May 2019 Hypoxia Task Force Meeting Agenda

May 15-16, 2019
Baton Rouge, LA

Public Networking Session

LSU/CPRA Center for River Studies
The Water Campus
100 Terrace Ave
Baton Rouge, LA 70802

Public Meeting

Hilton Baton Rouge Capitol Center
201 Lafayette Street
Baton Rouge, LA 70801

Wednesday, May 15

5:30 Public Networking Session for HTF, Partners, and Stakeholders at the Louisiana State University/Coastal Protection and Restoration Authority Center for River Studies

6:00 Open Tour of the River Model

7:30 Adjourn

Thursday, May 16

8:30 Hypoxia Task Force Public Meeting Convenes, Introductions

8:40 Update on Federal Collaborative Effort to Address Nation's Most Challenging Water Issues

- Dave Ross, Assistant Administrator for Water, U.S. EPA, HTF Federal Co-Chair

8:50 Louisiana Welcome and Orientation, Highlights from State Nutrient Reduction Strategy

- Kyle R. ("Chip") Kline, Jr., Executive Assistant to the Governor for Coastal Activities
- Rowdy Gaudet, Mayor-President Sharon Broome's Office, Assistant Chief Administrative Officer
- Chuck Carr Brown, Secretary, Louisiana Department of Environmental Quality

9:20 Gulf Science Update and Summary of Hypoxia Zone in 2018

- Steven Thur, NOAA National Centers for Coastal Ocean Science

9:35 Nonpoint Source Measurement Framework for Measuring Progress: Advancements, Next Steps, and Lessons Learned in Indiana and Arkansas that Can Inform Progress Tracking in All HTF States

- Julie Harrold, Indiana State Department of Agriculture
- J. Ryan Benefield, Arkansas Natural Resources Commission

9:55 Brief Synopsys – Recent Developments in Using Satellite/Aerial Imagery to Track Landscape-Scale Adoption of Cover Crops, Reduced Tillage, and Water Retention/Structural Practices

- Adam Schnieders, Iowa Department of Natural Resources
- Mike Komp, CTIC

10:15 National Fish and Wildlife Foundation Gulf of Mexico Work

- Tanner Johnson, NFWF

10:25 Break

10:40 Outlook: Lessons Learned in Seeking "Nontraditional" Investments in Nonpoint Source Reductions

- Steve Rowe, Newtrient

11:00 SERA-46: Update on Research/Extension Outcomes in Support of HTF Goals

- Beth Baker, Mississippi State University

11:15 Public Comment Period

11:35 Comments from HTF

11:45 Adjourn

Gulf Science Update and Summary of Hypoxia Zone in 2018

Dr. Steven Thur
NOAA
National Ocean Service
National Centers for Coastal Ocean Science

Mississippi River Gulf of Mexico Watershed Nutrient Task Force

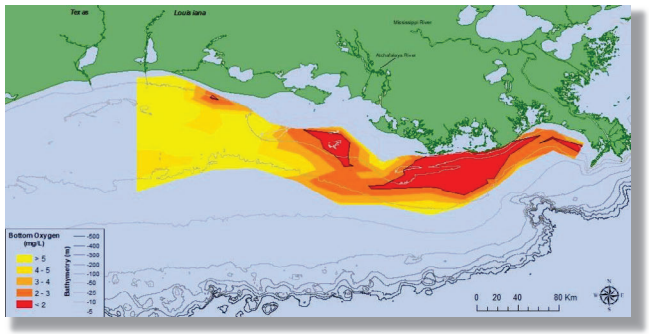
Hypoxia Task Force Meeting
Baton Rouge, LA, May 2019

Outline

- Hypoxia zone monitoring cruise, forecast and retrospective analysis
- Ongoing hypoxia impacts research, key publications and accomplishments and gulf wide monitoring and coordination efforts
- Outlook for upcoming season

NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE
coastalscience.noaa.gov

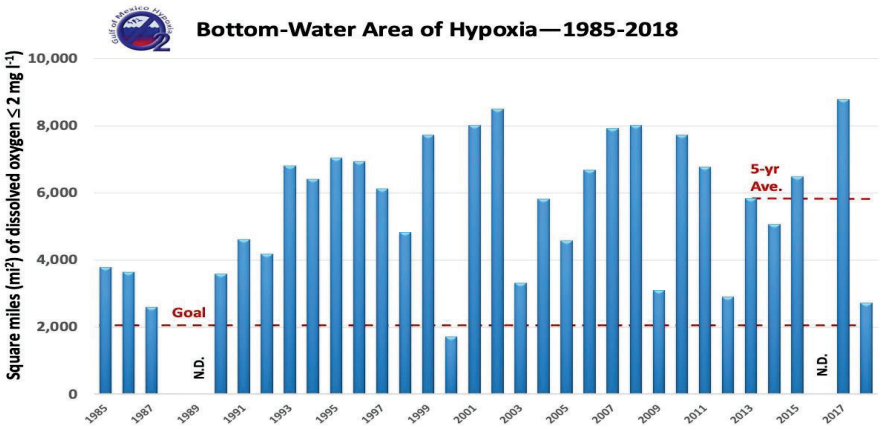
2018 Hypoxic Zone Monitoring Results



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

Measured Size= 2,780 square miles

5-year average = 5,770 square miles



Long-term monitoring data set

From Nancy Rabalais (LSU/LUMCON)

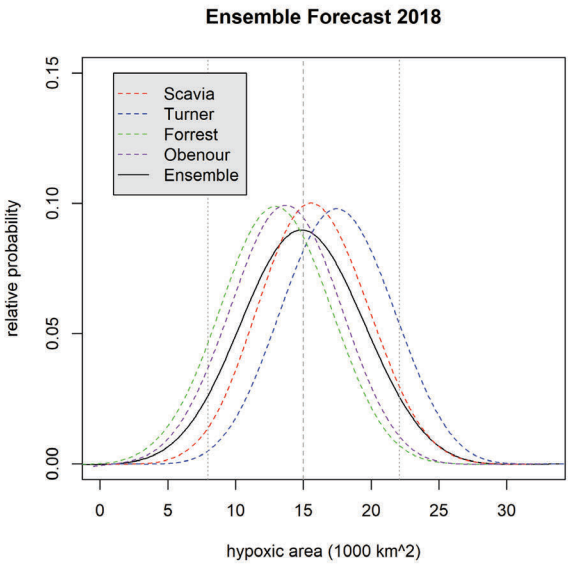
NOAA USGS science for a changing world

JOINT NEWS RELEASE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
U.S. GEOLOGICAL SURVEY

– June 7, 2018 –

Average Sized Dead Zone Forecast for Gulf of Mexico

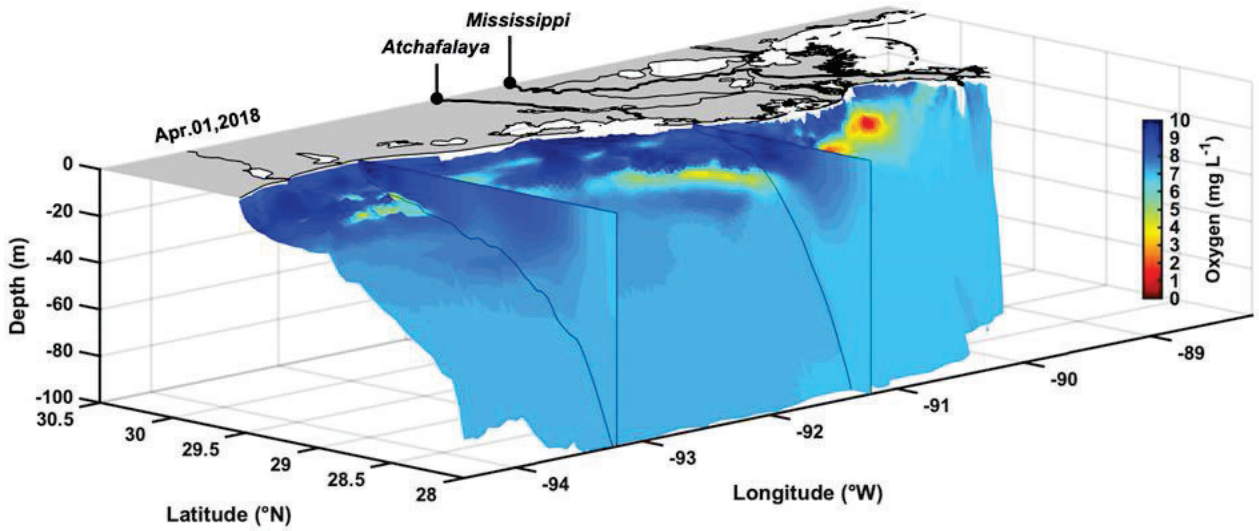
NOAA scientists are forecasting that this summer's Gulf of Mexico hypoxic zone or 'dead zone' – an area of low to no oxygen that can kill fish and other marine life – will be approximately 5,780 square miles [14,970 square kilometers], approximately the size of Connecticut

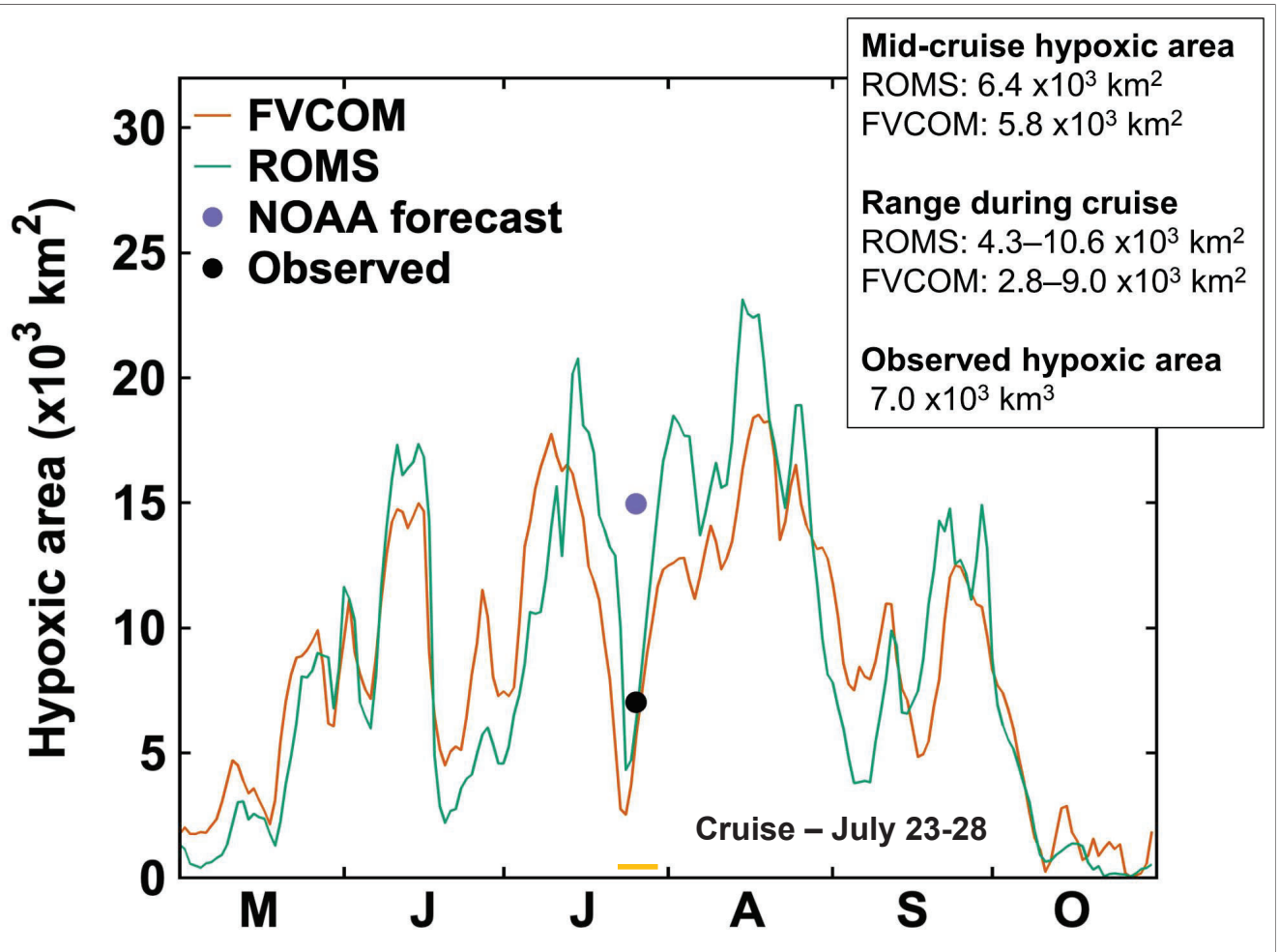


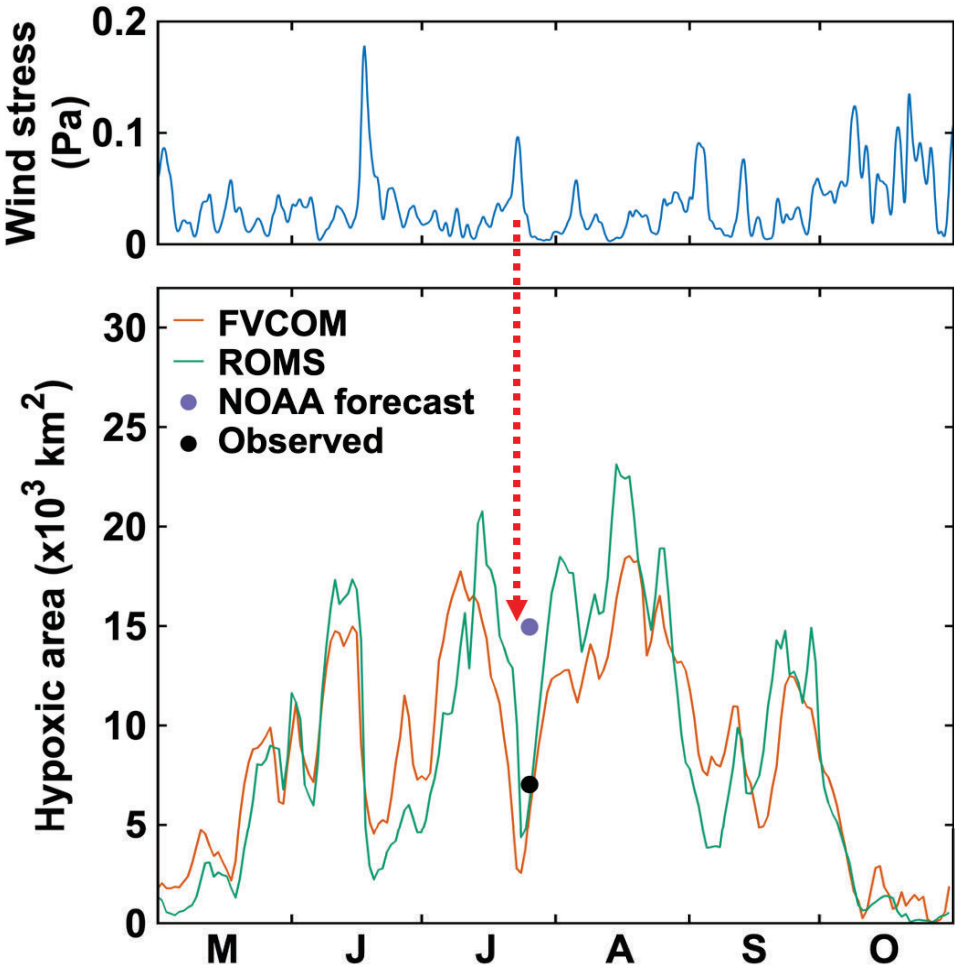
Models that simulate the 3-D Zone have added value

- Models can predict the future zone conditions
- Models can be used to estimate area, volume, and duration
- Models can recreate (hindcast) the zone to explain what happened

FVCOM



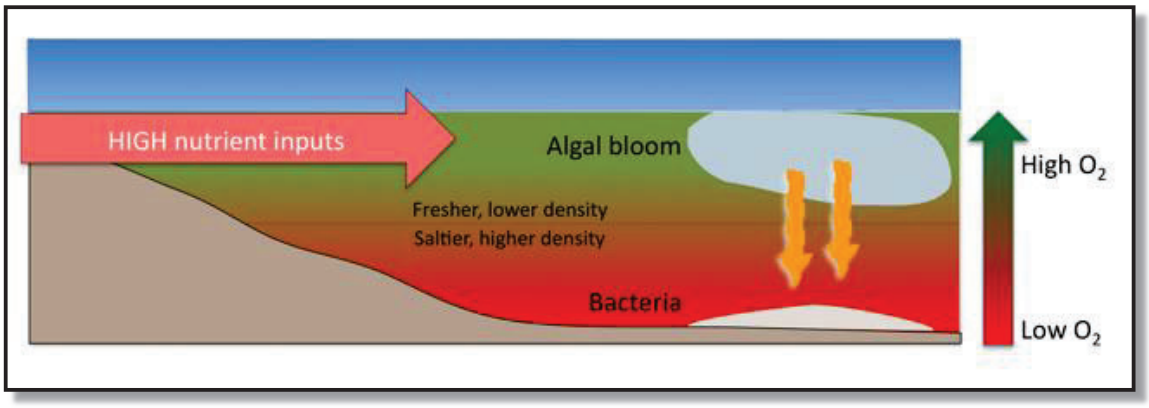




Strong wind events coincide with large decreases in hypoxic area that are only temporary.

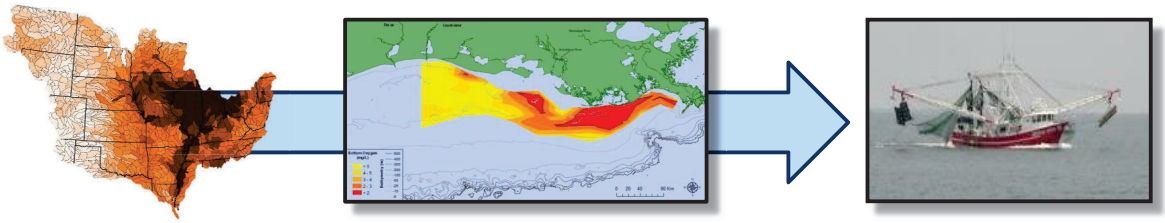
Small zones do not always reflect nutrient reductions

- **High nutrient inputs and calm conditions leading to water stratification are both needed for hypoxic zone formation.**



The 5-year average helps deal with a dynamic zone

- **We average across years (snapshots) to have a more robust measure.**
- **The annual cruise offers the only monitoring based metric available, but with newer models we can ask important questions about the metric and consider additional metrics:**
    - *When is the zone the largest and how often does the cruise capture it?*
    - *How long is the zone present (seasonal duration)?*
    - *What is the volume?*
    - *How might diversions affect hypoxia?*
    - *"End to End" Nutrient Management Scenario Evaluations*



Quantifying the ecological impacts of hypoxia

Synthesis of long-term datasets and modeling of data to support fisheries and hypoxia management in the NGOM

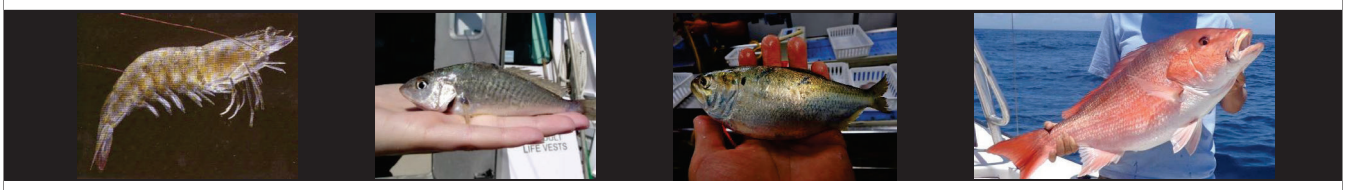
Scientific PI: Dan Obenour (NCSU); Kevin Craig (NOAA NMFS)

Linking models to connect nutrient pollution and impacts of diversions on hypoxia and the subsequent impacts on living resource

Scientific PI: Kenny Rose (UMCES), Dubravko Justic (LSU); Kevin Craig (NOAA NMFS)

User-Driven Tools to Predict and Assess Effects of Reduced Nutrients and Hypoxia on Living Resources in the GOM

Scientific PI: Kim de Mutsert (George Mason U); App. PI: Matt Campbell (NOAA NMFS)



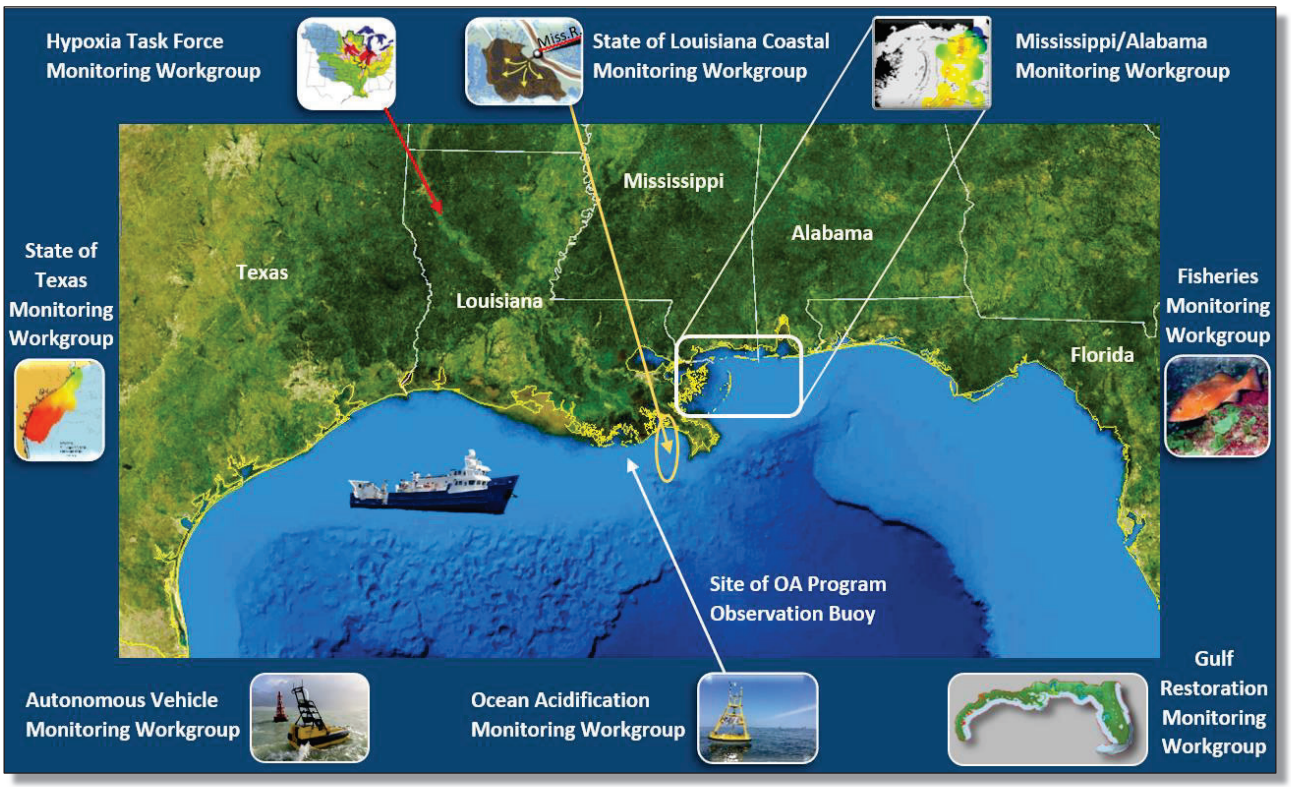
Brown Shrimp | Atlantic Croaker | Gulf Menhaden | Red Snapper

Recent Hypoxia Research Efforts and Publications

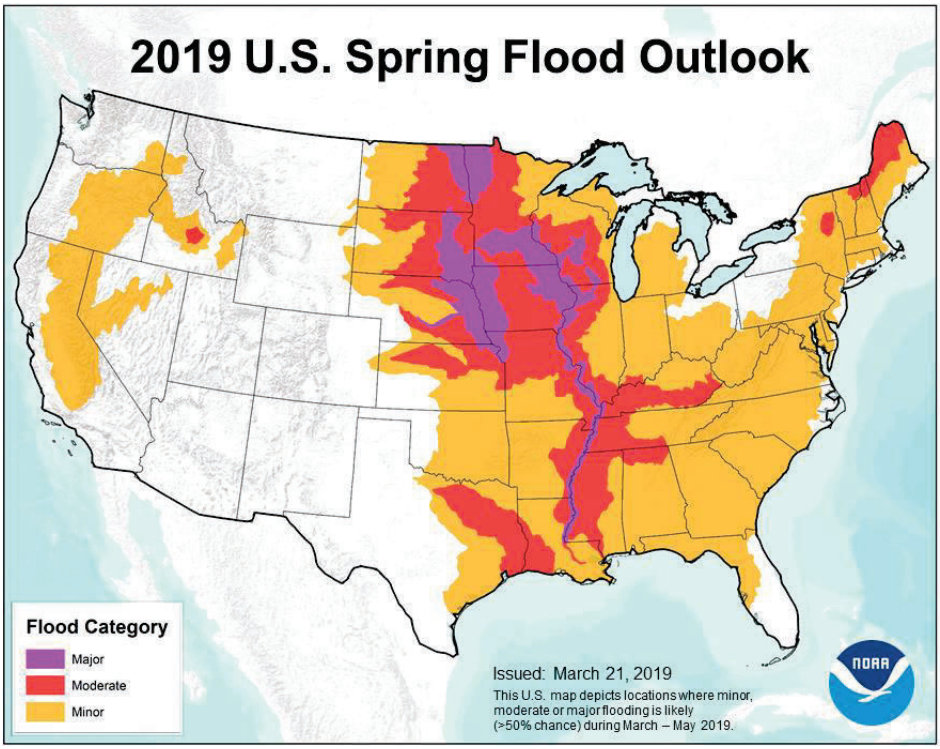
Several publications have come out with implications for hypoxic zone monitoring, forecasting, economic impacts and management targets.

- Adding phosphorus reduction targets lowers the amount of nitrogen reductions required to meet the Task Force goal (Fennel and Laurent, 2018) over reducing nitrogen only (Scavia et al., 2017)
- A summer-wide average of zone size may be a better metric for measuring hypoxia (Matli et al., 2018)
- Hypoxic volume is more responsive than hypoxic area to nutrient load reductions (Scavia et al., 2018)
- Shrimpers are having to travel further to avoid hypoxic waters and the value of shrimp is affected (Smith et. al 2017; Purcell et al., 2017)

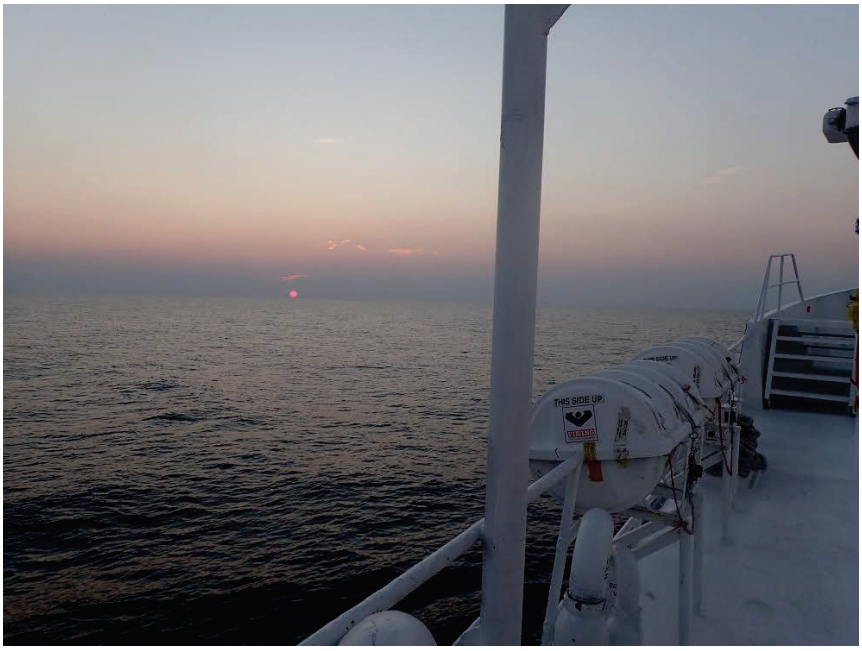
Cooperative Hypoxia Assessment and Monitoring Program (CHAMP)



Outlook for the 2019 Hypoxia Season

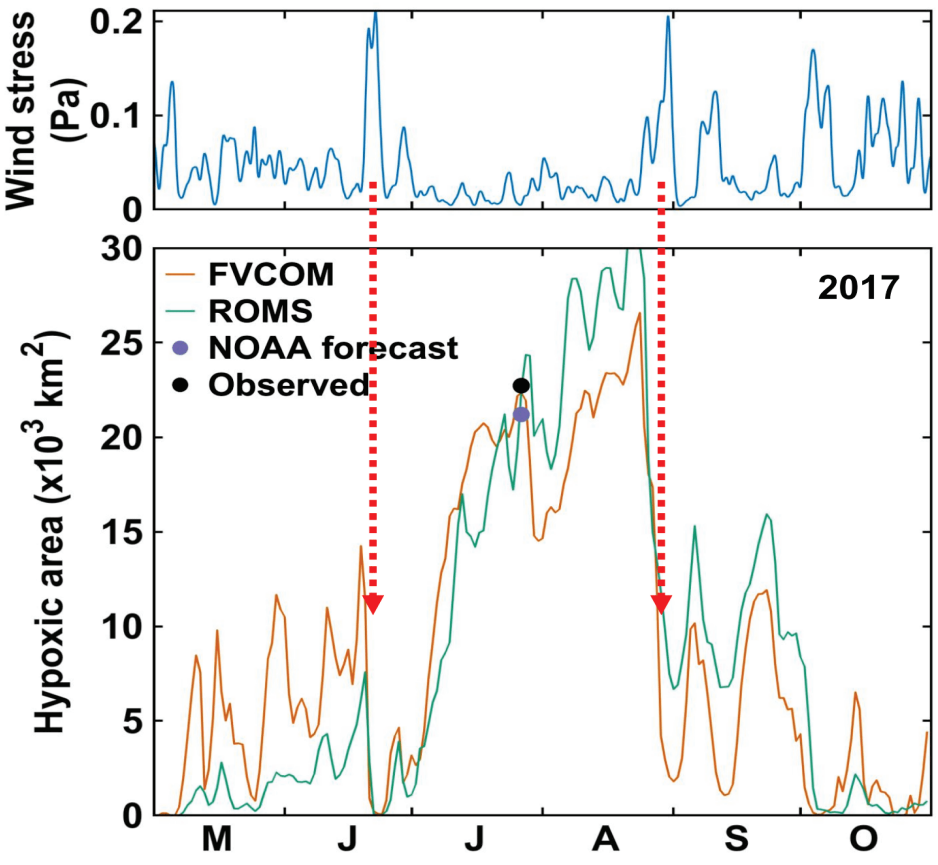


Thank you



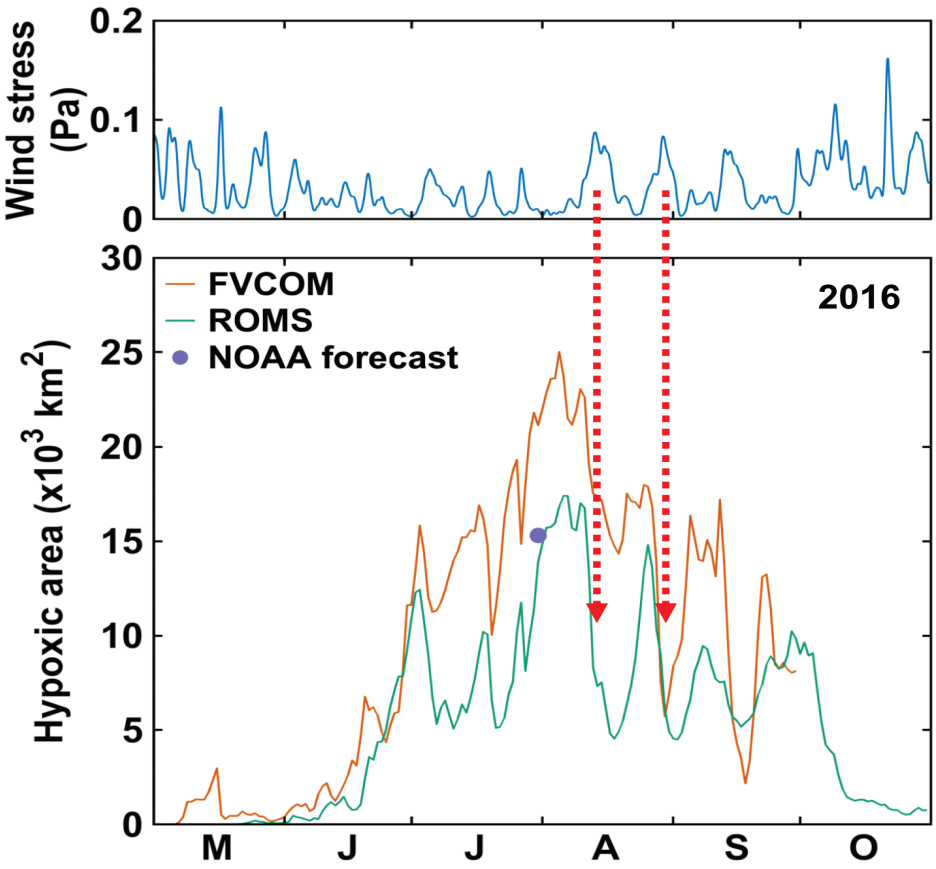
Additional Slides

Retrospective – 2017 Season



In 2017 there were no strong wind events between mid July and the end of August. But strong winds in late June and late August coincided again with large decreases in hypoxic area.

Retrospective – 2016 Season



In 2016 a series of smaller wind events throughout the summer led to reoccurring temporary reductions in hypoxic area.

Recent Hypoxia Research Efforts and Publications

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

Nutrient Reduction Targets

- Fennel, K. and Laurent A. 2018. **N and P as ultimate and proximate limiting nutrients in the northern Gulf of Mexico: implications for hypoxia reductions strategies**. Biogeosciences, 15: 3121-3131. https://doi.org/10.5194/bg-15-3121-2018
- Scavia, D., J. Dubravko, D.R. Obenour, K. Craig, L. Wang. 2018. **Hypoxic volume is more responsive than hypoxic area to nutrient load reductions in the northern Gulf of Mexico – and it matters to fish and fisheries.** Env. Res. Lett. https://doi.org/10.1088/1748-9326/aaf938.

Fisheries Impacts

- Smith MD, Oglend A, Kirkpatrick AJ, Asche F, Bennear LS, Craig JK, Nance JM. **Seafood prices reveal impacts of a major ecological disturbance.** Proceedings of the National Academy of Sciences. 2017; Jan 30:201617948. 10.1073/pnas.1617948114.
- Purcell KM, Craig JK, Nance JM, Smith MD, Bennear LS (2017) **Fleet behavior is responsive to a large-scale environmental disturbance: Hypoxia effects on the spatial dynamics of the northern Gulf of Mexico shrimp fishery.** PLoS ONE. 12(8): e0183032. https://doi.org/10.1371/journal.pone.0183032

Monitoring and Modeling

- Scavia D., I. Bertani, D. R. Obenour, R. E. Turner, D. R. Forrest, A. Katin. 2017. **Ensemble modeling and Gulf of Mexico hypoxia.** Proceedings of the National Academy of Sciences, 114 (33) 8823-8828; DOI: 10.1073/pnas.1705293114
- V. Rohith Reddy Matli, Shiqi Fang, Joseph Guinness, Nancy. N. Rabalais, J. Kevin Craig, and Daniel R. Obenour (2018). Space-Time Geostatistical Assessment of Hypoxia in the Northern Gulf of Mexico. Environmental Science & Technology 2018 52 (21), 12484-12493, DOI: 10.1021/acs.est.8b03474

Climate Effects

- Laurent, A., Fennel, K., Ko, D. S.,Lehrter, J. (2018). **Climate change projected to exacerbate impacts of coastal eutrophication in the northern Gulf of Mexico.** Journal of Geophysical Research: Oceans, 123, 3408–3426. https://doi.org/10.1002/2017JC013583

Nonpoint Source Measurement Framework:

Advancements, Next Steps and Lessons Learned in Indiana and Arkansas that Can Inform Progress Tracking in All HTF States

Gulf of Mexico Hypoxia Task Force Meeting

Baton Rouge, LA
May 16, 2019

Julie Harrold, Indiana State Department of Agriculture
J. Ryan Benefield, Arkansas Natural Resources Commission

Background on NPS Measures Workgroup

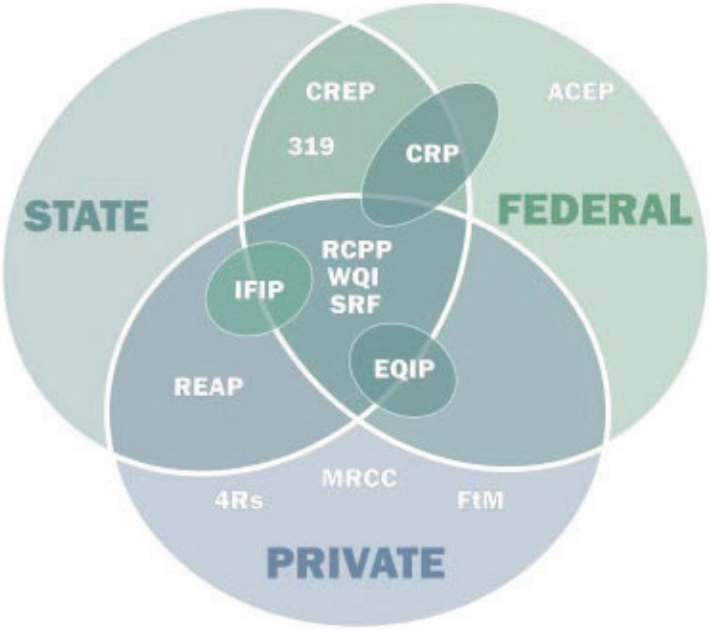
- NPS Measures workgroup tasked with identifying a common measure
  - All States could reasonably report
  - What is being done on-the-ground
- Not the only measure
  - Many tools for measures of water quality
- Use to report and track progress
  - Inform and improve implementation

https://www.epa.gov/sites/production/files/2018-05/documents/nps_measures_progress_report_1-_may_2018.pdf

Background on NPS Measures Workgroup

- Practice Summary:
  1. State and/or Local-level
  2. Federal-level
  3. Private/NGO-level

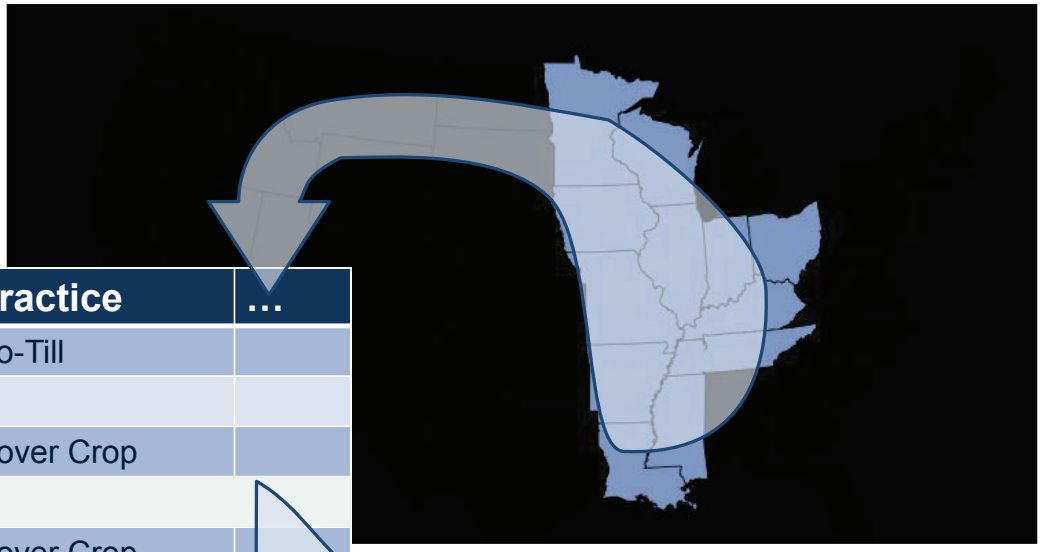
- Categories/parameters identified
  - Consistency of NPS Framework among states
- Identified challenges and barriers
  - Walton Family Foundation Grant
- Completed Final Draft of NPS Measures Progress Report



https://www.epa.gov/sites/production/files/2018-05/documents/nps_measures_progress_report_1-_may_2018.pdf

NPS Measures Progress Report

- Barriers:
  - Potential for duplication and over reporting (without certain information)
    - Ex. Combined state/fed sources for 1 practice (CREP), practices established on non-cropland, etc.
  - Consistent reporting of practices (similar units)
  - Account for longevity of practice(s)
  - Variability amongst practices and reported information – variability in practice names, acres treated, etc.
  - Location of practice installation and downstream effects
  - Private Implementation is a huge part of the story
- Walton Family Foundation project:
  - Resources to help coordinate continued development of the **NPS Measures Framework**
  - Previously working with Indiana and Arkansas
  - Working with Illinois, Kentucky, and Minnesota in 2019
    - Filling data gaps, reviewing data sources, supporting science assessments



State	HUC 8	Practice	…
Arkansas	08020304	No-Till	
⋮	⋮	⋮	
Illinois	07090006	Cover Crop	
⋮	⋮	⋮	
Indiana	05120111	Cover Crop	
⋮	⋮	⋮	
Kentucky	05140104	Wetland	
⋮	⋮	⋮	
Minnesota	07010203	Grass Waterway	

% N and P Non-Point Source Load Reduction

NPS Measurement Framework: Indiana

Gulf of Mexico Hypoxia Task Force Meeting

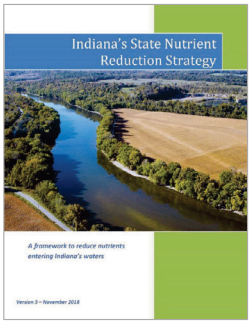
Baton Rouge, LA
May 16, 2019

Julie Harrold, ISDA Program Manager for CREP and Water Quality Initiatives

Supporting the State Nutrient Reduction Strategy

- Indiana's State Nutrient Reduction Strategy (SNRS) was developed to "capture statewide, present and future endeavors in Indiana which positively impact the State's waters as well as gauge the progress of conservation, water quality improvement and soil health practice adoption in Indiana".

- The Indiana SNRS represents the state's commitment to reduce nutrient runoff into Indiana's waters from point sources and non-point sources.







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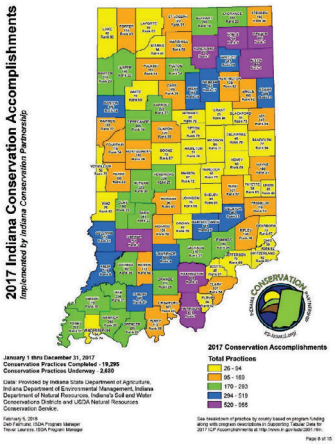
Indiana's current process of capturing Nutrient Load Reductions

- Since 2013, Indiana annually collects conservation practice data from conservation partners for all federal and state programs.

Supporting Tabular Data for 2017 ICP Conservation Accomplishments

2017 Total Practices Installed by County based on Program Funding - Map on Page 8

COUNTY	ACEP	AWEP	CREP	CRP	CSP	CWI	EQIP	IDEM	INFA	LARE	OTHER	WHIP	WRP	TOTAL
ADAMS	0	0	1	87	0	4	293	0	13	0	0	0	0	398
ALLEN	0	0	0	219	0	0	712	0	32	0	0	3	0	966
BARTHOLOMEW	0	0	0	179	0	0	157	0	18	5	0	0	0	359
BENTON	0	0	0	114	0	6	220	0	31	0	7	0	0	378
BLACKFORD	0	0	0	23	0	13	14	0	5	0	0	0	0	55
BOONE	0	0	0	20	0	3	13	0	31	6	0	0	0	73
BROWN	0	0	1	0	0	0	46	0	0	0	0	0	0	47
CARROLL	0	0	1	42	0	4	157	0	19	0	0	0	0	223
CASS	0	0	0	40	8	0	109	0	9	0	0	3	0	169



- Currently measure impact of assisted conservation practices using the EPA Region 5 Model to calculate Nutrient Load Reductions (NLRs).
  - http://it.tetratech-ffx.com/steplweb/default.htm

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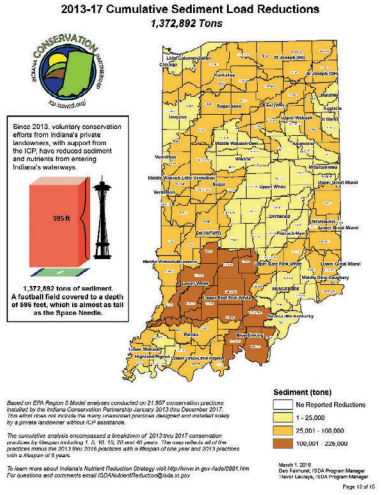
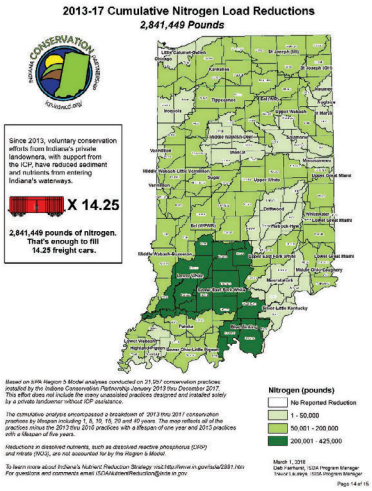
Sediment, Nitrogen, and Phosphorus Reductions

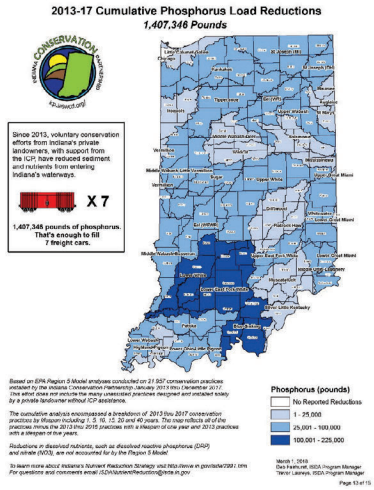
Sediment



Nitrogen



Phosphorus



*All these maps can be found in the 2017 ICP Conservation Accomplishments Report, which can be found on the ISDA website at http://www.in.gov/isda/2991.htm

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What Indiana is missing

- The current method/model used to determine NLRs captures only nitrogen and phosphorus reductions that are tied directly to sediment.
  - Nutrients that are dissolved and carried by runoff waters or snowmelt are not accounted for in this method.
- Therefore, we are missing the dissolved nutrients (nitrate and dissolved phosphorus).
- Also missing practices that can't be run through the Region 5 model due to the practice not being tied to sediment (Ex. nutrient management)

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Strengthening Indiana's Framework for Load Reduction Estimation

- ***Nutrient Reductions from Conservation Practices:*** *A Workshop to Strengthen Indiana's Framework for Load Reduction Estimation*, November 2, 2018

❖ Workshop Purpose

➢ To initiate a discussion in Indiana on ways to strengthen and enhance our existing method of capturing sediment and nutrient load reductions, and to include capturing dissolved nutrients, as well as find a potential path for moving forward.

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Goals and Outcomes from the Workshop

- Determine how we can capture nutrient load reductions for the dissolved components.
- Better model our nutrient load reductions from conservation practices, and better determine the impact of various practices on water quality.
- Use this as one of the tools to work toward the development of a Science Assessment for Indiana, to determine the impact of nutrient reductions from various practices on water quality.
- Move towards determining "practice-efficient targeting".

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Development of an Indiana Science Assessment

- Agreed upon at the workshop that Indiana needs a science assessment, and that is it critical for moving Indiana's nutrient reduction strategy forward.

❖ Three main components:

1) Determine loads and establish a baseline load of nutrients leaving the State.

2) Develop a consensus-based strategy for quantifying nutrient reduction from conservation practices, including dissolved nutrients.
   - Expand upon the use of the Region 5 Model that captures sediment-bound reductions

3) Identify practices that are most efficient in reducing N & P loads
   - Collective list and consistent definitions of best management practices
   - Will allow for prioritization of future conservation efforts: "Practice-efficient targeting"

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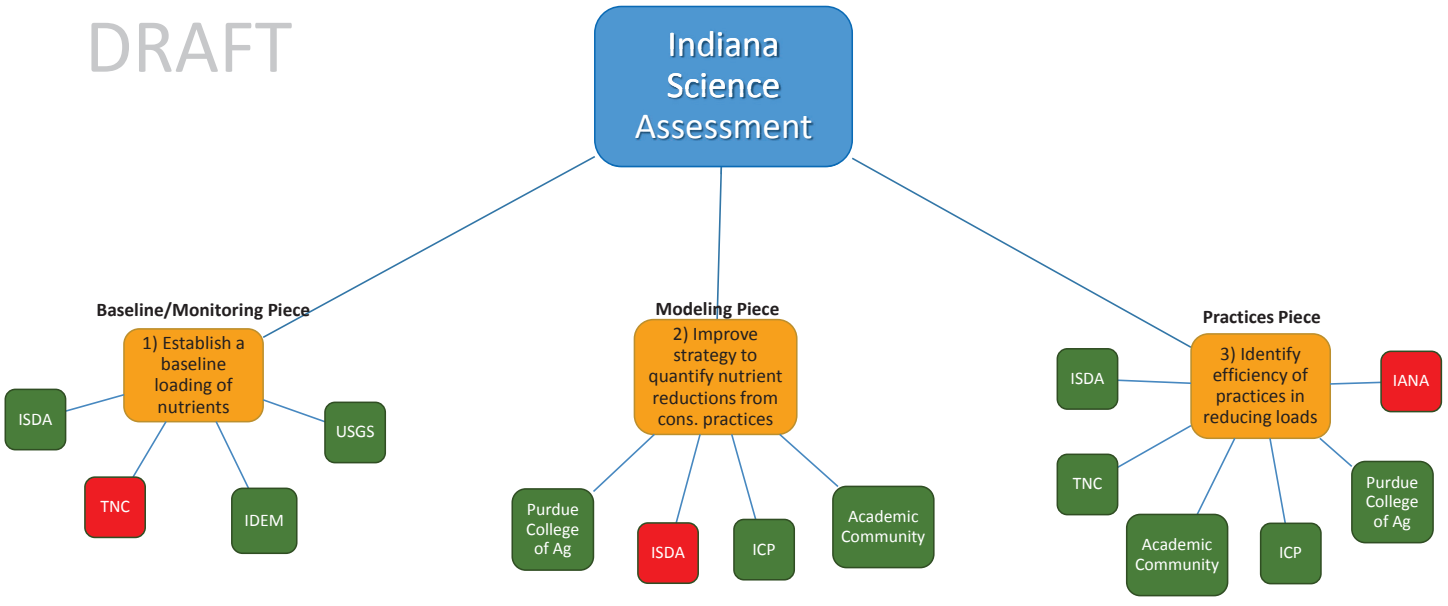


NPS Measurement Framework: Arkansas

Gulf of Mexico Hypoxia Task Force Meeting

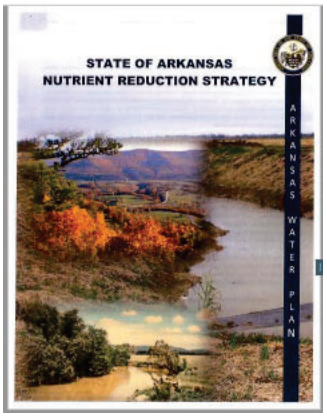
Baton Rouge, LA
May 16, 2019

J. Ryan Benefield, P.E., Arkansas Natural Resources Commission

Goal

- To develop an Arkansas specific measurement framework and consensus on expected nutrient reduction efficiencies associated with individual and suites of best management practices.

- The identification of practices needing additional research for future refinements of the framework.



Approach

- Expert Panel of 25
  - Federal Agencies (EPA, USDA-NRCS, USDA-ARS)
  - State Agencies (ANRC, ADEQ)
  - State Universities (UA, UACES, ASU)
  - NGO(IRWP, TNC, ARFB)

- 2 Meetings(and many emails)
  - 4 Hour Planning Meeting
  - 2 Day Offsite Retreat
  - Final Report

Practice Suites and Individual Practices

Practice Suite
Irrigation Water Management Practices Suite
Tailwater Recovery Practices Suite
Reduced Irrigation Water Use Practices Suite
Row Crop Soil Nutrient Management Practices Suite
Conservation Tillage and Cover Crop Suite
Pasture Management Practices Suite

Individual Management Practice
Prescribed Grazing
Stream Exclusion/Access Control
Watering Facility
Heavy Use Area Protection

Individual Management Practice
No-Till/Conservation Tillage
Cover Crops
Nutrient Management Plan
Tailwater Recovery System
Forested Riparian Buffer – Cropland
Forested Riparian Buffer – Pasture
Grassed Riparian Buffer – Cropland
Grassed Riparian Buffer – Pasture
Warm/Cool Season Grasses

Research Needs

- Streambank Stabilization/restoration and riparian buffers
- Timber management practices
- 2-stage ditches
- Irrigation management practices, including tailwater recovery systems and PipePlanner/PHAUCET
- Variable Rate fertilizer application

Lessons Learned

- The numbers will be wrong but very useful.
- Scientists take time to get used to the concept of “Best Professional Judgement”.
- Folks in Arkansas will debate for an hour over 2-3 percentage points of phosphorus reductions.
- Completing the framework is easy compared to gathering the data necessary to adequately report the nutrient reductions.
- The framework will need to be regularly updated and improved.

IOWA DEPARTMENT OF NATURAL RESOURCES

LEADING IOWANS IN CARING FOR OUR NATURAL RESOURCES

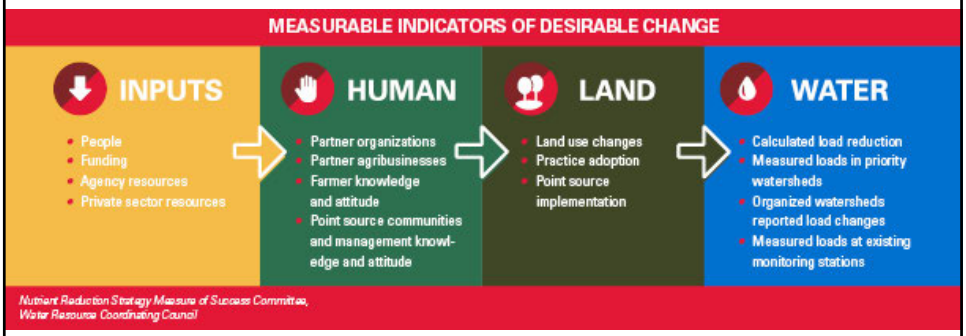
Mapping Conservation Practices Through GIS Surveys

Adam Schnieders
Water Quality Resource Coordinator
adam.schnieders@dnr.iowa.gov
515.238.0551

What you can learn about today!

- Project Background
- What practices can be mapped
- How are these practices mapped
- Benefits lightning round!!

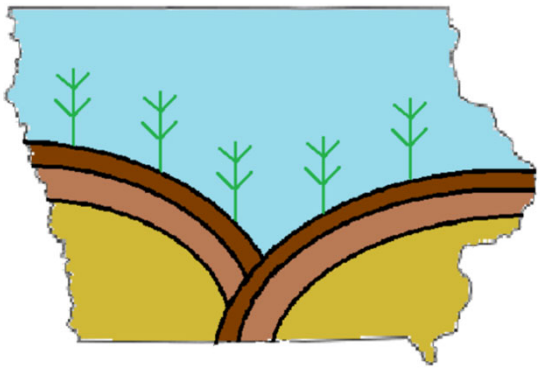
How do you know when the Nutrient Reduction Strategy is successful?



Project Background

- Who?
  - Iowa Department of Natural Resources
  - Iowa Nutrient Research Education Council
  - Iowa Department of Agriculture and Land Stewardship
  - Iowa State University
- What?
  - Map conservation practices across the state using the state LiDAR imagery
- How?
  - ISU students at the GIS Laboratory (3+ years of work to date)
- Cost?
  - ~$600,000 either billed or committed to date

What BMPs can be mapped?



The “Plus” in the 4R Plus

GRASSED WATERWAYS

Definition: Shaped, constructed channels seeded to grass or other vegetation to direct water to a stable outlet.

Why use grassed waterways:

- Protect field from gully erosion
- Slow down runoff water and channel to an outlet
- Trap sediment and nutrients in vegetation

CONTOUR FARMING

Definition: Contouring means farming with row patterns around hills, not up and down hills. Rows form small dams that slow water flow, increase infiltration and reduce erosion.

Why use contour farming:

- Reduces sheet and rill erosion
- Decreases transport of sediment and nutrients
- Increases water infiltration

CONTOUR BUFFER STRIPS/PRAIRIE STRIPS

Definition: Strips of grass or grass/legume mix that run along the contour of a farmed field. They alternate down the slope of a field with wider cropped strips.

Why use contour buffer strips or prairie strips:

- Reduce sheet and rill erosion
- Sediment, nutrients, and pesticides are removed from the runoff as they pass through the strips
- Can be used for forage production
- Provide habitat for wildlife

TERRACES

Definition: Earthen embankments constructed across a field slope following the contour that break long slopes into shorter ones.

Why install terraces:

- Reduce erosion by reducing slope length
- Reduce the development of gullies
- Retain runoff for moisture conservation
- Trap phosphorus attached to sediment particles

PONDS

Definition: Pond are pools of water formed by a dam or pit. There are two types of ponds – embankment ponds, which are made by constructing an embankment, and excavated ponds, which are formed by excavating a pit.

Why install a pond:

- Prevents soil erosion by eliminating gullies
- Protects water quality by collecting and storing runoff water and nutrients
- Provides water for livestock, fish and wildlife, irrigation, recreational opportunities

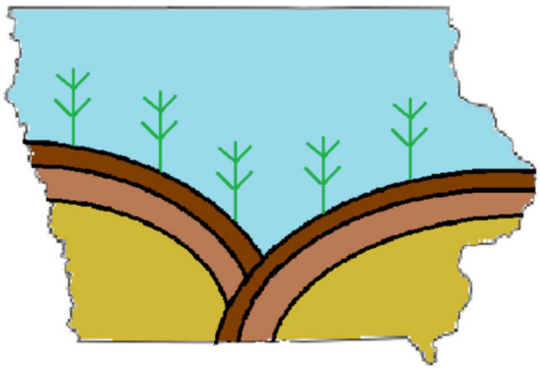
WATER AND SEDIMENT CONTROL BASINS

Definition: An earth embankment or a combination of ridges and channels constructed across the slope to form a sediment trap and water detention basin with a stable outlet.

Why install water and sediment control basins:

- Slow water movement
- Reduce gully erosion
- Trap sediment and nutrients
- Reduce and manage onsite and downstream runoff

How are these BMPs mapped?



We Have the Technology….

TERRACES

Definition: Earthen embankments constructed across a field slope following the contour that break long slopes into shorter ones.

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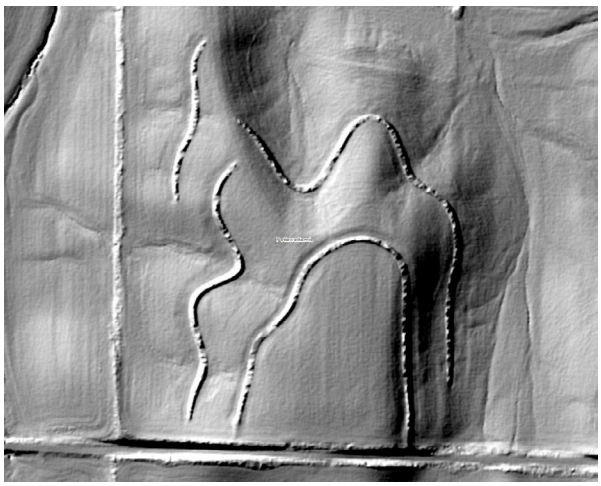
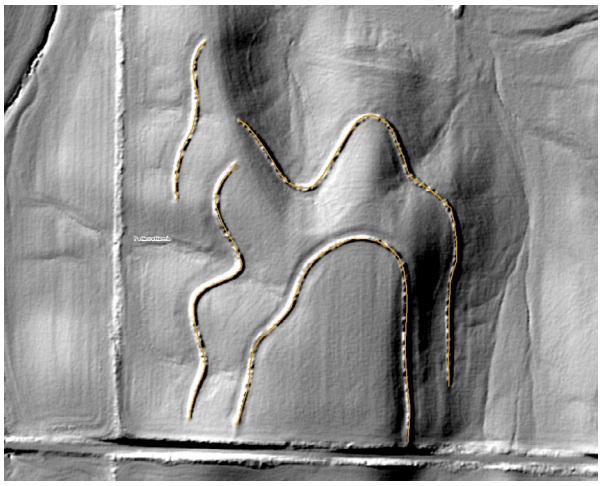
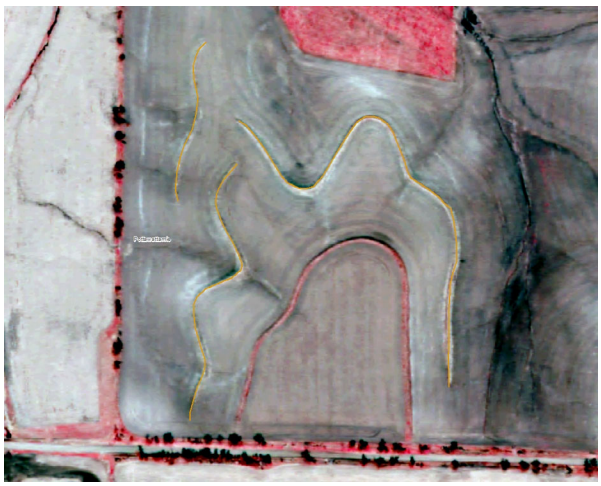
LiDAR



LiDAR with lines



CIR



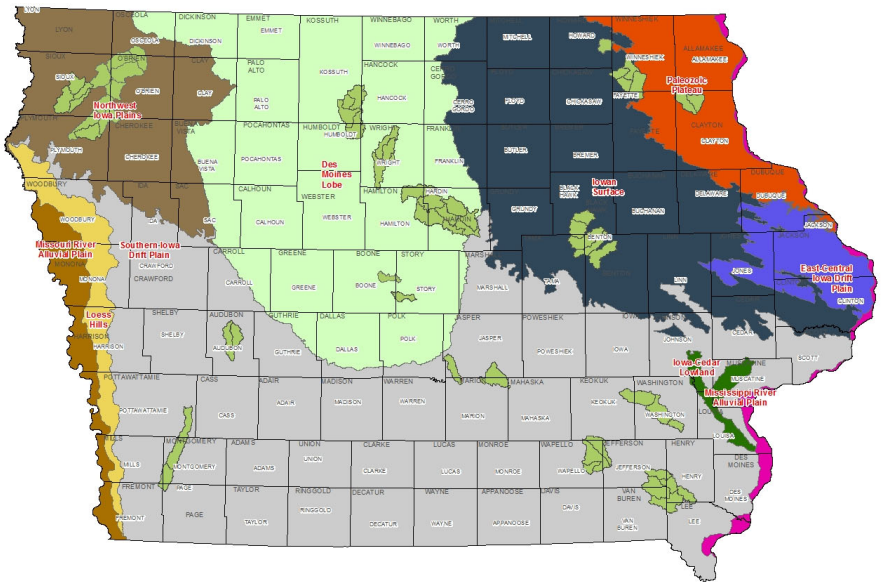
NAIP with lines

Benefits to mapping structural BMPs

- Establish a baseline to compare future progress to
- Estimate nutrient load reduction
- Estimate conservation investment
- Show historical progress over time and in future
- Evaluate saturation level of BMPs in watershed
- Improved modeling estimates
- Verify ACPF Tool results and streamline BMP implementation

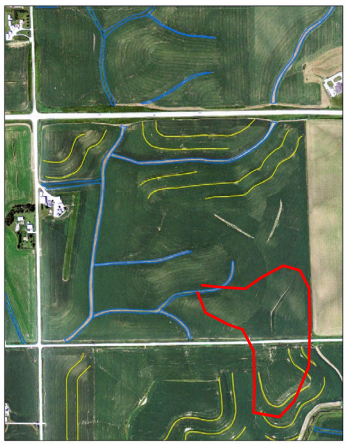
Benefits continued…

- Provides a uniform, consistent database to work from for the whole state
- Serve as an educational tool (right practice in the right place)
- Statewide picture – not just one program like CRP
- Not just cost-share, but overall progress over time
- Blind to private or public investment
- State vetted

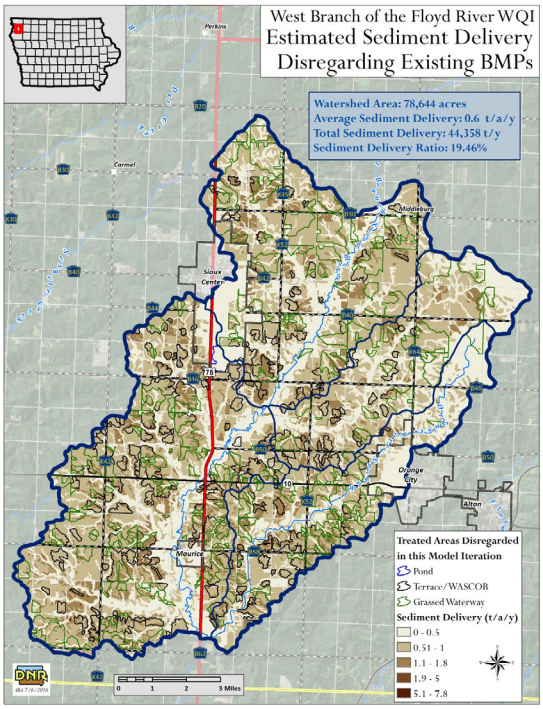


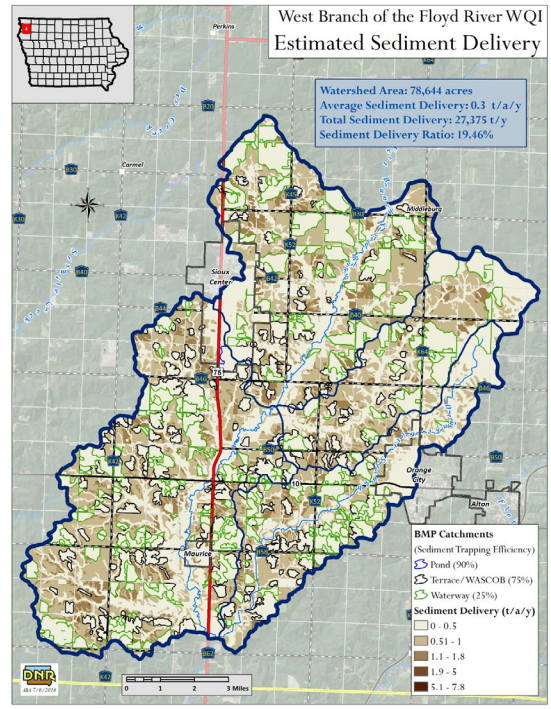
Can track new BMPs using Annual Photography

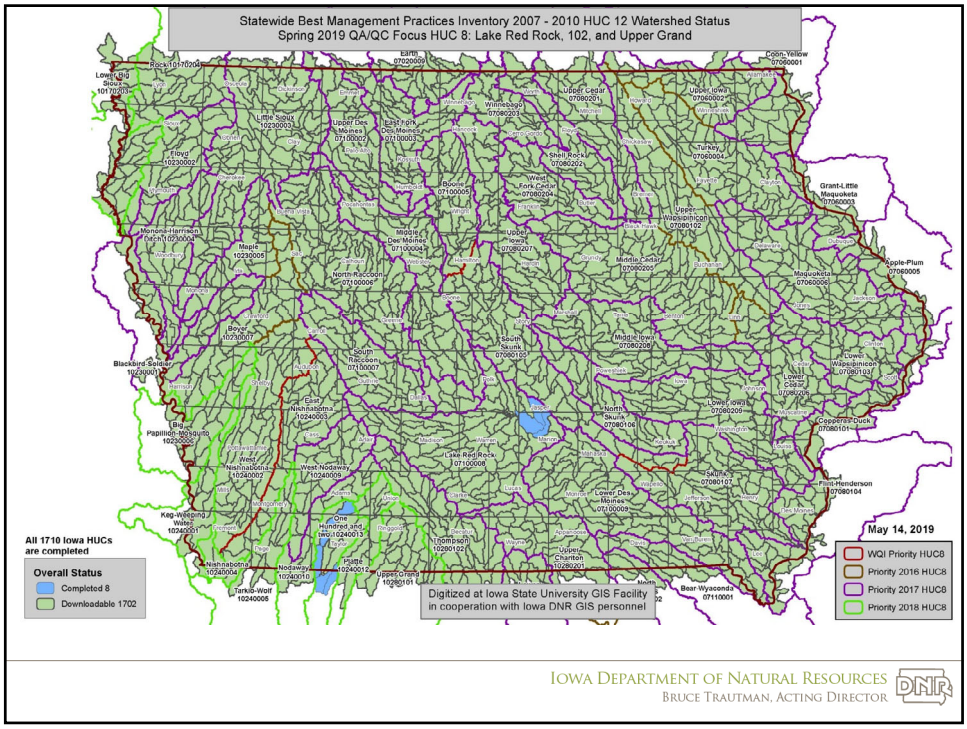
BMPs mapped from LiDAR



New terraces visible on 2011 photography







IOWA DEPARTMENT OF NATURAL RESOURCES
BRUCE TRAUTMAN, ACTING DIRECTOR

BMP Mapping Summary for Iowa (as of June 7, 2018)

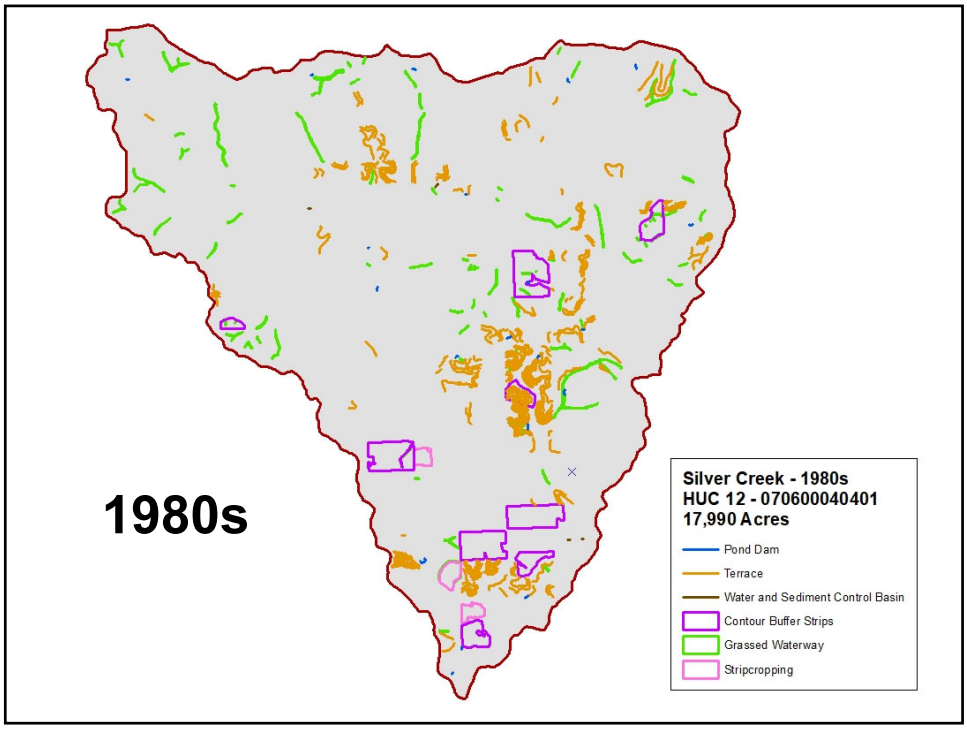
	HUC 12 Mapped	Pond Dams (number)	Grassed water ways (acres)	Terraces (number)	Terraces (miles)	WASCOBs (number)	WASCOB (miles)	Contour Buffer Strips (acres)	Strip cropping (acres)
Total	1,712	114,423	327,904	506,172	88,874	246,139	12,555	557,731	109,872

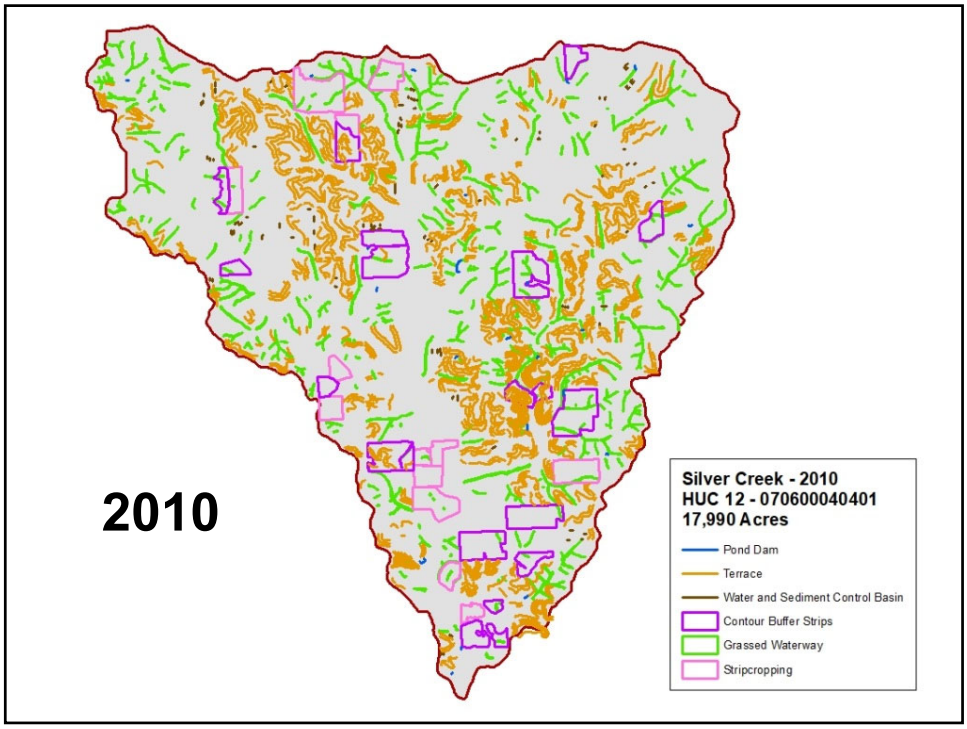
Conservation Investment To Date

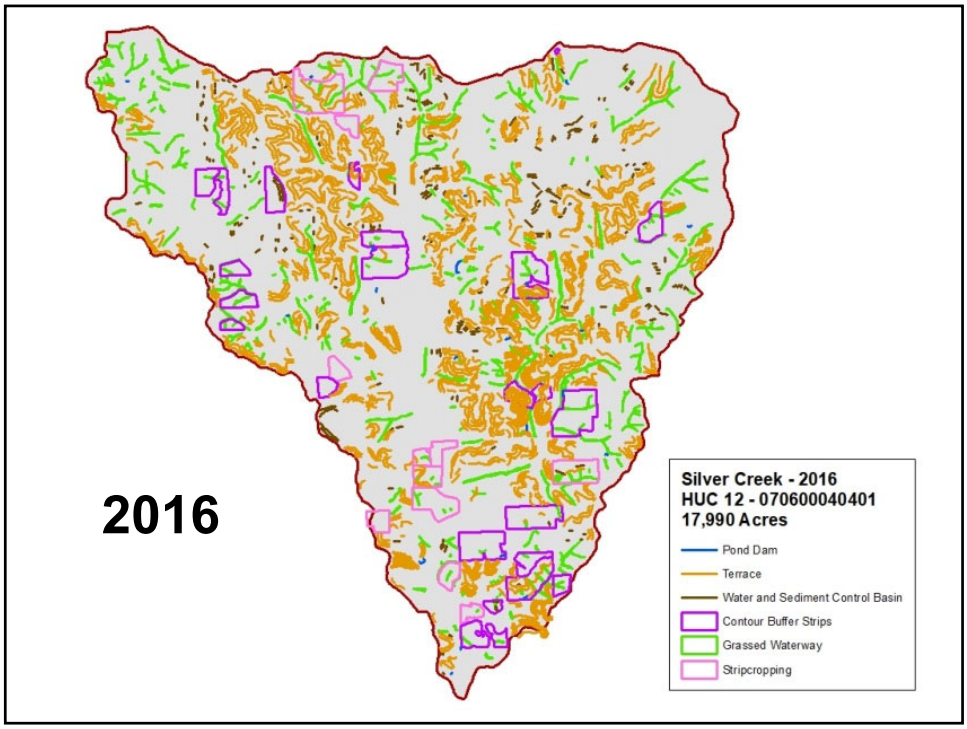
- State finalized (~36,000,000 acres)

grassed waterways	= $1,317,000,000
terraces	= $2,116,000,000
WASCOBs	= $ 787,000,000
Ponds	= $2,002,000,000
Total	= **$6,224,000,000**

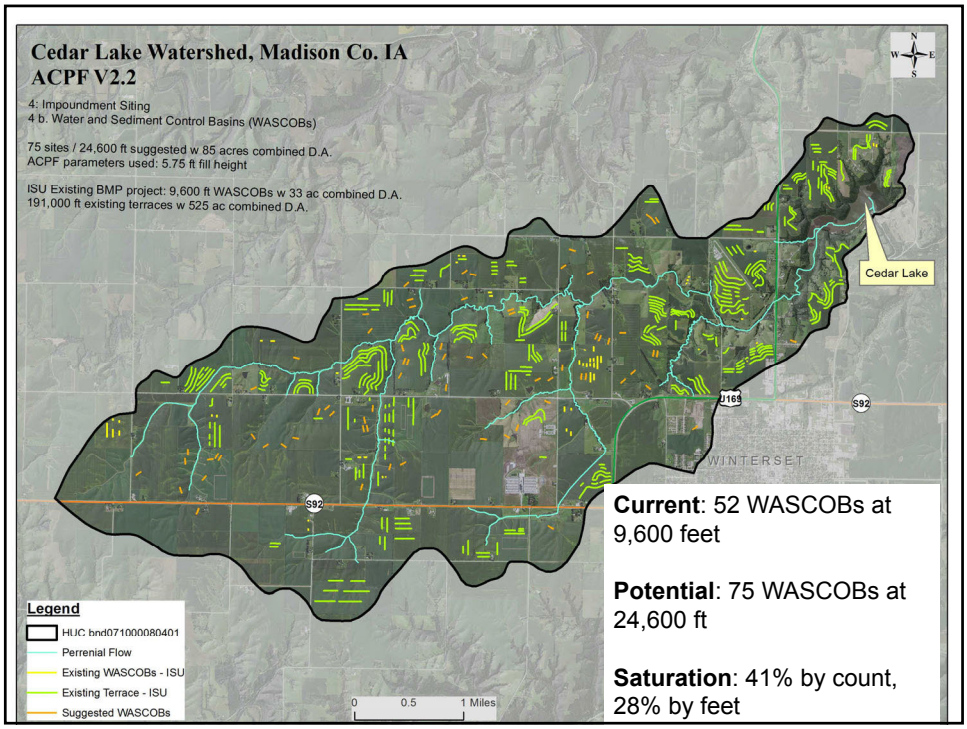
~$3,600,000 per HUC12 watershed


1980s
Silver Creek - 1980s
HUC 12 - 070600040401
17,990 Acres
Pond Dam
Terrace
Water and Sediment Control Basin
Contour Buffer Strips
Grassed Waterway
Stripcropping

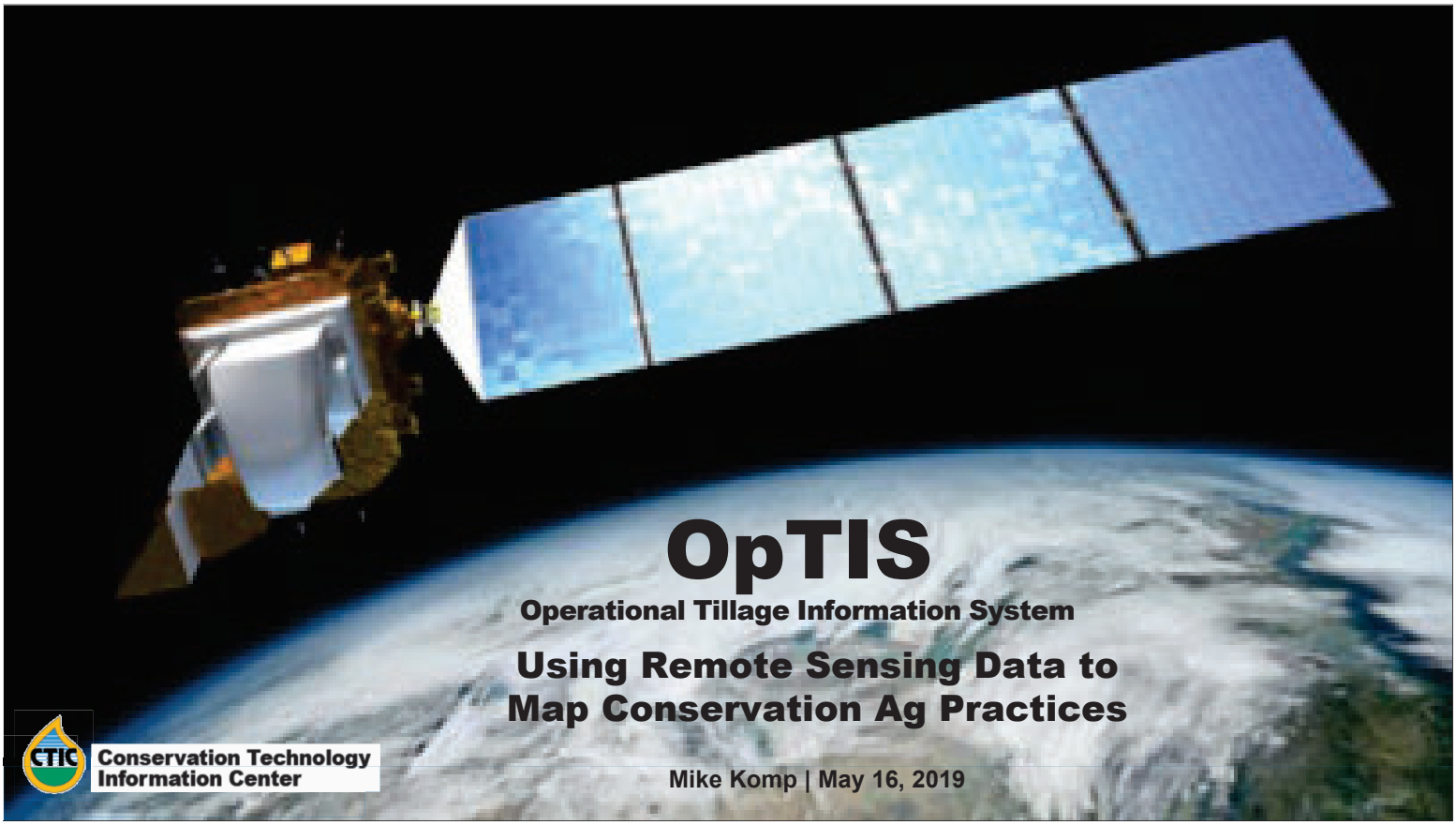

2010
Silver Creek - 2010
HUC 12 - 070600040401
17,990 Acres
Pond Dam
Terrace
Water and Sediment Control Basin
Contour Buffer Strips
Grassed Waterway
Stripcropping



Practice	1980s	2010	2016	Gain/Loss 80s-2016	% Change 80s-2016	Rate Change/ Yr 80s-2010	Rate Change/ Yr 2010-2016	Rate Change/ Yr 80s-2016
Ponds	20	22	21	1	5%	0.1	-0.2	0.0
Terraces (miles)	41	135	155	114	276%	3.1	3.4	3.2
WASCOBs (miles)	0.1	2.8	11.9	11.8	8400%	0.1	1.5	0.3
Grassed Waterways (ac)	78	298	251	172	219%	7.3	-8.0	4.8
Contour Buffers (ac)	551	1022	1101	549	100%	15.7	13.2	15.3
Stripcropping (ac)	75	633	580	505	674%	18.6	-8.8	14.0



Artificial Intelligence Opportunities



OpTIS

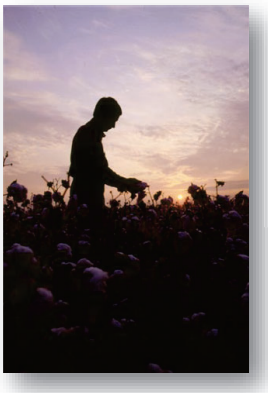
Operational Tillage Information System

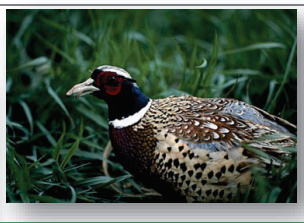
Using Remote Sensing Data to Map Conservation Ag Practices

Conservation Technology Information Center

Mike Komp | May 16, 2019

CTIC: The Mission





CTIC connects, champions and provides information on sustainable agricultural systems and technologies that are productive, profitable and preserve natural resources.

OpTIS: Multiple Past & Current Co-Sponsors

Outline

What is OpTIS?

Next steps

Possible applications

OpTIS: What is it?

Applied · Geosolutions

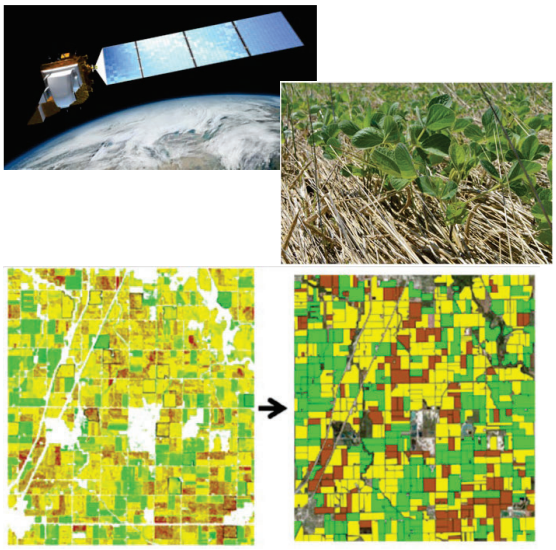
Technology from Applied GeoSolutions

Uses publicly-available remote sensing data to map & monitor adoption of tillage practices and cover crops

Multi-scale: field (not-released), HUC8, Crop reporting district

Temporal comparisons

Data available (FREE!) at www.ctic.org

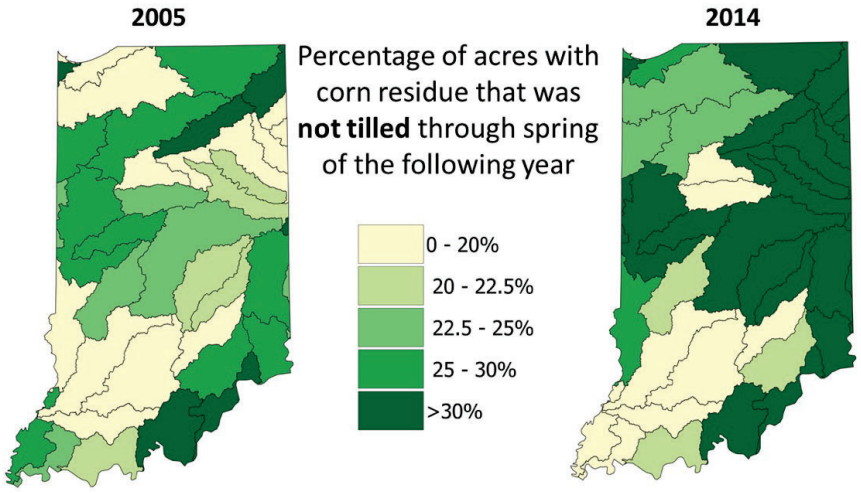


OpTIS: Indiana Pilot

Verified OpTIS automa processing method fo an important ag state

"Ground-truthed" usin 10 years of CRM-style tillage-transect data (2005-2014)

Report available at www.optis.ags.io



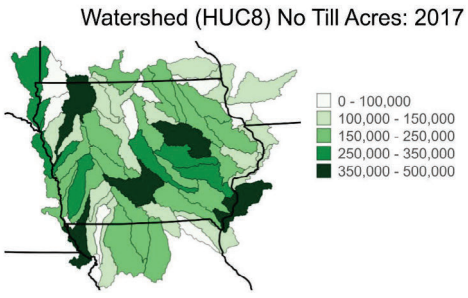
OpTIS Data: Details

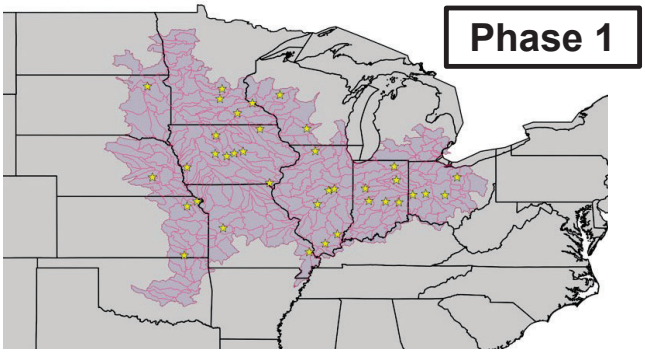
CRM Survey Data (Legacy)	No-Till	Ridge-Till	Mulch Till	Reduced Tillage *(low residue)*	Conventional Tillage
Residue Level	>30%			15-30%	<15%
	Conservation Tillage				
NRCS (approximate)	329	345			
OpTIS	No-Till	Reduced Tillage (Corn) No-Till (other crops)		Reduced Tillage *(low residue)*	Conventional Tillage
Residue Level	>50%	30-50%		15-30%	<15%
	Conservation Tillage				
NRCS (approximate)	329	345			

Data reported by previous year's crop (corn, soy, small-grain, other)
Land not planted to row crops (e.g. pasture) is excluded

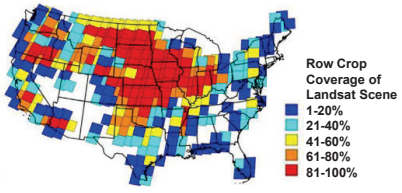
OpTIS: Next steps

Phase 1: Corn Belt 2005-2017 (Summer 2019)





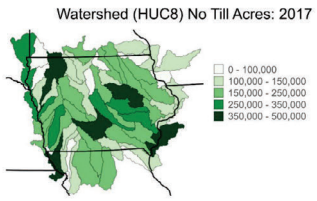
Phase 2

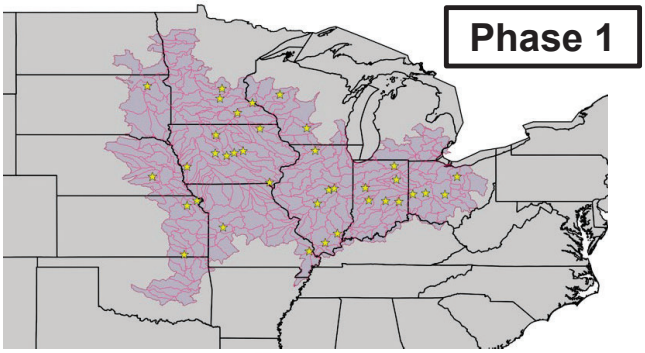


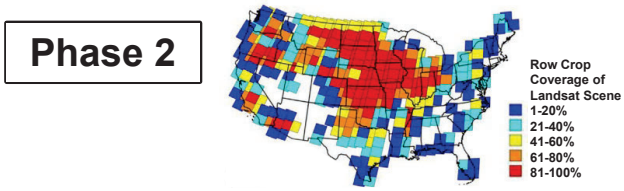
OpTIS: Next steps

Phase 2: Nationwide (TBD)

N-Gage: **Utilize OpTIS data to support water quality trading within the MRB**







OpTIS: Other opportunities

Measure **Soil Health** baselines and trends

Input to **Water Quality** models (local and basin-scale)

Input to Biogeochemical models (e.g. DayCent, DNDC, etc.) to estimate **GHG** emissions and changes in **Soil Carbon**

Targeting **Conservation** efforts

Provide validation data for **Ecosystem Services Markets**

And many others … (e.g. **Biodiversity**, etc.)

How to learn more

www.ctic.org

Dave Gustafson
314-409-7123
gustafson@ctic.org

Mike Komp
608-886-7599
komp@ctic.org

Gulf Environmental Benefit Fund

May 2019

About Us – National Fish and Wildlife Foundation

Who We Are

- Chartered by Congress in 1984
- 30 member Board appointed by Secretary of the Interior,
  - Includes FWS Director and NOAA Administrator

What We Do

- Sustain, restore and enhance wildlife
- Bring collaboration among federal agencies and private sector

How We Do It

- Leverage public funding with private money – average 3:1

Bald eagle

NFWF is

- An implementer – we fund projects

NFWF is not

- An advocacy organization that engages in lobbying or litigation

How We Do It

Non-Federal Partners
- Corporations
- Foundations
- Private Donors
- Mitigation and Settlements
- States
- NGOs

$

NFWF

Convener of focused, leveraged funding and leadership for priority wildlife and habitat conservation through grant making

$

Federal Partners
- Appropriations
- Cooperative Agreements

Competitive Grants/Strategies

Private Lands | Voluntary | Economic Opportunity

NFWF

About NFWF's Impact-Directed Environmental Accounts (IDEA)

NFWF administers funds designated for specified conservation, mitigation, or restoration purposes arising from judicial and regulatory proceedings, through what it calls Impact-Directed Environmental Accounts (IDEA)

FEDERAL, STATE AND LOCAL ENFORCEMENT FUNDS

- Community Service Payments
- Restitution
- Supplemental Environmental Projects

FEDERAL AND STATE PERMIT MITIGATION FUNDS

- Species (e.g., ESA, CESA, BGEPA)
- Wetlands (e.g., CWA)
- Long-Term Management & Maintenance

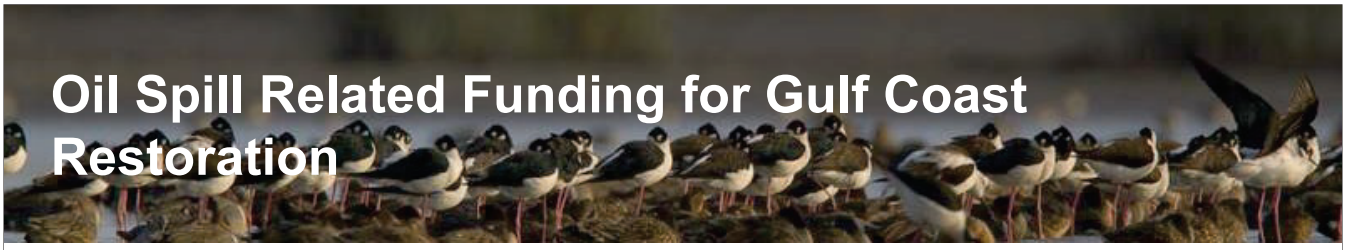
NATURAL RESOURCE DAMAGE FUNDS

OTHER ENVIRONMENTAL BENEFIT FUNDS

NFWF

April 20, 2010

Disaster erupted in the Gulf of Mexico. The Deepwater Horizon explosion and oil spill caused 11 deaths and released an estimated five million barrels of crude oil into Gulf waters, with devastating implications for North America's richest marine ecosystem.



Oil Spill Related Funding for Gulf Coast Restoration

$16.7 Billion Committed

$8.8 Billion

through the Natural Resource Damage Assessment (process focused on restoring natural resources injured by an oil spill)

money can be used for

- Natural resource projects
- Loss of use projects (e.g. compensate for recreational opportunities that were lost because of the spill)

$5.3 Billion

through the RESTORE Act (law that sends money to the Gulf for restoration and recovery)

money can be used for

- Environmental and economic restoration projects
- Research activities

$2.5 Billion

to the National Fish & Wildlife Foundation (nonprofit organization distributing some settlement monies)

money can be used for

- Barrier islands and river diversions (LA)
- Natural resource projects (AL, FL, MS, TX)

NFWF

NFWF

Gulf Environmental Benefit Fund: Key Provisions of Plea Agreements

Photo Credit: Terry Ross

- Funding: NFWF has received a total of $2.54B:
  - $1.27B for barrier island & river diversion projects in Louisiana
  - Remaining funds allocated by formula:
    - 28% each for Alabama, Florida, Mississippi ($356M/state)
    - 16% for Texas ($203M)
- Purpose: Fund projects that remedy harm to the type of natural resources (habitats, species) that were affected by the spill
- Consultation: with State resource agencies, FWS and NOAA
- Timeline: Funds were paid over a 5-year period: 2013-2018

NFWF

Gulf Environmental Benefit Fund: Key Provisions of Plea Agreements

Photo Credit: Terry Ross

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NFWF

Gulf Environmental Benefit Fund: Payment Timetable

	Payment (in millions of dollars)	Louisiana	Alabama	Florida	Mississippi	Texas
Apr. 2013	$158.00	$79.00	$22.12	$22.12	$22.12	$12.64
Feb. 2014	353.00	176.50	49.42	49.42	49.42	28.24
Feb. 2015	339.00	169.50	47.46	47.46	47.46	27.12
Feb. 2016	300.00	150.00	42.00	42.00	42.00	24.00
Feb. 2017	500.00	250.00	70.00	70.00	70.00	40.00
Feb. 2018	894.00	447.00	125.16	125.16	125.16	71.52
Totals	**$2,544.00**	**$1,272.00**	**$356.16**	**$356.16**	**$356.16**	**$203.52**

BP = $2,394M
Transocean = $150M

- $2.544 billion has been received to date
- All funds are now in hand

Photo Credit: thepipe26 (Flickr)

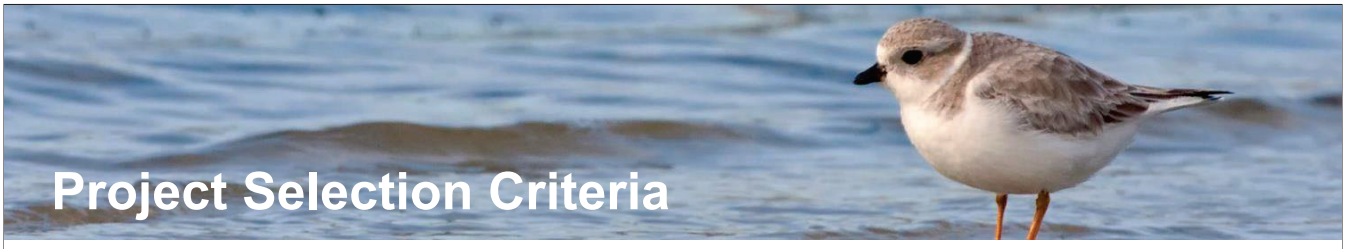
Program Implementation

- Consultation with state and federal resource agencies

  State agencies:
  - Alabama – Department of Conservation & Natural Resources
  - Florida – Fish & Wildlife Cons. Comm. & DEP
  - Louisiana – Coastal Protection and Restoration Authority
  - Mississippi – Department of Environmental Quality
  - Texas – TXPWD, GLO and TCEQ

  Federal agencies:
  - NOAA
  - U.S. Fish and Wildlife Service

- States have established websites for submission of projects
- NFWF to facilitate consensus on project slate



Project Selection Criteria

Required (per plea agreements):

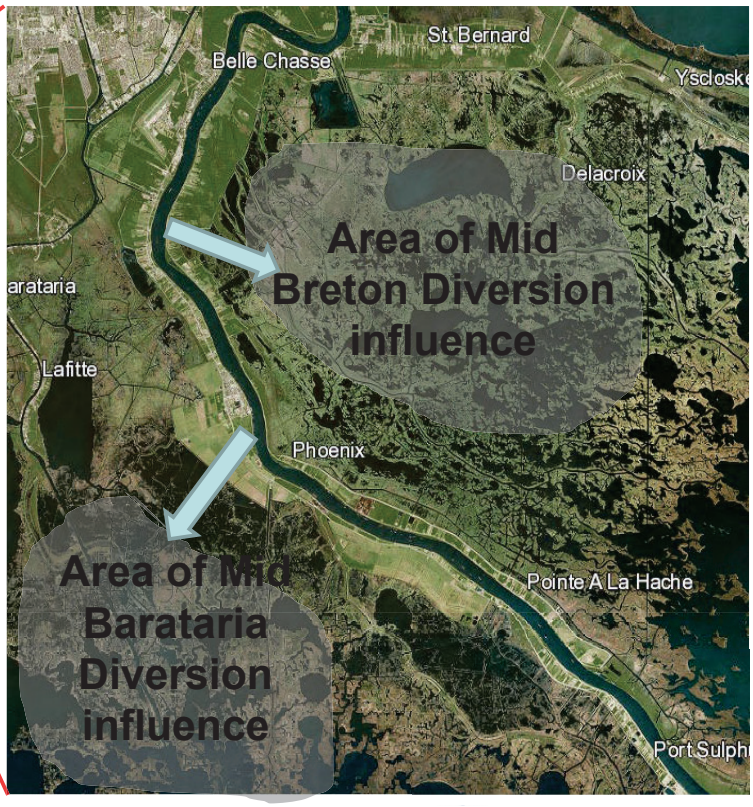
- Remedy harm to the type of natural resources (habitats, species) affected by oil spill
- Projects must occur within Gulf states and waters and be within reasonable proximity to impacts, as appropriate
- Infrastructure only as necessary to restore or protect natural resources
- Louisiana: **barrier island and river diversion projects only**

Other:

- Alignment with restoration plans such as under RESTORE
- Science-based, measurable outcomes
- Cost-effective and potentially leveraged to maximize impact

NATIONAL FISH AND WILDLIFE FOUNDATION NFWF

GEBF in Louisiana – Mid Basin Mississippi River Sediment Diversions



Mid Barataria Sediment Diversion:

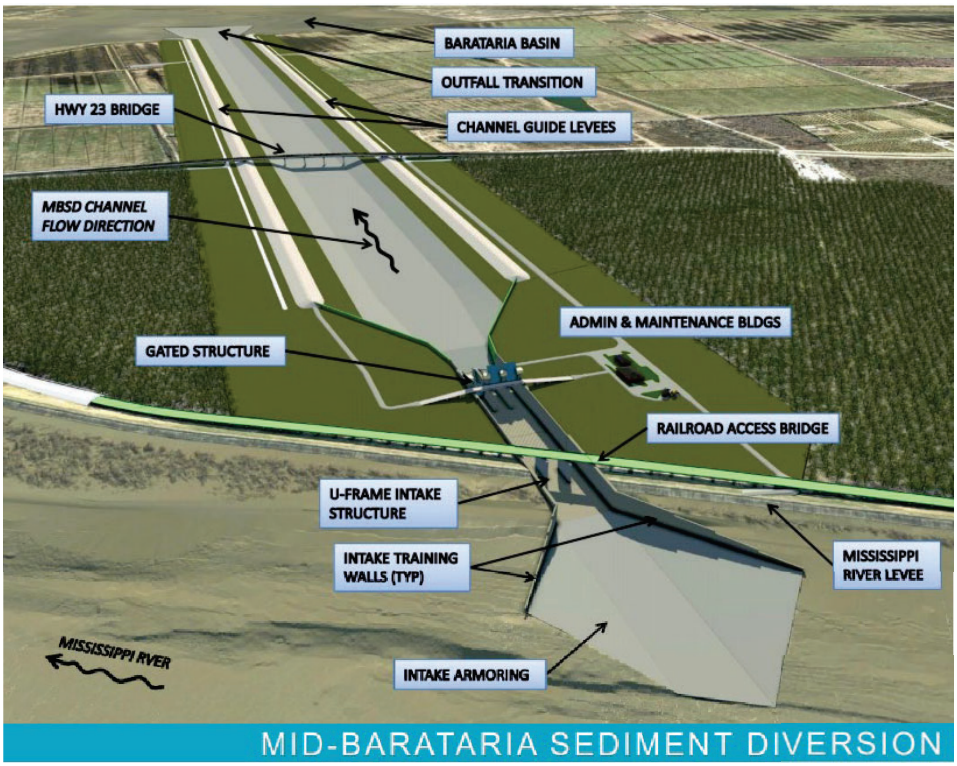
- Expected to build or sustain 24,200 acres (~40mi^2) over 50 years
- Est. cost to construct: $900+M

Mid Breton Sediment Diversion:

- Expected to build or sustain 16,100 acres (~25mi^2) over 50 years
- Est. Total cost to construct: $600+M (NFWF)

GEBF in Louisiana – Design of Mid-Barataria Sediment Diversion Structure

@30% design stage



Current Status: GEBF Projects and Gulf Wide

- **GEBF: $1.29B awarded to date (51%)**
  - 143 projects
  - Leverages $875M for **$2.2B total impact**

- **Other NFWF investments in the GULF: $98.6M**
  - Total impact: $225M w/ match
  - Private lands and longleaf forest conservation
  - Enhanced fisheries management
  - Coastal resilience
  - Inform future GEBF or other investments

- **Other Active NFWF programs in the Gulf and Mississippi River include:**
  - Conservation Partners Program work in Upper Mississippi River Basin
  - Forestland Stewards Partnership work in Mississippi River Valley
  - Acres for America
  - National Coastal Resilience Fund (NOAA)

NFWF

Lessons Learned in Seeking "Nontraditional" Investments in Nonpoint Source Reductions

Hypoxia Task Force Meeting

Steven Rowe, CEO
Newtrient LLC
May 16, 2019

NEWTRIENT™
INNOVATIVE SOLUTIONS IN RESOURCE RECOVERY

NEWTRIENT'S MISSION

Reduce the environmental footprint of dairy and make it economically viable to do so.

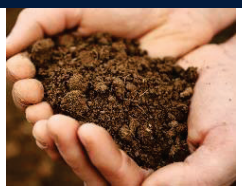
What Newtrient Believes…

the lowest-cost, voluntary environmental benefit should be economically incented by those who have high-cost pollution prevention obligations

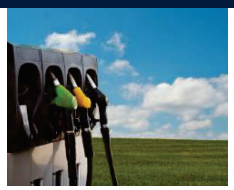
Agriculture (Dairy) Can and Must be Part of the Solution

- Farms help **resolve societal issues** (water pollution, GHG emissions, e.g.)
- Farmers **realize economic benefits** from on-farm, voluntary actions
- Farmers **improve their social license to operate** and increase consumer trust

Valuing the Whole Farm

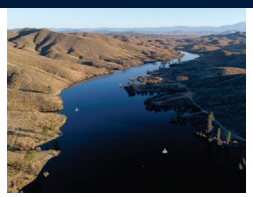


SOIL HEALTH

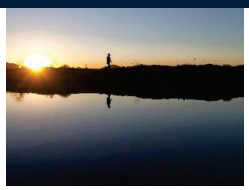


ENERGY

AIR QUALITY, BIODIVERSITY, WEATHER RESILIANCE, RECREATION



IMPROVED WATER QUALITY



WATER QUANTITY CONSERVATION

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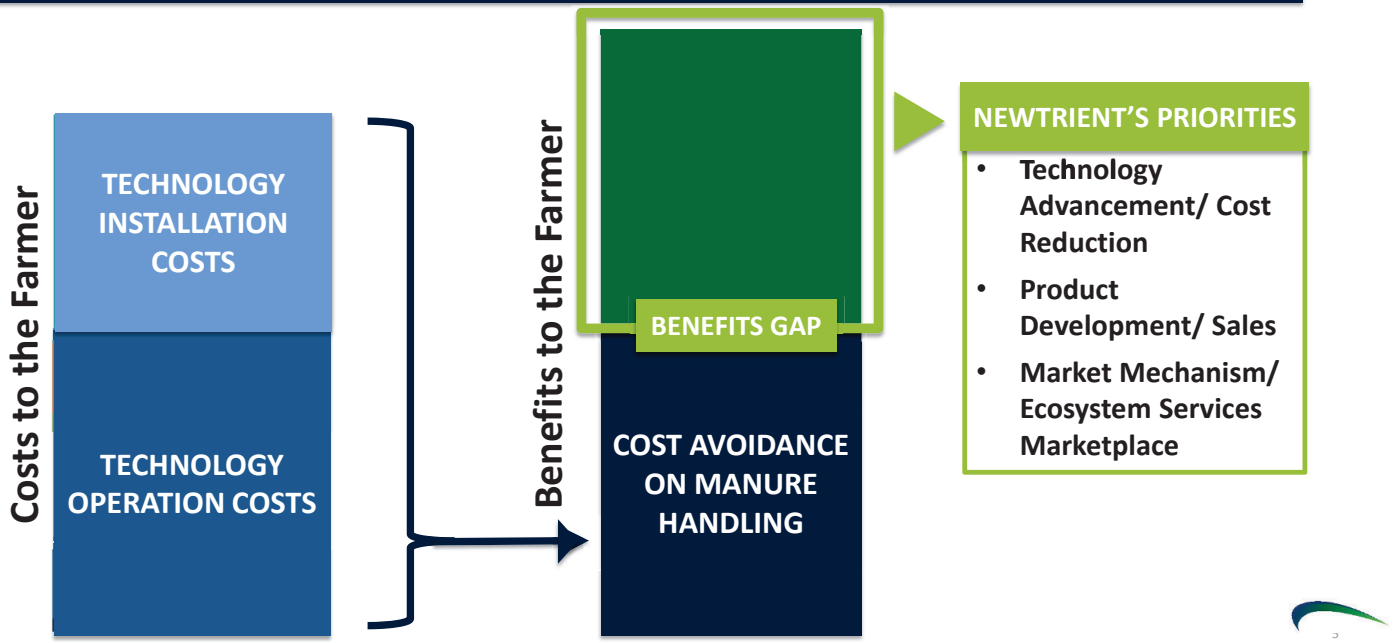
Focus Needs to be on Closing the Economic Benefits Gap

Annual Cost and Benefits Gap of Technology & Practice Adoption

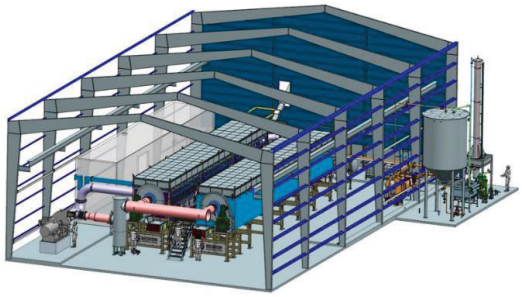


Dairy Technology and Practices Deliver Ecosystem Benefits

Bio-Filtration (Nitrification/Denitrification)

Dissolved Air Floatation (DAF)

Evaporative

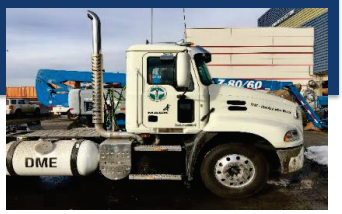


Conservation Buffers

Realistic Revenue Streams from Manure

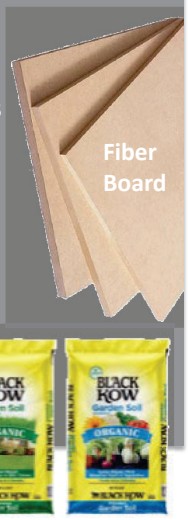
Energy

- Electricity
- Heat
- Renewable Natural Gas
- Aviation Fuel
- Biodiesel
- Hydrogen
- Methanol
- Syngas



Manure-Based Products

- N – Ammonium Nitrate, Ammonium Sulfate
- P – Ammonium Phosphate, Mono ammonium Phosphate
- Compost
- Bedding
- Custom Fertilizer Products
- Worm Castings
- Biochar
- Water
- Cow Pots (fiber
- Magic Dirt (fiber)
- Zeolite
- Struvite
- Digestate algae
- Humus



Environmental Services

- Carbon
- Renewable Identification Numbers
- Low Carbon Fuel Standard
- Renewable Energy Credits
- Nutrient trading: Water quality credits (N & P)
- Other monetizable attributes (e.g. flood control, water quantity management)
- Soil health attributes

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Most Promising Ecosystem Service Markets Today

ECOSYSTEM SERVICES

RENEWABLE ENERGY
WATER QUALITY
WATER QUANTITY
AIR QUALITY
GHG REDUCTION
CARBON SEQUESTRATION
SOIL HEALTH
RECREATION
WEATHER RESISTANCE
BIODIVERSITY

ECOSYSTEM SERVICES BUYERS

REGULATED

MUNICIPALITIES
PERMIT HOLDERS
STATES

NON-REGULATED

NON GOVERNMENTAL ORGANIZATIONS
PHILANTHROPISTS
COMPANIES WITH CORPORATE SOCIAL RESPONSBILITY (CSR) GOALS
INVESTORS

Market-Based Programs Surging Globally

"Global market for ecosystem services surges to $36-42 billion in annual transactions"

"over 550 programs are active worldwide"

"watersheds has the largest volume of global transactions, with $24.7 billion in transactions annually"

UCLA nature sustainability The global status and trends of Payments for Ecosystem Services; James Salzman, Genevieve Bennett, Nathaniel Carroll, Allie Goldstein & Michael Jenkins https://www.nature.com/articles/s41893-018-0033-0

Years of Water Quality Market Attempts

Kieser & Associates, LLC

How do Market-based Solutions Flourish?

National Support Opens Window of Opportunity for Dairy

USDA EPA United States Environmental Protection Agency

December 2018

USDA, EPA Partnership Supports Water Quality Trading To Benefit Environment, Economy

https://www.epa.gov/newsreleases/usda-epa-partnership-supports-water-quality-trading-market-based-and-other-collaborative-approaches-address

EPA United States Environmental Protection Agency

February 2019

EPA Announces New Water Quality Trading Policy Memorandum

EPA efforts seek to modernize the agency's water quality trading policies to leverage emerging technologies and facilitate broader adoption of market-based programs

Creating Ecosystem Services Markets Across the U.S.

NEWTRIENT

Key Takeaways

- Food and the environment is an “AND” obligation, not an “OR” choice
- Let natural science, social science and sound economics be our guide
- Any improvement is good – Precisely wrong is okay so long as the path is directionally correct
- Positive drivers drive fast change
- “Demand” drives the economic incentives and thus an effective marketplace
- Buyers require certainty. Sellers require predictability.

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Lessons Learned in Seeking “Nontraditional” Investments in Nonpoint Source Reductions

Steven Rowe
CEO, Newtrient
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NEWTRIENT
INNOVATIVE SOLUTIONS IN RESOURCE RECOVERY

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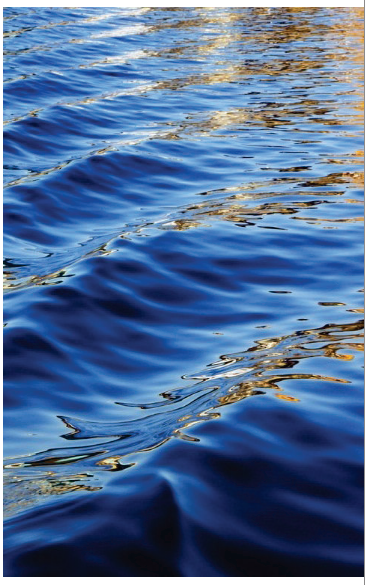
Land Grant Universities Working Collaboratively with the Hypoxia Task Force

Beth Baker, Mississippi State University
Baton Rouge, LA



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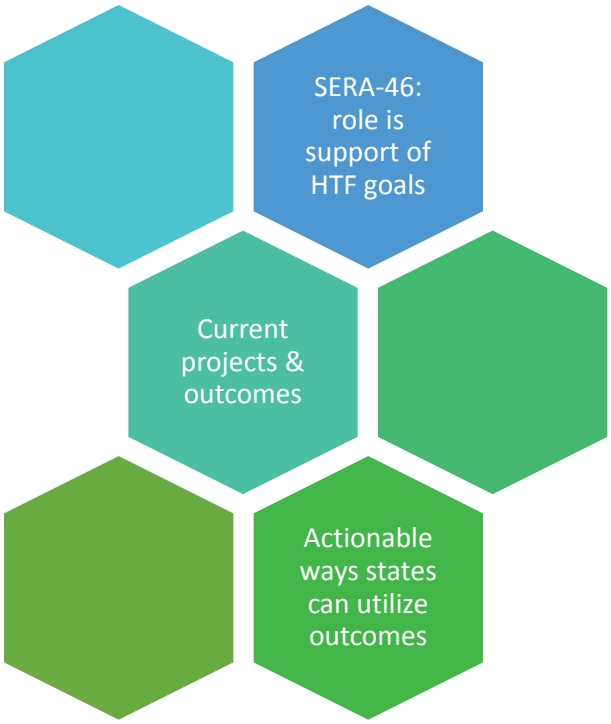
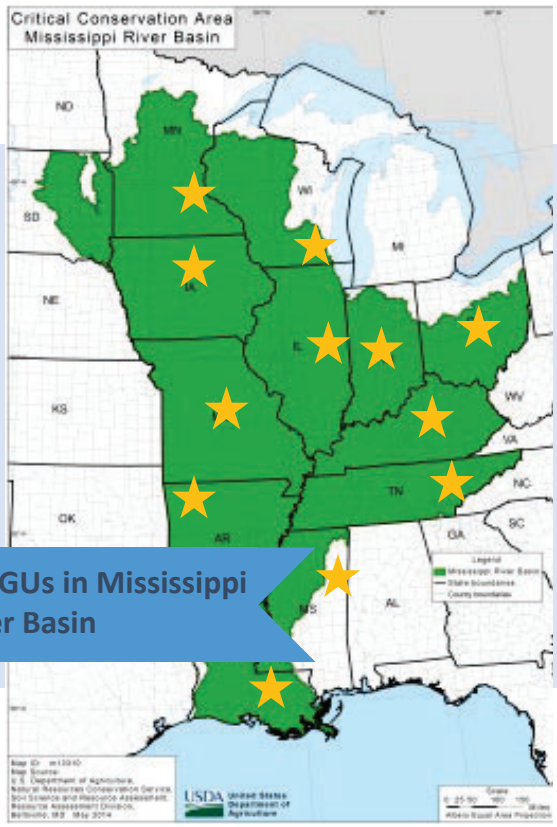
Overview





12 LGUs in Mississippi River Basin

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USDA-NIFA coordinates multistate efforts via regional committees

Strong linkage/coordination with Hypoxia Task Force

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SERA-46 Goal

Promote effective implementation of science-based approaches to nutrient management/conservation that reduces nutrient losses to the environment.

Strategies to move the needle on nutrient reduction

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1. ***Strengthening Networks***
2. ***Conservation Systems Research and Outreach***
3. ***Monitoring and Tracking of Progress***

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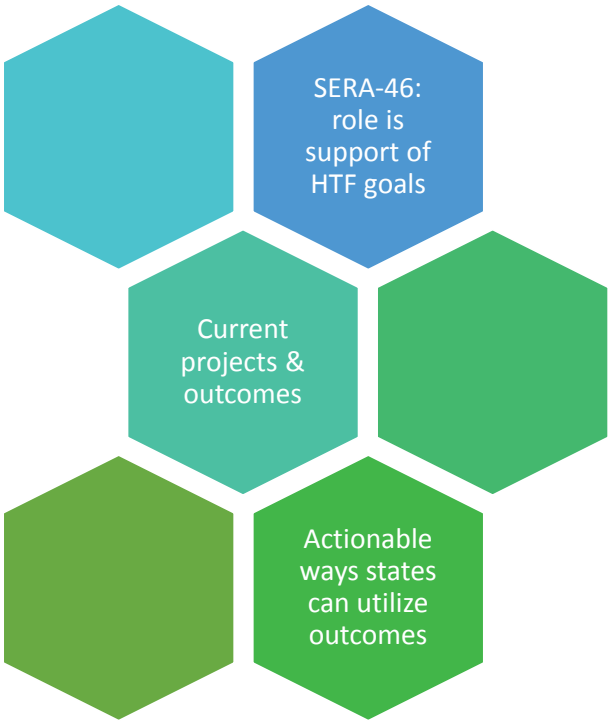

Building Capacity For Watershed Leadership

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Project Goals:

- Strengthen relationships among watershed leaders, agricultural leaders, and state and federal agencies
- Expand the knowledge base by coupling high-quality agricultural and watershed management research with practice-based knowledge of farmers, farm advisors and watershed leaders
- Improve coordination and delivery of educational and engagement programming

Building Capacity For Watershed Leadership

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Primary Deliverables:

- Needs assessment of watershed training programs that cultivate farmer and farm advisor leadership in N and P use for water quality.
- 2 watershed leadership summits that brought state and federal agencies, local conservation districts, universities, NGOs, farmers, farm advisors, commercial shrimpers, and others together to learn from one another about hypoxia, water quality and nutrient management.
- Engaging pilot watersheds in Ohio (Upper Scioto) and Arkansas (Beaver Lake)
- Working on expanding training

https://northcentralwater.org/files/2019/03/MARBreport-2-2019-FINAL.pdf

May 2019 Hypoxia Task Force Meeting, Baton Rouge, LA

Civic Engagement and Environmental Stewardship in the MARB Area

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Project Overview:

- Developing civic engagement measures to assess and encourage non-government stewardship of state-level nutrient reduction strategies. Through funding provided by EPA and GOMA.

Primary Objectives:

- Continue active facilitation of the work group
- Facilitate a series of webinars and conference calls that will culminate in an applied research symposium focused on civic engagement considerations and opportunities related to nutrient reduction
- Develop and release a synthesis report with recommendations and next steps
- Expand website (Human Dimension in Water: to incorporate civic engagement materials and products

Walton Family Foundation – Conservation Practice Tracking

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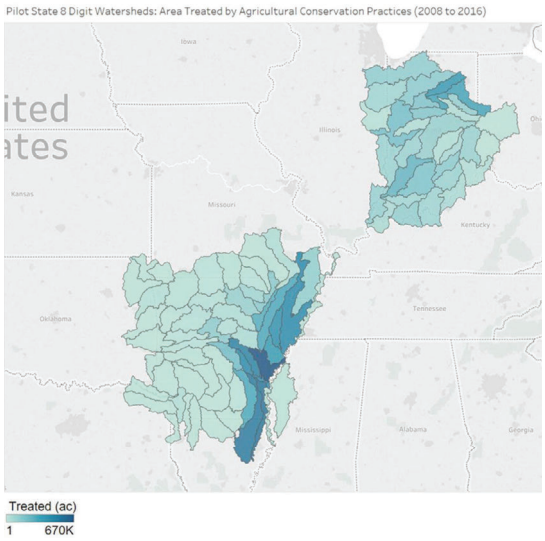
Project Overview:

- The embodiment of the Non-Point Source Measures Workgroup report recommendations
- Extension of NRCS compiled conservation practice data

Primary Objectives:

- Consistent story across member states
  - Focus on water quality related conservation practices



NPS Measures Workgroup Report: https://www.epa.gov/sites/production/files/2018-05/documents/nps_measures_progress_report_1-_may_2018.pdf

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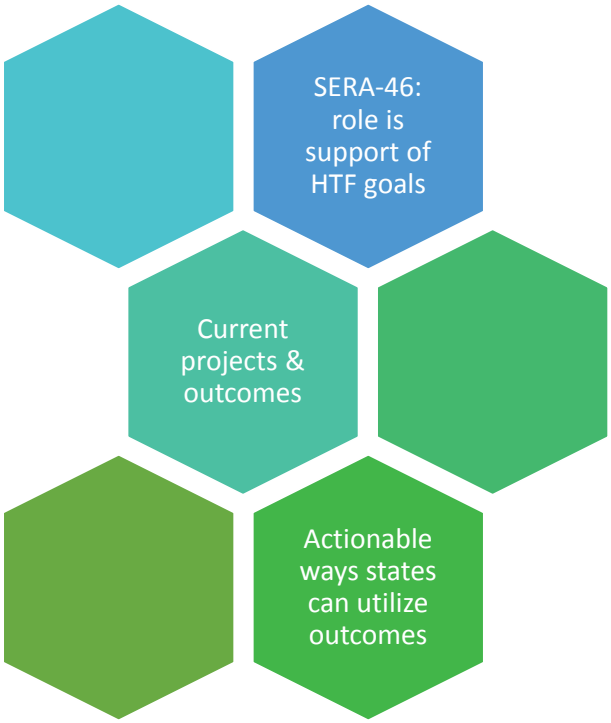

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Building Capacity For Watershed Leadership

Actionable ways states can utilize/apply outcomes:

- Review needs assessment for ideas on increasing farmer and farm advisor leadership on nutrient management for water quality
- Share needs assessment
- Encourage folks from your states to use the MARB listserv (join-marb-leaders@lists.wisc.edu) and learn from leaders in other states
- Provide feedback on new training modules when they are drafted
- Thank you to all of you that participated in the summits!

Civic Engagement and Environmental Stewardship in the MARB Area

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3 major outcomes:

- Established and facilitated active work group
- Facilitated the "Applied Research Symposium: The Social Dimensions of Nutrient Reduction" and Developed and released "Social Indicators to Accelerate the Implementation of Nutrient Reduction Strategies Synthesis Report."
- Established website: Human Dimension in Water: Website linked here!

Actionable ways states can utilize/apply outcomes:

- Maintain and expand collaborative network created by the project
- Support the creation of a programmatic research program on ECE: initiate a data collection pilot program on already identified priority watersheds in the lower-MARB area

Walton Family Foundation – Conservation Practice Tracking

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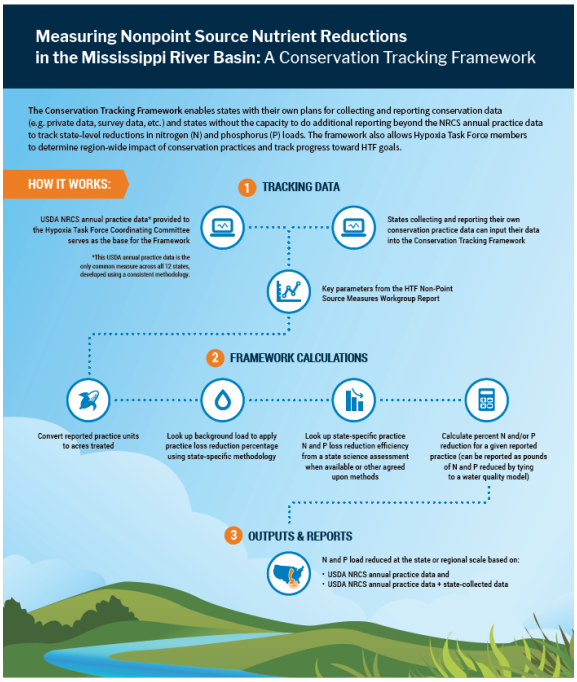
Major Outcomes (thus far)

- Draft framework with compiled NRCS conservation practice database
  - Estimate cumulative acres treated by water quality conservation practices **over time**
- Conservation Practice based science workshops in Arkansas and Indiana
- Infographic highlighting steps of framework
- Lessons learned about data availability and quality
- Pilot states were Indiana and Arkansas
- Working with Illinois, Kentucky, and Minnesota for phase 2
  - Filling data gaps, reviewing data sources, and supporting science assessments



For More Information

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http://northcentralwater.org/sera-46/

https://www.epa.gov/ms-htf/hypoxia-task-force-partnerships

Thank You!

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