partnering in peace and war to strengthen our nation's security, energize the economy and reduce risks from disasters



Federal Actions in Support of the States

- USACE Civil Works Mission Includes:
 - Dredging for Waterway Navigation
 - Design and Construction of Flood Protection Systems
 - Ecosystem Restoration and Environmental Regulation



Federal Actions in Support of the States



Federal Actions in Support of the States



Federal Actions in Support of the States

- Navigation
 - Dredge 255,000,000 cubic yards annually
 - Operates and maintains 12,000 miles of commercial inland navigation channels
 - Supports nation's inner cities
 - Commercial harbors



Federal Actions in Support of the States

- Flood Risk Management
 - Mississippi Rivers and Tributaries Project
 - Protects population (4.5 million)
 - Protects infrastructure
 - Protects food source



Ecosystem Restoration



Lower Mississippi River Conservation Committee (LMRCC)



Angeline Rodgers, USFWS/LMRCC
USACE River Engineering
Working Group Webinar Series





Conserving
the natural resources
of the Mississippi's floodplain

LMRCC's Mission

- Promote the restoration and wise use of the natural resources of the Lower Mississippi River through cooperative efforts involving planning, management, information sharing, public education, advocacy and research.



LMRCC Member Agencies

[Arkansas Department of Environmental Quality](#)

[Arkansas Game and Fish Commission](#)

[Kentucky Department for Environmental Protection](#)

[Kentucky Department of Fish and Wildlife Resources](#)

[Louisiana Department of Environmental Quality](#)

[Louisiana Department of Wildlife and Fisheries](#)

[Mississippi Department of Environmental Quality](#)

[Mississippi Department of Wildlife, Fisheries and Parks](#)

[Missouri Department of Conservation](#)

[Missouri Department of Natural Resources](#)

[Tennessee Department of Environment and Conservation](#)

[Tennessee Wildlife Resources Agency](#)



LMRCC Cooperating Federal Agencies & Partners

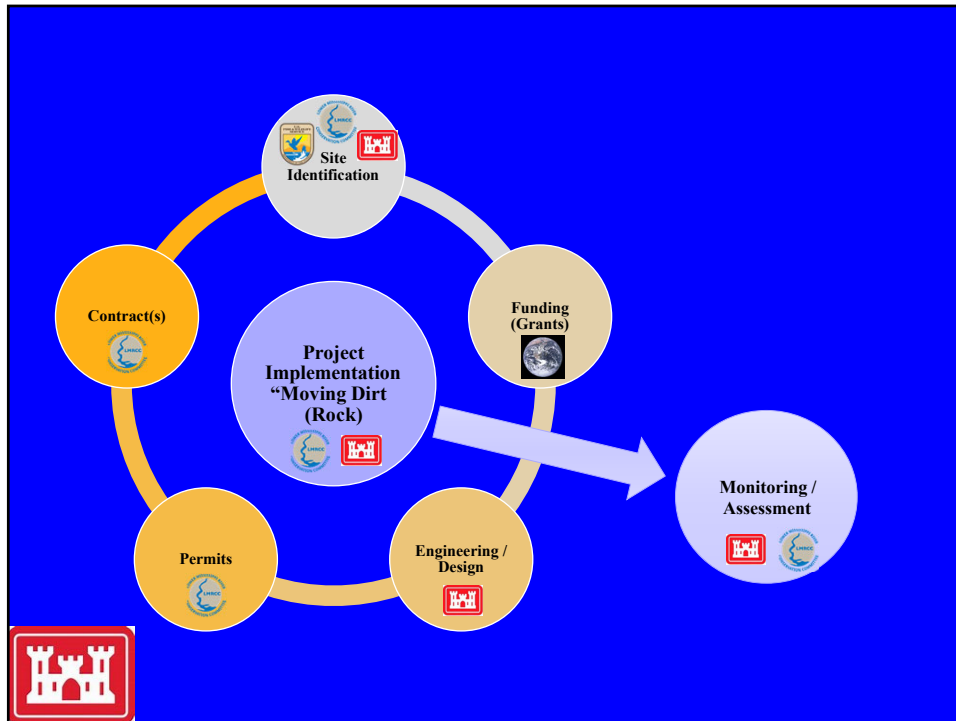
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- U.S.D.A. Natural Resources Conservation
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- Mississippi River Trust
- The Nature Conservancy



LMRCC Programs

- Restoring America's Greatest River Initiative
- **Lower Miss River Batture Reforestation Project**
- Lower Miss River Basin Asian Carp Management & Control
- Fishing the Lower Miss River
- Lower Miss River Resource Assessment
- Lower Miss River Economic Profile





LMRCC Restoration Projects

Project Category	# of Projects per Category
Restore Secondary Channels	73
Restore Lakes/Backwaters	69
Notch Dikes – Main Channel	39
Improve Boat Ramp Access	21
Conserve/Restore Gravel Bars	10
Procure Batture Land	10
Restore Borrow Pits	5
Construct Chevrons	5
Construct Hardpoints	4
Restore Tributary Mouth	2
Construct/Restore Islands	1
TOTAL PROJECTS	239

Federal Actions in Support of the States

Planning Assistance to States Program



Planning Assistance to States Program

- Section 22 of the Water Resources Development Act of 1974 (Public Law 93-251), as amended by Section 205 of the 1992 WRDA, provides authority for the U.S. Army Corps of Engineers to assist states, eligible Native American Indian tribes, local governments or other non-federal entities in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources.



Planning Assistance to States Program

- Water Supply and Demand Studies
- Water Quality Studies
- Environmental Conservation/Restoration Studies
- Wetlands Evaluation Studies
- Dam Safety/Failure Studies
- Flood Damage Reduction Studies
- Flood Plain Management Studies
- Coastal Zone Management/Protection Studies
- Harbor/Port Studies



Federal Actions in Support of the States

Randy Holder
U.S. Army Corps of Engineers
Mississippi Valley Division

