

# **Landscape Conservation Cooperatives (LCCs) Integrate Basin-Wide Challenges from Grassland Birds to Pallid Sturgeon... and Gulf Shrimp**



LCC Contacts: Gwen White, Science Coordinator  
and dozens of other agencies & organizations  
in the 7 LCCs of the Mississippi River Basin  
Funded by the multi-LCC Network Project #2013-17

# A crisis is brewing on the prairie ...

High commodity prices are great for farmers...

Not so great for grassland birds and pollinators.

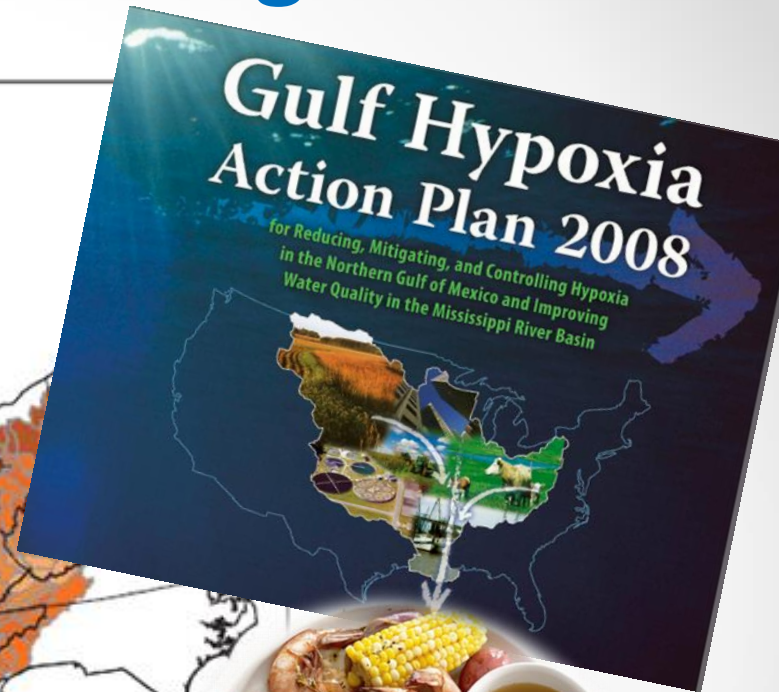
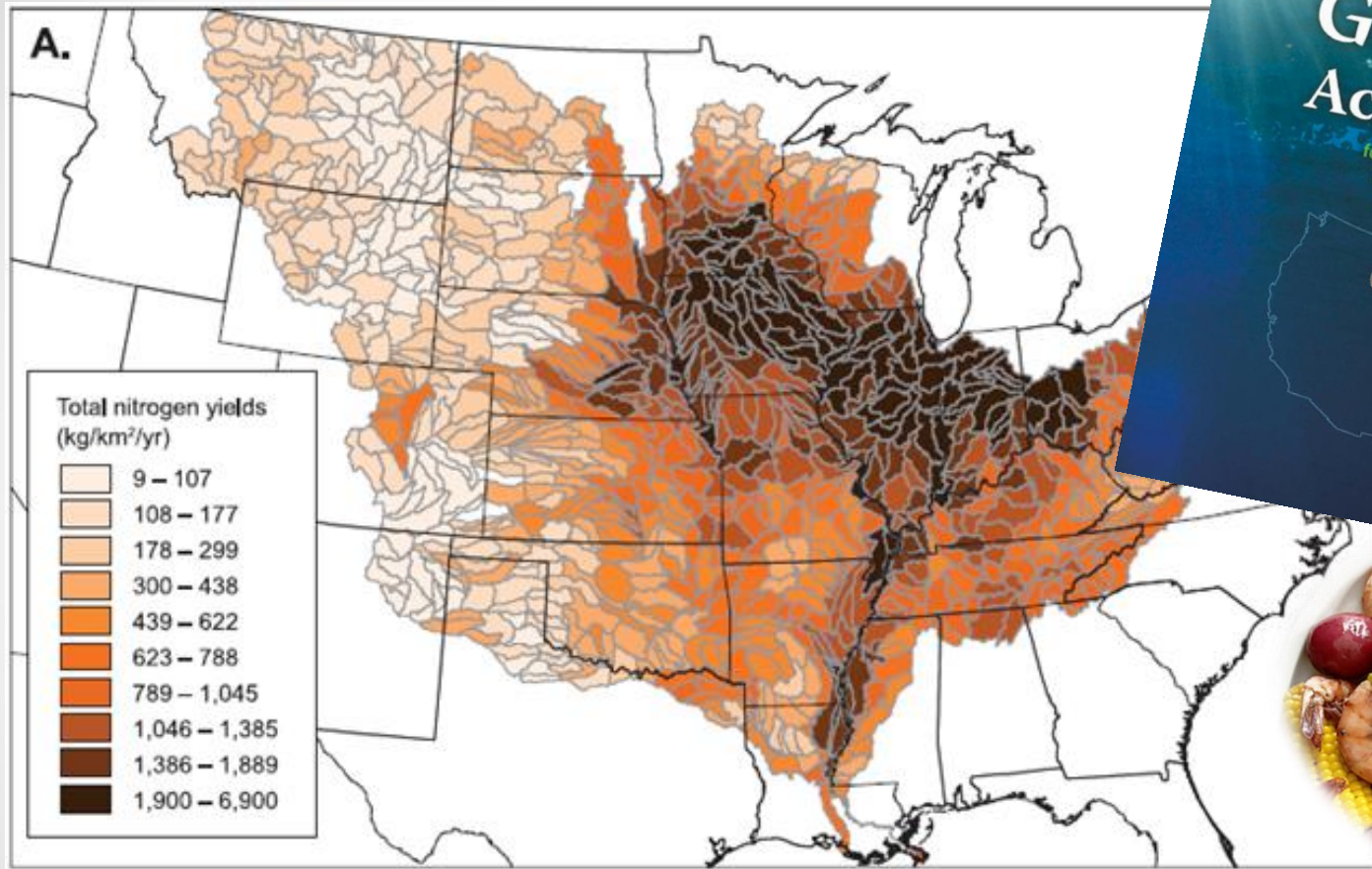
From 2008-2012, plowed under 7.2 million acres for crops.

These are the highest rates of loss since the Dust Bowl.



**Is this another Silent Spring?**

# ...and downstream in the Big Rivers



**As farmers retire over the next 20 years, about 400 million acres will change hands – some to international investors.**

**[all national cropland = 442 million acres]**

*From: Oakland Institute 2014. Down on the Farm. Wall Street: America's New Farmer.*



# 22 Landscape Conservation Cooperatives (LCCs)

**7 span the  
Mississippi Basin**



**1. Plains & Prairie Potholes LCC**

*Rick Nelson*

**2. Upper Midwest & Great Lakes LCC**

*John Rogner, Brad Potter*

**3. Eastern Tallgrass Prairie & Big Rivers LCC** - *Glen Salmon, Gwen White*

**4. Great Plains LCC** – *Nicole Athearn, James Broska*

**5. Gulf Coastal Plains & Ozarks LCC** – *Greg Wathen, Todd Jones-Farrand*

**6. Appalachian LCC** – *Cal DuBrock, Jean Brennan*

**7. Gulf Coast Prairie LCC** – *Bill Bartush, Cynthia Edwards*

# Who are the Steering Committee members in the Eastern Tallgrass Prairie & Big Rivers LCC?



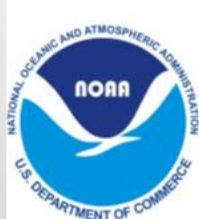
US Army Corps  
of Engineers®



Chicago  
Wilderness



The Nature  
Conservancy



# What do we want to accomplish?

## Mission Possible:

**Restore & Connect Wildlife  
with People on the  
Rich Soils of a Functional  
Working Landscape**

**Must be pragmatic,  
scalable/regional,  
collaborative, transparent,  
and value-added to ongoing  
restoration efforts!**





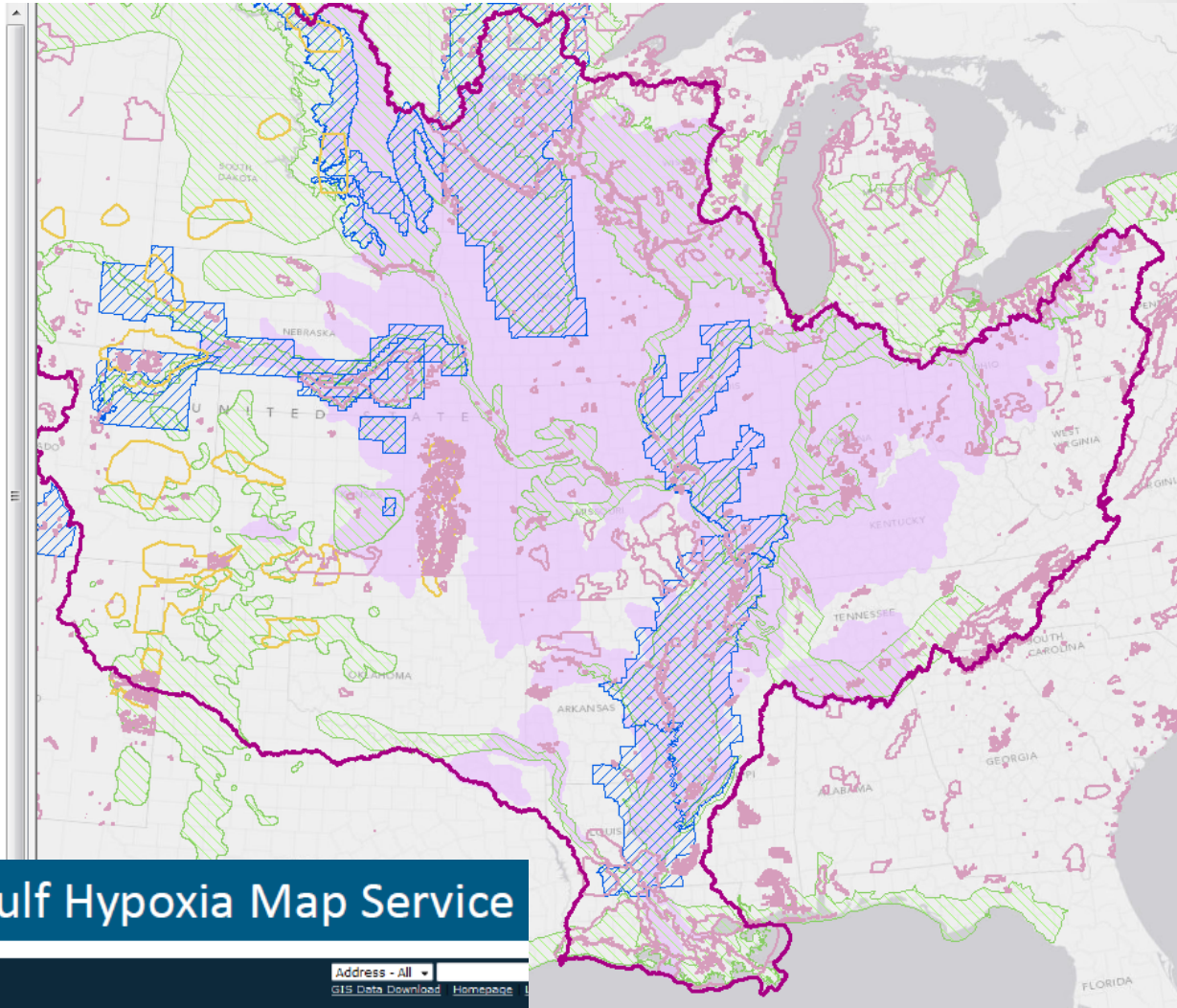
# Where would we focus combined actions?

## Interactive online spatial analysis & optimization tools

pink = initial water quality priority zone based on SPARROW & updated agricultural land use

blue = example bird focus areas (Audubon, Ducks Unlimited, etc)

- ☒ **MRB - Conservation Designations**
  - ☒ Mississippi River Basin
- ☒ **Regional Focus Areas**
  - ☒ Audubon - Important Bird Areas
  - ☒ Grassland Priority Conservation Areas (CEC)
  - ☒ Ducks Unlimited - Land Acquisition/Easement Focus Areas
  - ☒ Ducks Unlimited - Landscape Conservation Priority Areas
- ☐ UMRGLR JV - Woodland Breeding Bird Habitat Priorities
- ☐ UMRGLR JV - Wetland Breeding Bird Habitat Priorities
- ☐ UMRGLR JV - Openland Breeding Bird Habitat Priorities
- ☐ Grassland Bird Conservation Areas
- ☐ Arkansas/Miss. Alluvial Valley CDN - Restoration Focus Areas
- ☐ Upper Mississippi River Forest Partnership
- ☐ Arkansas/Miss. Alluvial Valley CDN - Restoration Priorities
- ☐ Open Pine Management DST
- ☐ Bobwhite Conservation Initiative - Biologist Ranking Index
- ☐ **Conservation Estate**
  - ☒ National Wildlife Refuge
  - ☒ National Conservation Easement Database (2013)
  - ☒ Protected Areas Database (USGS v1.3)
- ☒ **State Focus Areas**
  - ☐ Alabama - Priority Conservation Areas (Terrestrial)
  - ☐ Alabama - Priority Conservation Areas (Aquatic)
  - ☐ Illinois - Grassland Focus Areas (INAI Sites)
  - ☐ Illinois - Conservation Opportunity Areas
  - ☐ Iowa
  - ☐ Kentucky - Tier1 Conservation Areas
  - ☐ Minnesota
  - ☐ Missouri
  - ☐ Nebraska - Biologically Unique Landscapes
  - ☐ Nebraska - Migratory Bird Landscape
  - ☐ North Dakota - Conservation Focus Areas
  - ☐ Ohio - Conservation Focus Areas



Mississippi River / Gulf Hypoxia Map Service

# Watersheds Selected at a Landscape Scale for Nutrient Reduction may not Benefit Wildlife

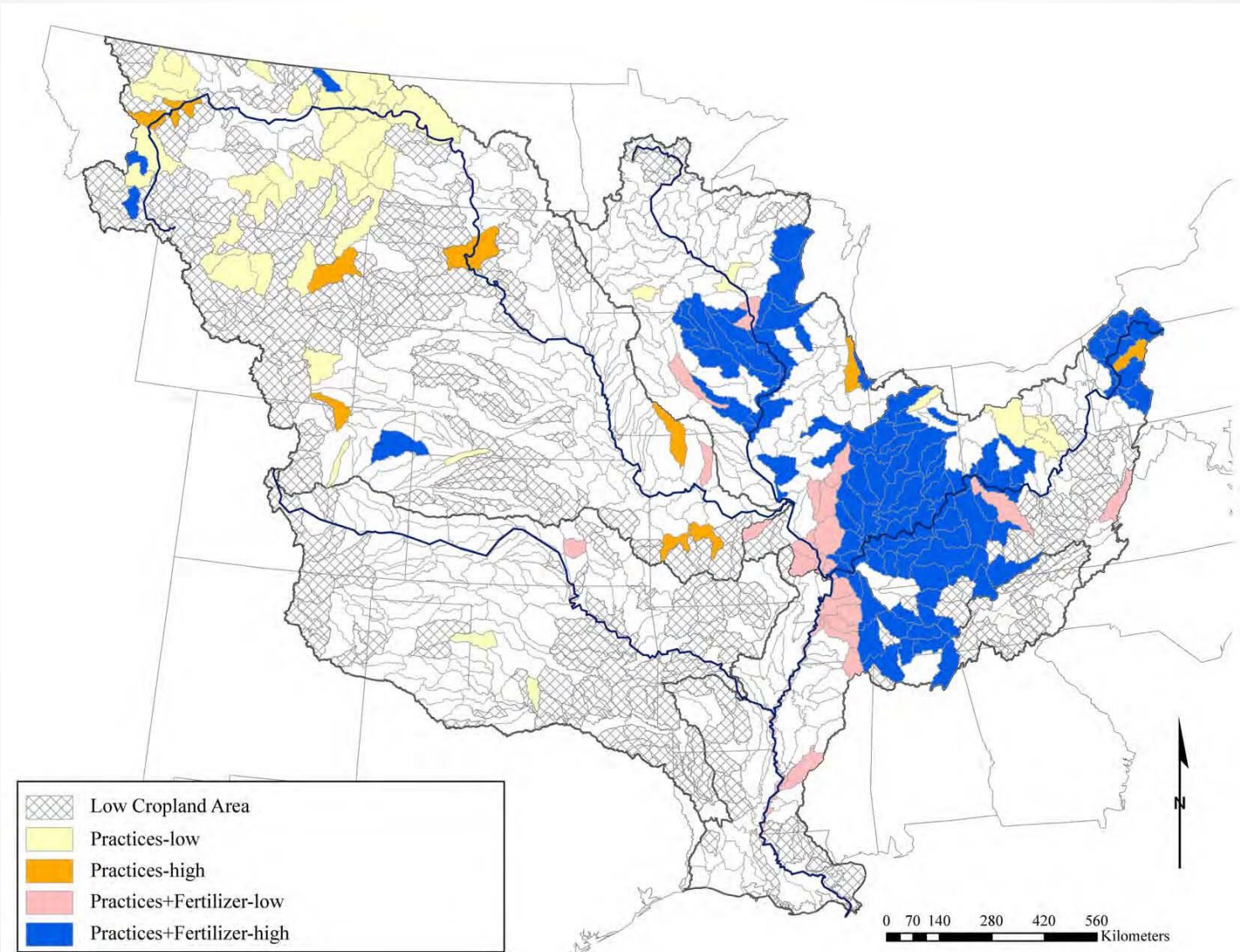
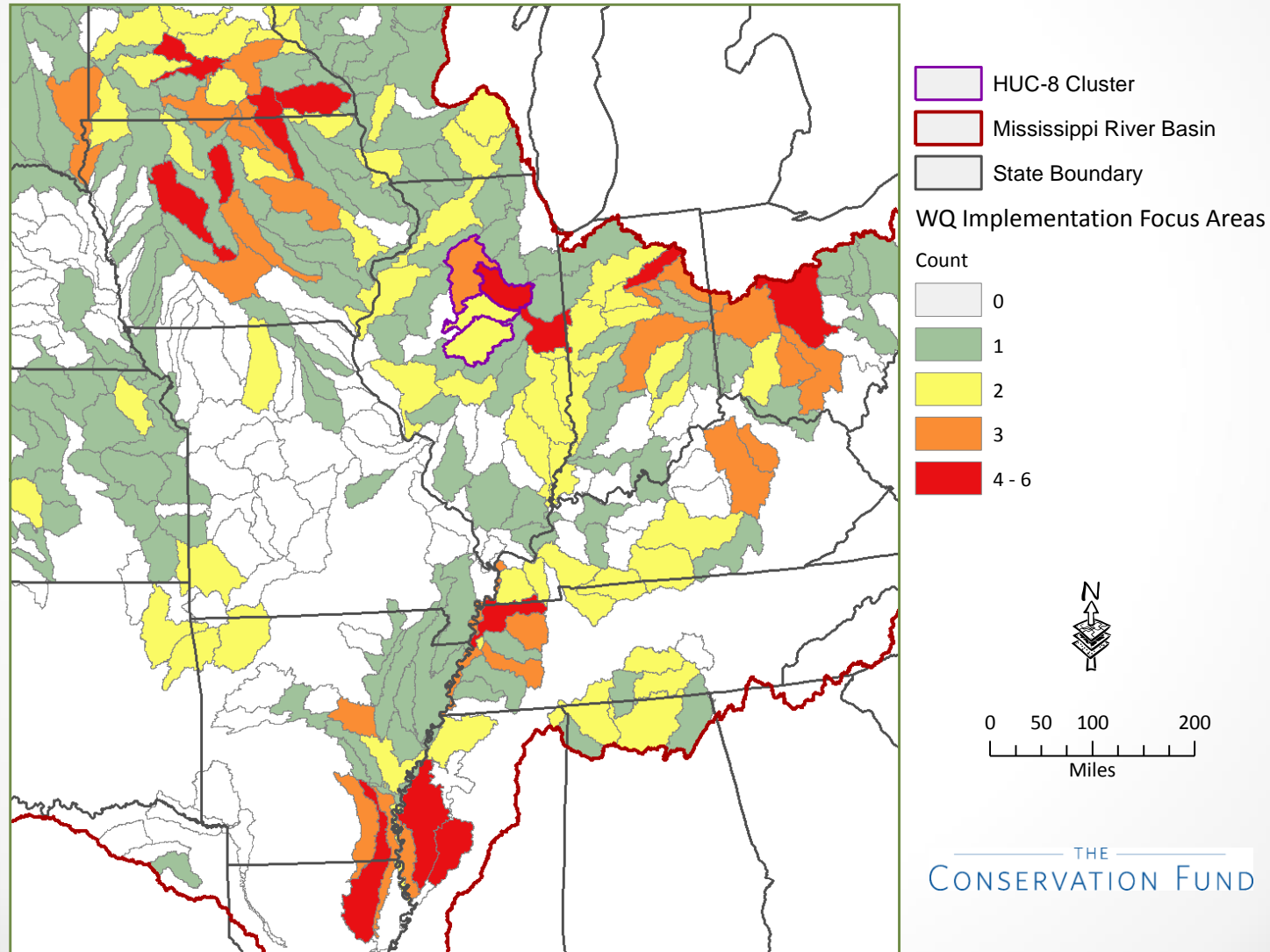


Fig. S7. Identified solution for a 40% reduction in mean 5-year average hypoxia. Crosshatched watersheds did not have CEAP-NRI costs and shares of cropland in need of additional conservation estimates due to the CEAP-NRI survey coverage.



# Watersheds Selected at the State or Regional Scale May Not Provide Solutions at the Landscape Scale



# CONVENED SCIENTISTS & MANAGERS AT A WORKSHOP IN MEMPHIS, TN

*2014 MRB/GHI Decision  
Making Workshop Report*  
(i.e., “The Memphis Report”)  
identifies:

- 5 Ecological Systems & 5 Farm Production Systems
- Species that may indicate progress in each system
- Alternative Actions by Farming System
- Prioritized list of Cost-Effective Strategies
- Initial list of barriers, science needs & programs

The screenshot shows a web browser with two tabs: "Mississippi River Basin/Gu" and "MRB GHI Practices Sign U". The address bar displays "www.tallgrassprairielcc.org/research-projects/mississippi-r". The website header features a logo with three interlocking loops in blue, green, and orange, followed by the text "EASTERN TALLGRASS PRAIRIE & BIG RIVERS LANDSCAPE CONSERVATION COOPERATIVE" and the tagline "Effective conservation through collaboration and sound science". A navigation bar includes links for HOME, OUR COMMUNITY, WHAT WE DO, CONSERVATION RESEARCH, NEWSROOM, and CONTACT. Below the navigation bar, there are "PREV" and "NEXT" navigation arrows. The main content area displays the title "Mississippi River Basin/Gulf Hypoxia Structured Decision Making Workshop 2014" with the date "March 19, 2014". The text describes the workshop held from August 12-14, 2014, in Memphis, TN, and provides contact information for Gwen White at gwen\_white@fws.gov. It also includes a quote: "Maintain a working landscape—and design a landscape that works—for water quality, wildlife and people". A paragraph discusses the nutrient load from the Eastern Tallgrass Prairie and Big Rivers LCC to the Gulf of Mexico hypoxic zone. To the right of the text is a satellite image of the Gulf of Mexico showing a large area of greenish water. Below the image is the caption: "Satellite view of Gulf of Mexico. Photo courtesy of NASA/Creative Commons."

Mississippi River Basin/Gu x MRB GHI Practices Sign U x

→ www.tallgrassprairielcc.org/research-projects/mississippi-r

**EASTERN TALLGRASS PRAIRIE & BIG RIVERS**  
LANDSCAPE CONSERVATION COOPERATIVE  
*Effective conservation through collaboration and sound science*

HOME OUR COMMUNITY WHAT WE DO CONSERVATION RESEARCH NEWSROOM CONTACT

PREV NEXT

### Mississippi River Basin/Gulf Hypoxia Structured Decision Making Workshop 2014

March 19, 2014

August 12 – 14, 2014 in Memphis, TN  
For more information, contact Gwen White at gwen\_white@fws.gov

*Maintain a working landscape—and design a landscape that works—for water quality, wildlife and people*

States within the Eastern Tallgrass Prairie and Big Rivers LCC geography currently contribute the greatest nutrient load to the Gulf of Mexico hypoxic zone through downstream states in the greater Mississippi River watershed. Recent extensive new tile drainage and reversion of Conservation Reserve Program lands to cropland in the Plains and Prairie Potholes LCC geography as a result of high commodity prices suggest that those states may contribute excessive nutrients



Satellite view of Gulf of Mexico. Photo courtesy of NASA/Creative Commons.

# Who participated in the Gulf Hypoxia workshops?

## Universities:

- Kansas State University
- Mississippi State University
- Ohio State University
- Louisiana University Marine Consortium
- University of Illinois
- University of Minnesota
- University Wisconsin-Madison

## NGOs:

- Agricultural Watershed Institute
- Mississippi River Network
- Ducks Unlimited
- Enviroscapes Ecological Consulting
- Fishers & Farmers Fish Habitat Partnership
- Gulf Hypoxia Task Force
- Illinois Council on Best Management Practices
- KGregg Consulting
- Lower Mississippi River Committee
- Midwest Conservation Biomass Alliance
- Mississippi Interstate Cooperative Resource Association
- National Wildlife Federation
- Natural Land Institute
- Oak Ridge National Laboratory
- Ohio River Basin Fish Habitat Partnership
- Practical Farmers of Iowa
- The Conservation Fund
- The Nature Conservancy
- Wildlife Management Institute

## State agencies:

- Indiana DNR
- Iowa Dept of Agriculture
- Minnesota Pollution Control Agency
- Missouri Dept of Conservation
- Nebraska Game & Parks Commission
- Tennessee Wildlife Resources Agency

## Federal agencies:

- Army Corps of Engineers
- Dept of Energy
- Dept of Transportation
- EPA (OWOW, Hypoxia Task Force)
- Fish & Wildlife Service (ES, Partners, EA, NCTC)
- USDA Forest Service
- US Geological Survey (NAWQA, HTF)
- National Park Service
- NOAA (HTF)
- South Central Climate Science Center
- USDA Farm Service Agency
- USDA National Institute of Food & Agriculture
- USDA NRCS (AR, IN, TN, MRBI)

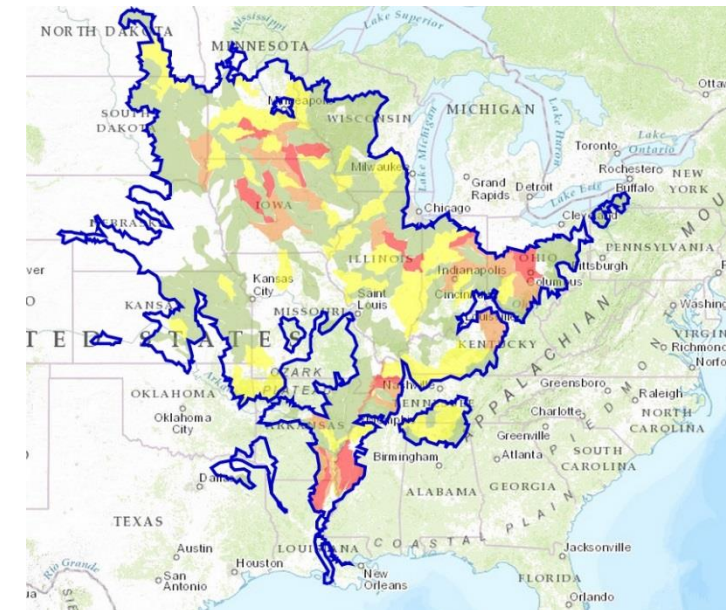
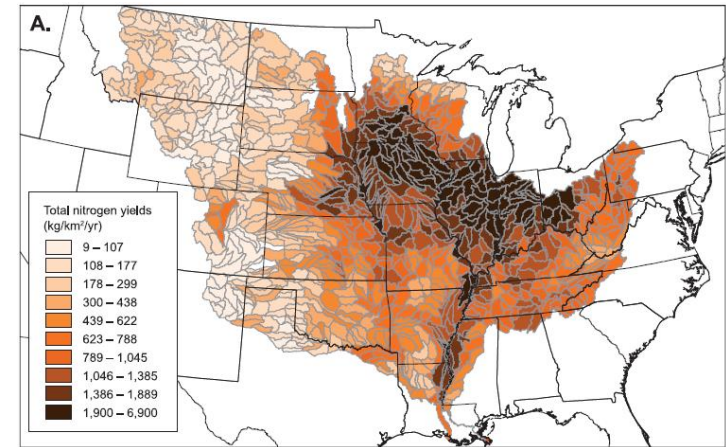
50 people in Memphis.

Over 250 in the contact list and counting...



# DEFINE THE GOAL & THE GEOGRAPHY

We are seeking broad consensus on how and where to best design and implement conservation delivery throughout the Mississippi Basin in a way that benefits **wildlife**, while simultaneously reducing the **nutrient loading** to Gulf hypoxia and balancing **agricultural interests**.



# Landscape Conservation Design (LCD)

- identify landscape-scale **targets** of interest based on objectives (wildlife, water, agriculture)
  - capability (species and habitats), migratory connectivity, ecological integrity, climate resilience
- articulating measurable **performance metrics** for those targets
  - Population levels for species & habitats
  - Water quality set at 45% reduction in nutrients
  - Agricultural production (ecosystem services)

# Common Agenda = shared multi-sector objectives (blue)

Increase or maintain productivity  
(ecosystem services)

Increase Wildlife  
Benefits

Increase  
Agricultural  
Productivity

Decrease  
Gulf Hypoxia

Decrease  
Implementation  
costs

Modified Headwater

Prairie

Forested Riparian

Bottomland  
Hardwood

Increase Net Returns

Decrease Risk

Maximize Resilience

Decrease Regulatory  
Uncertainty

Watershed  
nutrient load

Local nutrient  
load

Species  
(abundance, life history  
or occupancy)

Input  
costs

Soil  
health

Water  
quantity

Ground water

Surface water

N & P load

Ave \$/acre

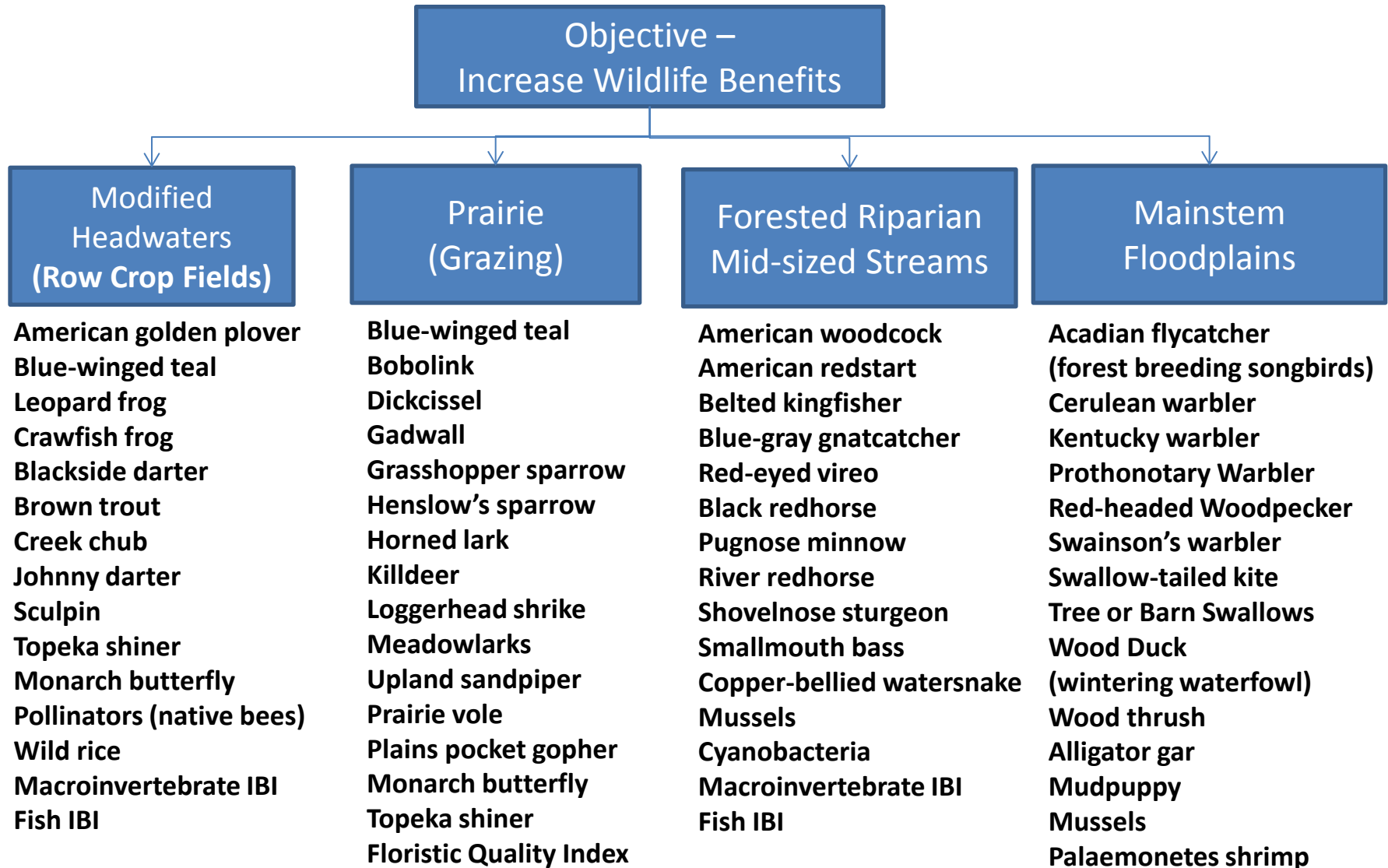
Ave \$/acre

Shared Measurement = performance metrics (red)



# Shared Measurement –

## Which Wildlife Species indicate progress in each of the 4 Ecological Systems?

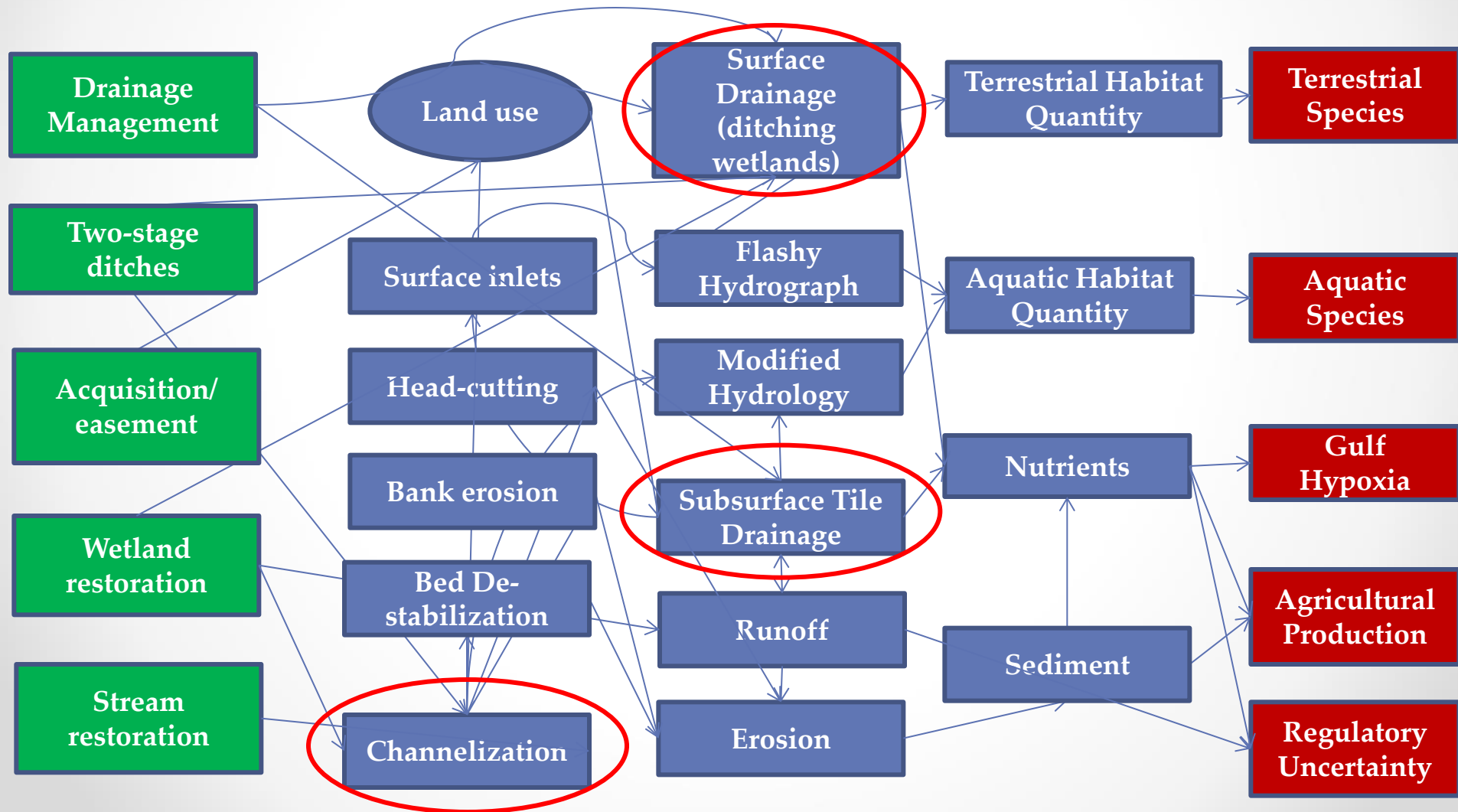


# The Landscape Conservation Design (LCD) process includes :

- assess **current and projected** changes in landscape patterns and process
- define **desired** future conditions
- select **strategies** for implementation
- map **opportunities** on the landscape
- **model** scenarios and tradeoffs
- implement, evaluate and **refine**

# Which relationships are key leverage points for choosing **Actions (green)** to achieve **Objectives (red)** in each of 4 Ecological Systems?

Example Influence Diagram: Modified Headwaters - Hydrology



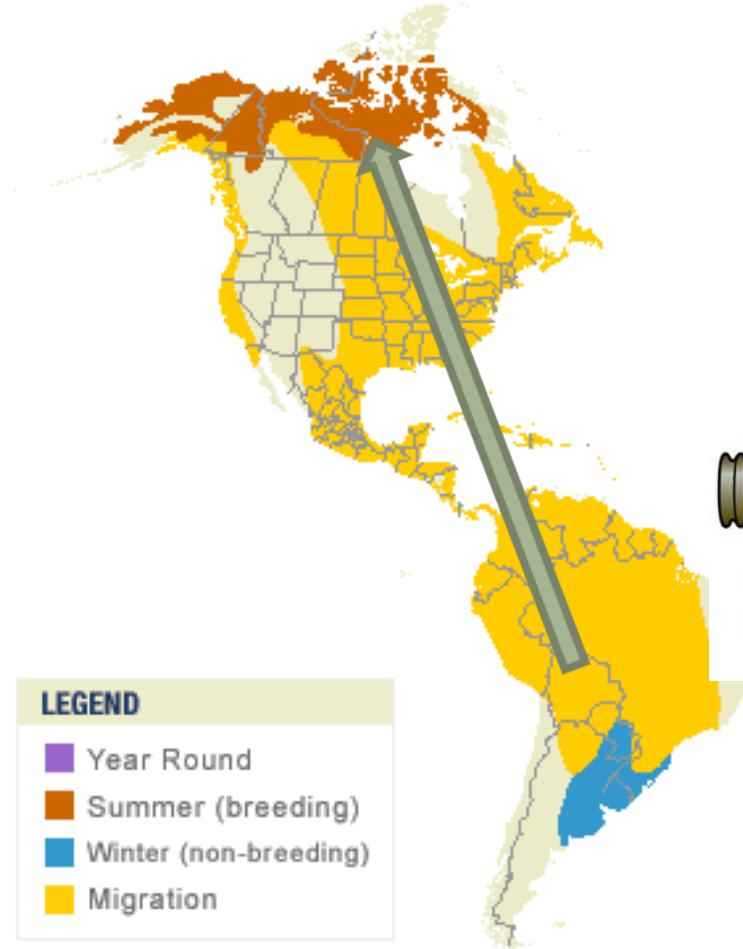


# Example of multi-benefit Conservation Practice

## American Golden-Plover

### Drainage Water Management for Drought Mitigation & Wetland Habitat

American Golden-Plover  
*Pluvialis dominica*

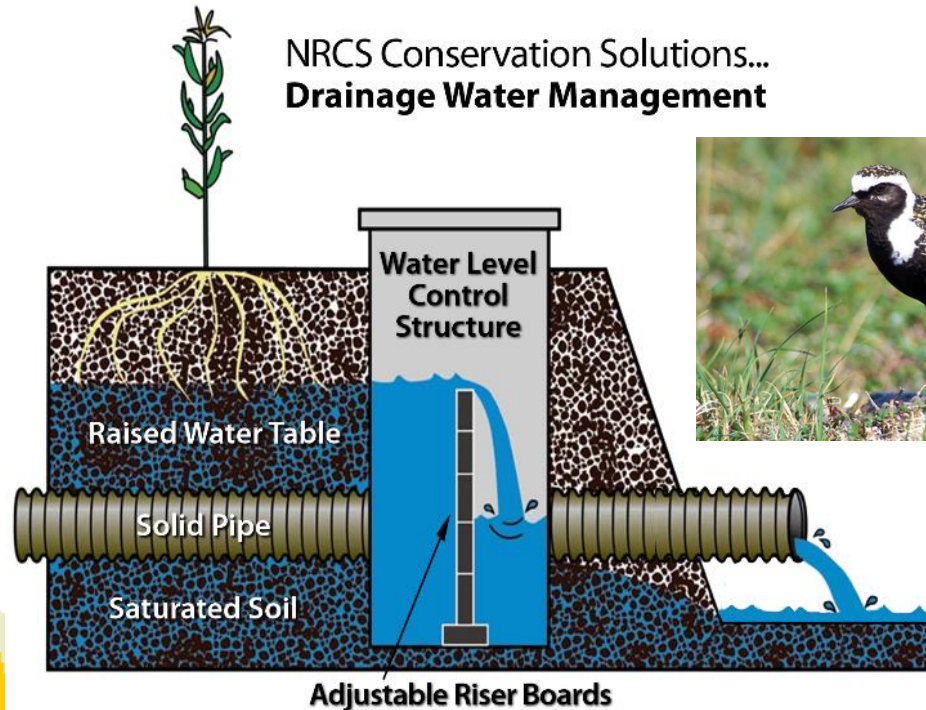


#### LEGEND

- Year Round
- Summer (breeding)
- Winter (non-breeding)
- Migration

Map by Cornell Lab of Ornithology  
Range data by NatureServe

NRCS Conservation Solutions...  
**Drainage Water Management**



# Mutually Reinforcing Activities

## Cost-Effective Practices

### Strategies to Achieve Multiple Objectives

Headwaters &  
Corn & Soybean  
Row Crops

#### *Low cost / effective*

Soil health  
Crop land for inverts  
Drainage lay out  
Oxbow restoration  
No till  
Crop rotation

#### *Medium cost*

Buffers  
Alt crops (biomass)  
Cover crops  
Native contour STRIPS  
Stream fencing

#### *High cost*

Habitat restoration  
Drainage water mgt  
Treatment wetlands  
Nutrient standards

Prairies  
Grazing Lands

#### *Low cost / effective*

Conversion incentive  
Grazing BMPs

#### *Medium cost*

Prescribed fire  
Grassed wetland buffer  
Drought mgt  
Prairie STRIPS

#### *High cost*

Compensate services  
Riparian habitat  
Restore savanna/oaks  
Native seed mix

Riparian Forest  
Mid-sized  
Streams

#### *Low cost / effective*

Buffers in headwaters  
Soil health

#### *Medium cost*

Bank stabilization  
Livestock fencing

#### *High cost*

Restore connectivity  
Hydrologic restoration  
Remeandering  
Sediment removal  
Infiltration  
Dam removal  
Easements  
Acquisition  
Wetlands

Floodplain Ag  
Midwest  
(Corn & Beans)

#### *Low cost / effective*

Veg restoration

#### *Medium cost*

Vegetation control  
Levee breaks  
Remove tiles  
Stop log structure  
Carp grates  
Reforestation

#### *High cost*

Connectivity  
Backwaters  
Control structures

Floodplain Ag  
Lower Miss Valley  
(Cotton & Rice)

#### *Low cost / effective*

Vegetation diversity  
Convert marginal land

#### *Medium cost*

Wetland reforestation  
Regulate diversions  
Invasive control

#### *High cost*

Re-open channels  
Dredge wetlands  
Acquisition (forest)  
Water diversion  
Connectivity  
Market drivers



# Putting a Plan into Action:

Prototype spatial analyses (Landscape Conservation Design at several scales) followed by further refinement to:

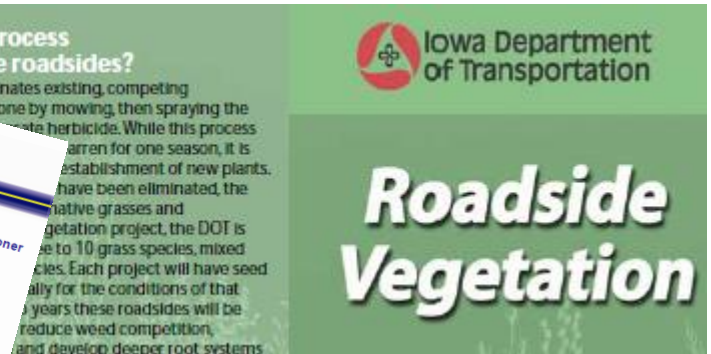
- Map Opportunity Areas
- Examine Trade-offs
- Identify Science Needs
- Determine Barriers and Opportunities for Implementation
- Initiate Collaboration and Outreach for implementation

*Who needs this information and in what form to change policies and programs?*



# How is this MRB/GHI framework being used?

## To design practices that provide multiple benefits





# 15 Multi-Benefit Practices

## *Uplands – in all priority watersheds*

- Drought Management
- Grassed Wetland Buffer
- Grazing BMPs
- Prairie Biomass/Biofuels
- Prescribed Fire

## *Tributaries/Headwaters – in all priority watersheds*

- Cover Crops – Wheat, Camelina
- Drainage Water Management
- Two-stage Ditches
- Buffers - Field Borders & Streams

## *Floodplains Upper Basin – Upper Mississippi, Lower Missouri, Ohio Rivers*

- Hydrologic Restoration - Connectivity

## *Floodplains Lower Basin- Mississippi Alluvial Valley(3 practices)*

- Diversion
- Reforestation
- Vegetation Diversity

# Join a Work Team!

## Matching Practices to Species & Programs for Implementation

- **What & Where**

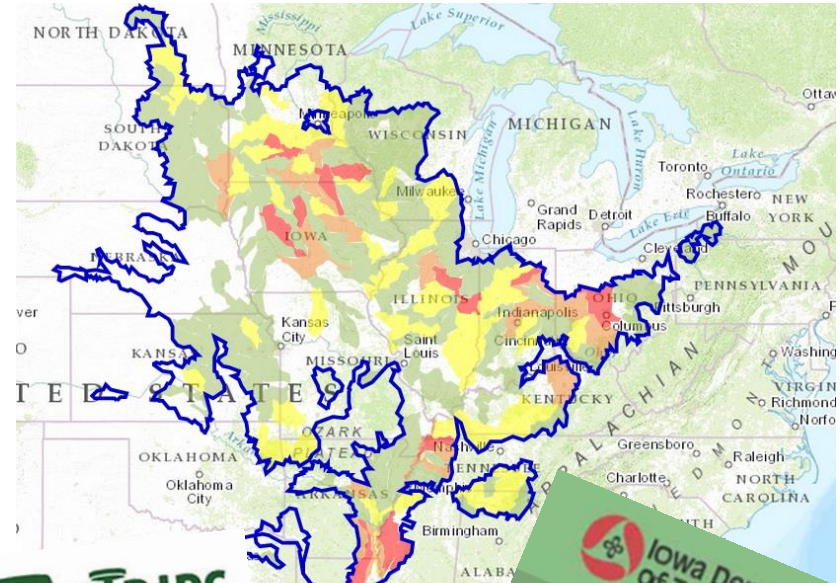
- Which **species** respond to each **practice** with multi-sector benefits?
- Do we have **population objectives and monitoring**?
- Will **redesign of the practices** maximize multiple benefits?

- **Who & Why**

- Which **programs** implement, research and/or design these practices?
- What are the **socioeconomic implications**?

- **How**

- How do we **deliver this information** to programs?



How is this MRB/GHI framework being used?

## To Explore State of the Science & Research Needs



### UPPER MISSISSIPPI FLOODPLAIN FOREST WORKSHOP

September 15-17, 2015  
Holiday Inn – Dubuque, IA  
*Convening scientists and managers  
to explore the status of current  
knowledge and science needs.*



## FLOODPLAIN SCIENCE NETWORK

Stakes for floodplain management and policy making in the Midwest get higher with each passing flood. We work together to provide clear, dependable, comprehensive information to river communities, so they can address complex issues.

Home	The Network	Stories	Beliefs	Questions	Invitation	Cont
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Different floods.  
Different rivers.  
Same 20th  
century response.



# How is this MRB/GHI framework being used?

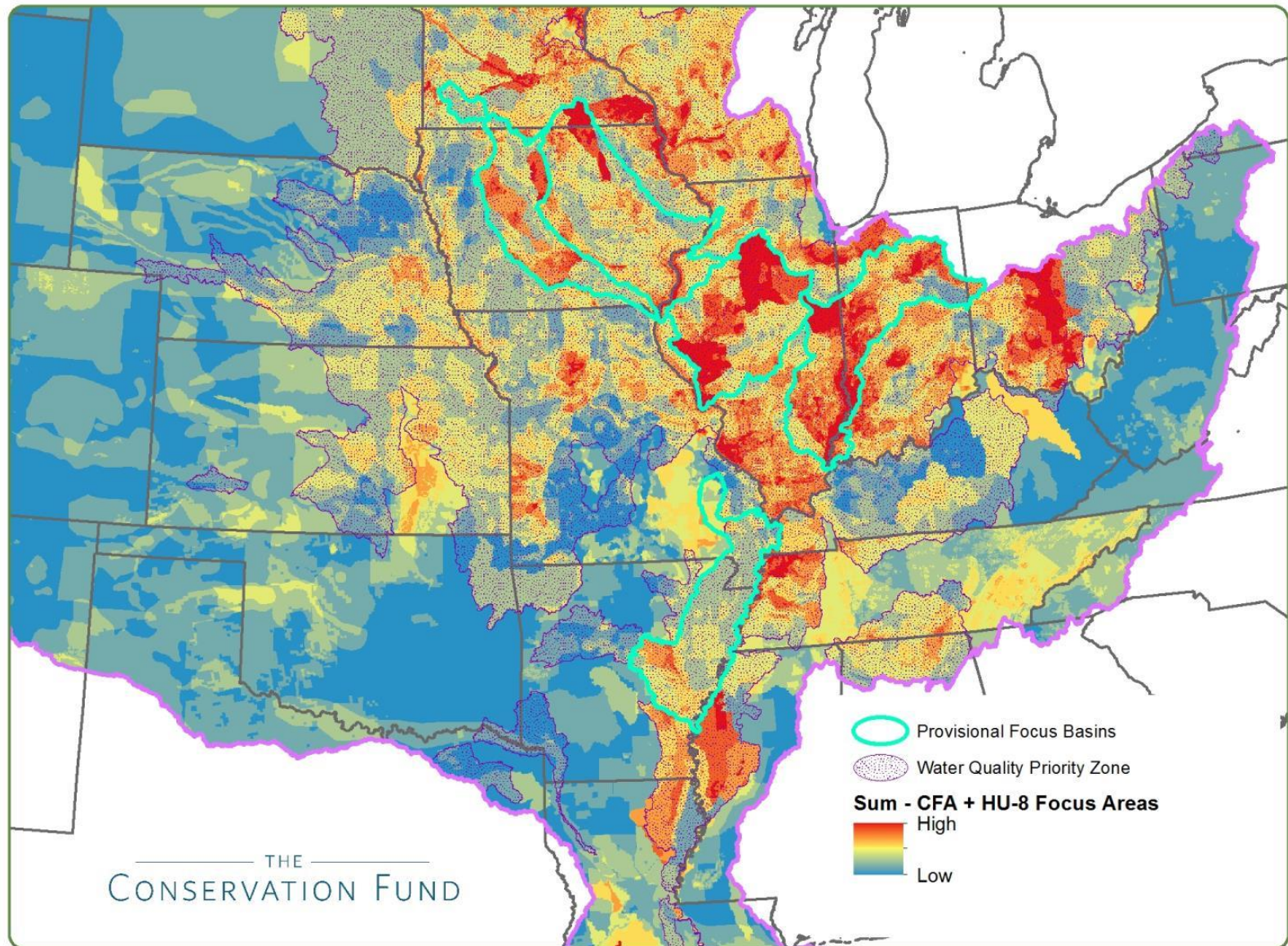
## To Configure Practices on the Landscape at Various Scales





# MRB/Gulf Hypoxia Conservation Blueprint v1.0

Interactive online spatial analysis & optimization tools

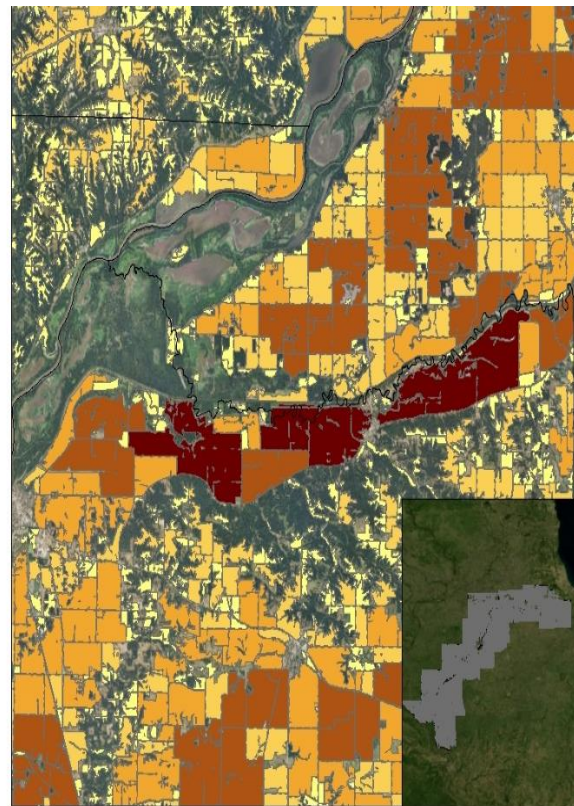




# Smaller Landscape Conservation Designs are testing a spatial analysis to identify opportunity areas

Examples: Middle Illinois River; Lower Wabash River teams

## Prairie STRIPS in Row Crops



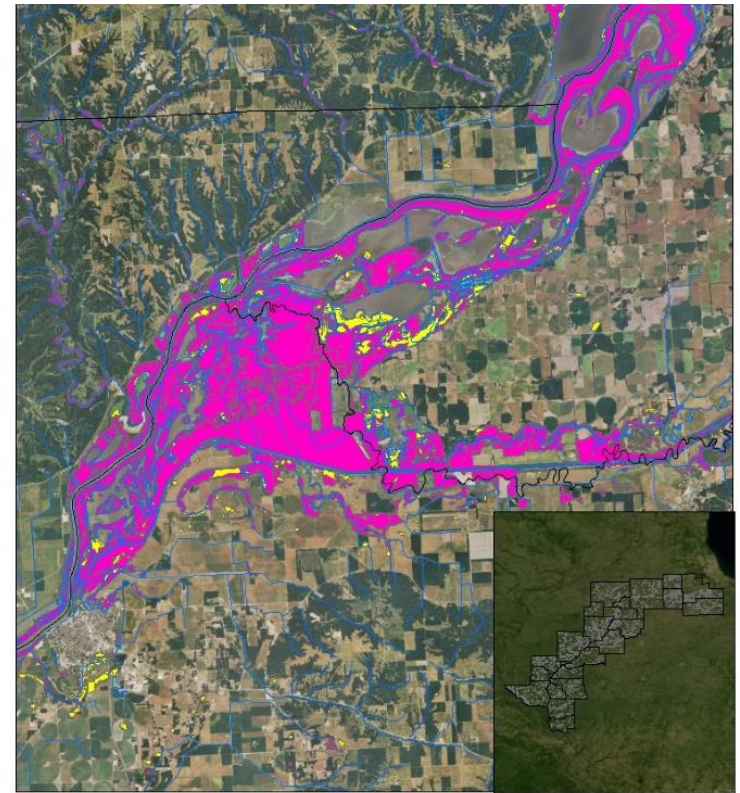
This map depicts the possible areas to place prairie STRIPs within the river valley. The darker areas indicate places where larger STRIPs can be utilized, calculations were based on 10% of available land area. The smaller image is an overview of prescribed fire areas of the entire valley; whereas the larger map depicts a larger view of only a portion of the map.

**Legend**

- River Valley Counties
- Prairie STRIP Area (Acres)
- 0.00 - 13.50
- 13.50 - 67.05
- 67.05 - 165.25
- 165.25 - 324.39
- 324.39 - 1315.09

0 2.5 5 10 Miles

## Grassed Wetland Buffers



This map depicts both wooded and emergent wetland buffers that were formed at 20 meters. The area of each buffer was overlaid onto the land use to determine what areas would be most beneficial to create. The smaller image is of the entire river valley, whereas the larger image is a close up of only a portion to allow for greater detail.

**Legend**

- Illinois River Valley Counties
- Illinois River Valley Streams
- Emergent Wetlands Buffer
- Wooded Wetlands Buffer

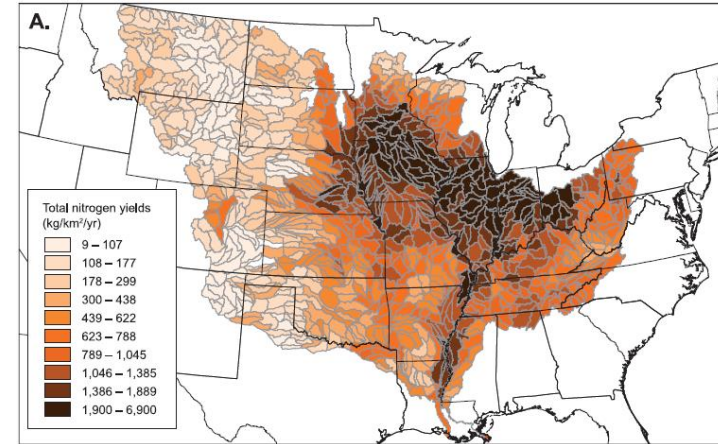
0 1.25 2.5 5 Miles

# Where to Start?

## Pilot Areas in the Mississippi Basin

- Target clear objectives
- Envision the future(s)
- Use best available science
- Stakeholder-driven
- Transparent assumptions
- Iterative prototyping

“Focused action is going to be more inspiring than perfect planning.” – Eric Schenck, DU / ETPBR LCC Steering Committee





# Collaborative Power of Multiple LCCs pulling conservation partners together



*Conservation agencies can piece together a landscape that works for wildlife, water quality and people.*

## Contact us:

Staff of 7 LCCs in the MRB

Gwen White, PhD

Science Coordinator

[www.tallgrassprairielcc.org](http://www.tallgrassprairielcc.org)