

# Offsetting GHG Emissions: Agriculture's Role in the Mississippi Alluvial Valley



# Three Topics...

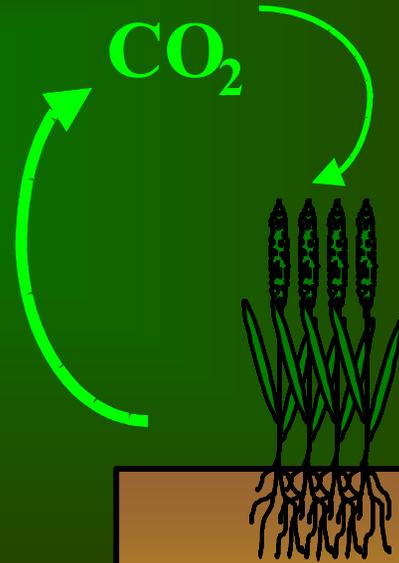
- A View from the Wildlife Community on Agriculture's Role in Offsetting GHG Emissions
- How the Wildlife Community is Positioning Itself to Support Agriculture's Role
- A “Context for Coordination”

# Past Agricultural Practices

Erosion



Intensive tillage



Residue removal



Low Productivity



Paustian 2001

# Improved Agricultural Practices

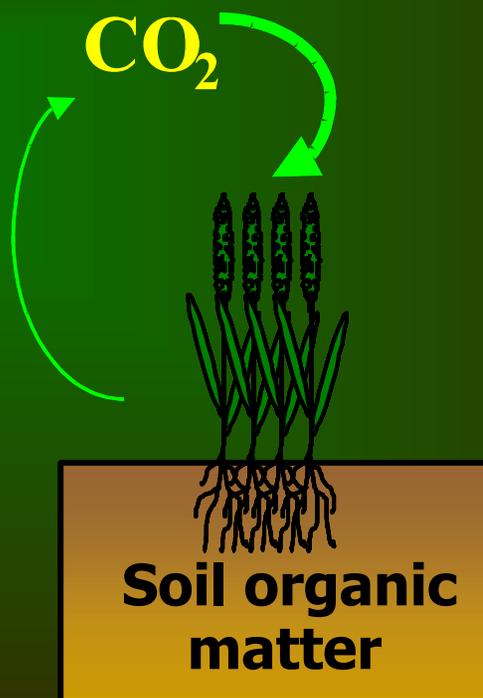
Conservation buffers



Conservation tillage



Cover crops



Improved rotations



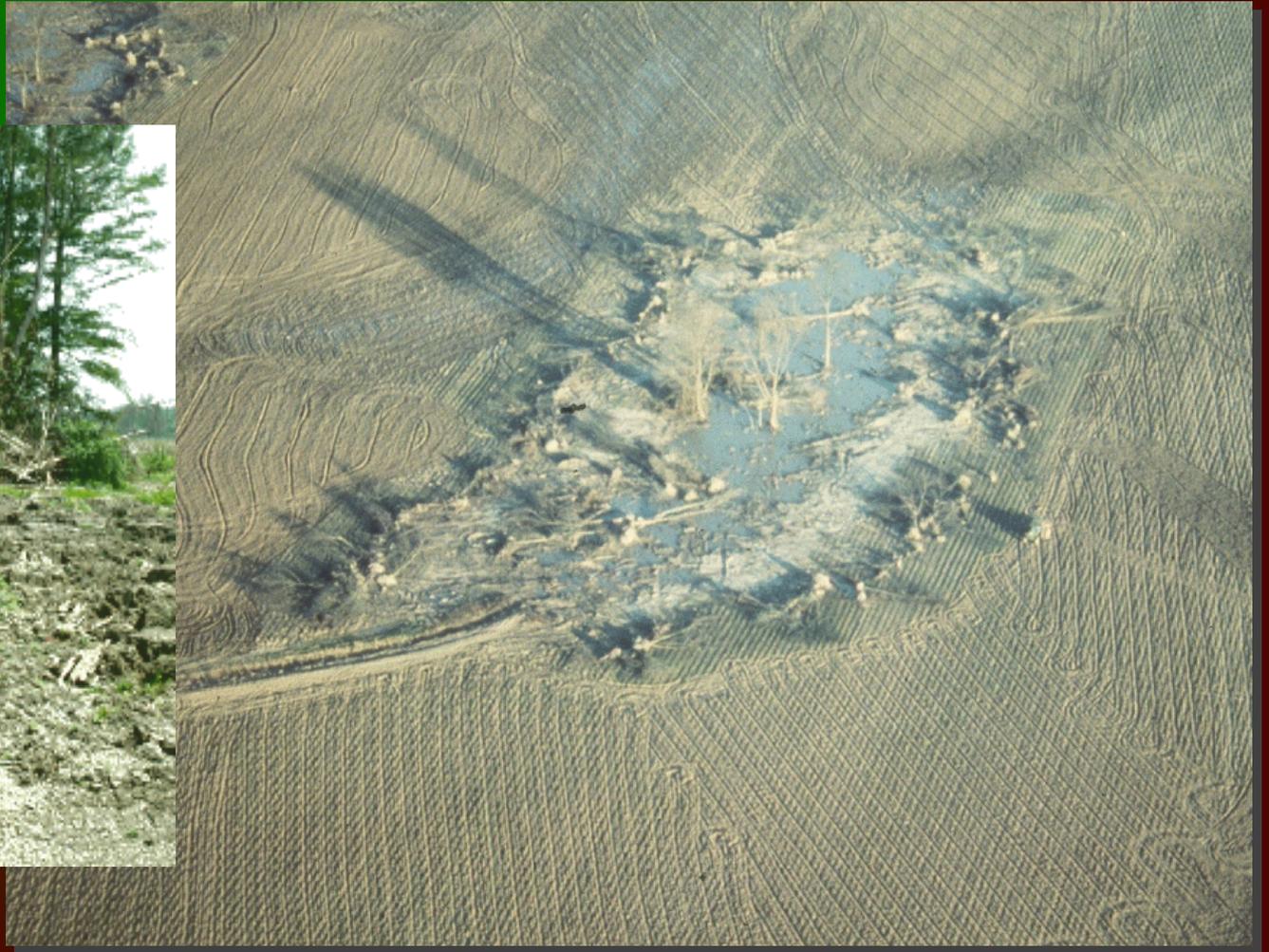
Paustian 2001

# Winter Flooded Agricultural Fields

3,806 Water  
Management Units



210,329 acres

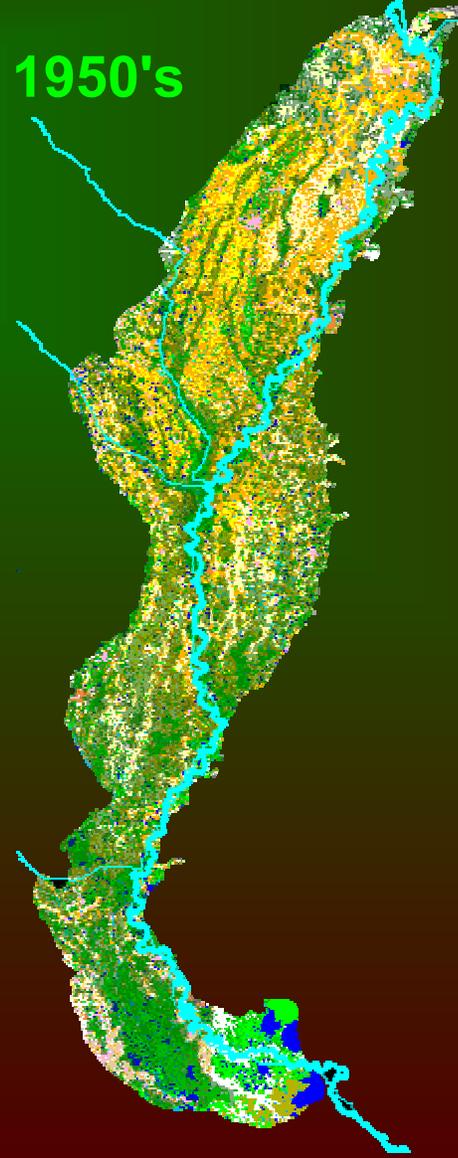


# Agricultural Expansion in “The Nation’s Floodplain”

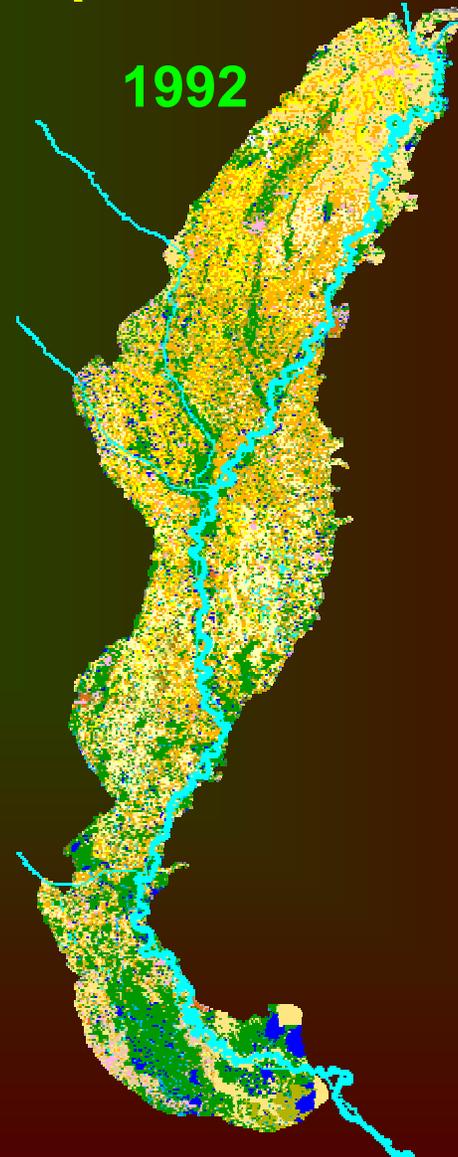
Pre-European  
Settlement



1950's



1992



- View: Forest Cover of the 1950's
  - Ace\_vburg\_dist\_mask.shp
  - Flood\_storage\_100+acres.bil
  - Forest\_cover\_of\_1950s.shp
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Forest Cover  
1950's



6,263,000 acres

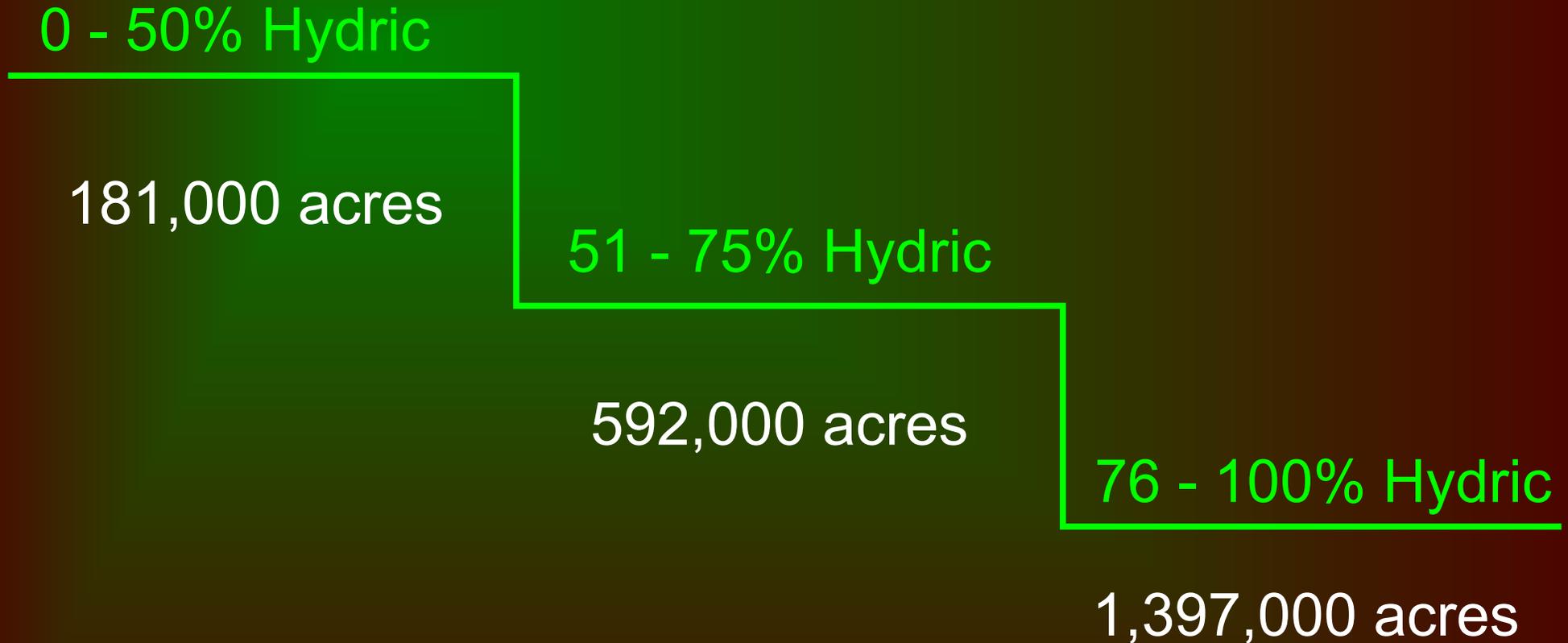
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Forest Cover  
1992



4,081,000 acres

# Forest Wetland Conversion 1950's – 1992 Distribution by Hydric Soil Associations\*



\* STATSGO

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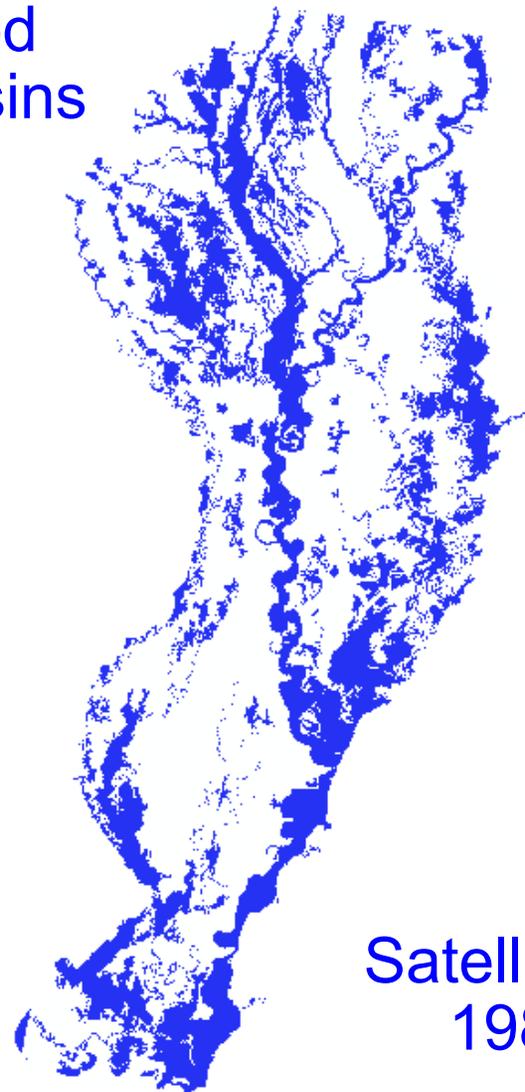
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**View: Flood Basins (Continuous /**

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Display Source

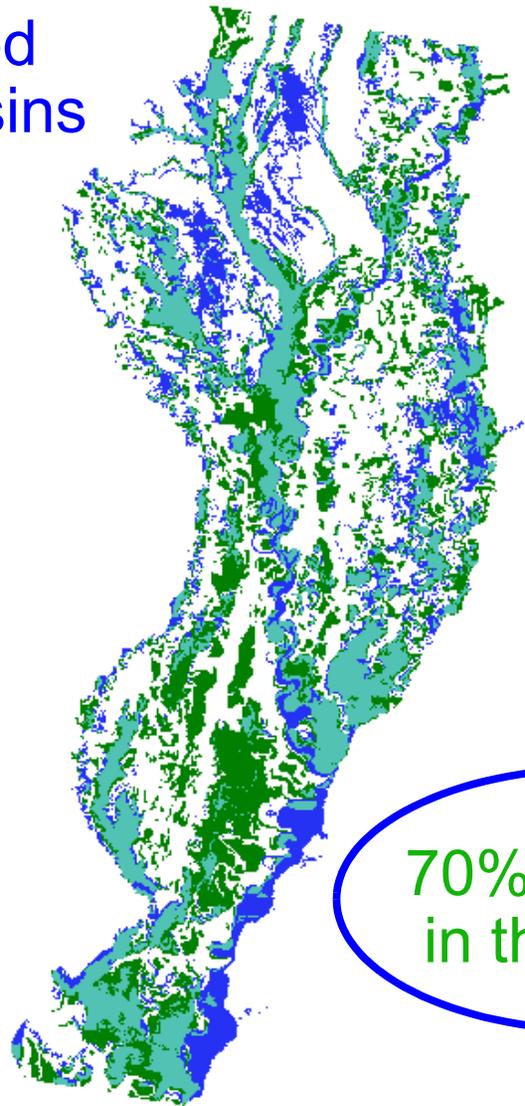
# Natural Flood Storage Basins



## Satellite Imagery 1983-1999

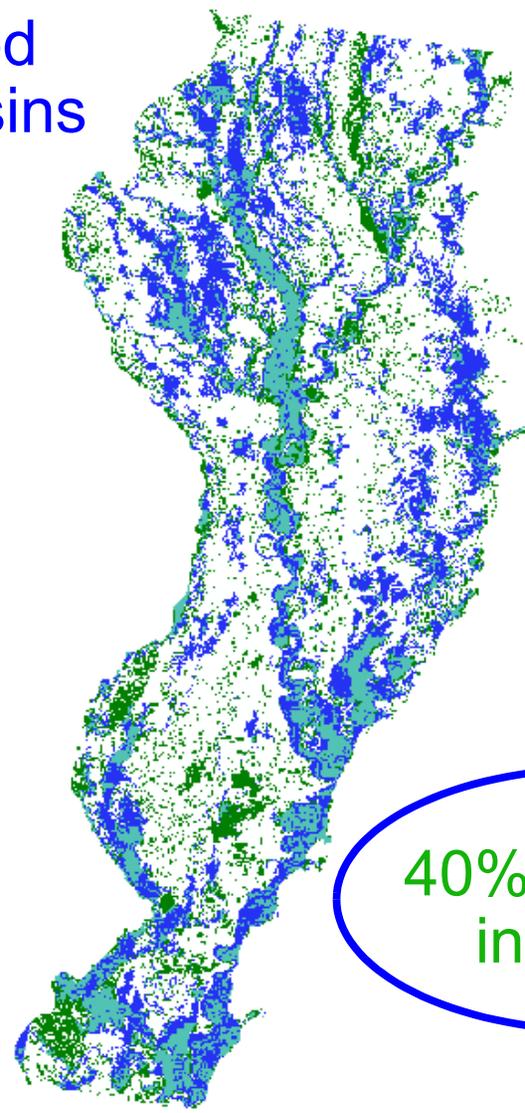
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70% Forested in the 1950's

# Natural Flood Storage Basins



40% Forested  
in 1990's

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Display Source

# Agriculture's Role in Offsetting GHG Emissions in the Mississippi Alluvial Valley

- Soil Carbon Sequestration through Agricultural Best Management Practices
- Terrestrial Sequestration via Forest Wetland Restoration on Environmentally Sensitive Lands

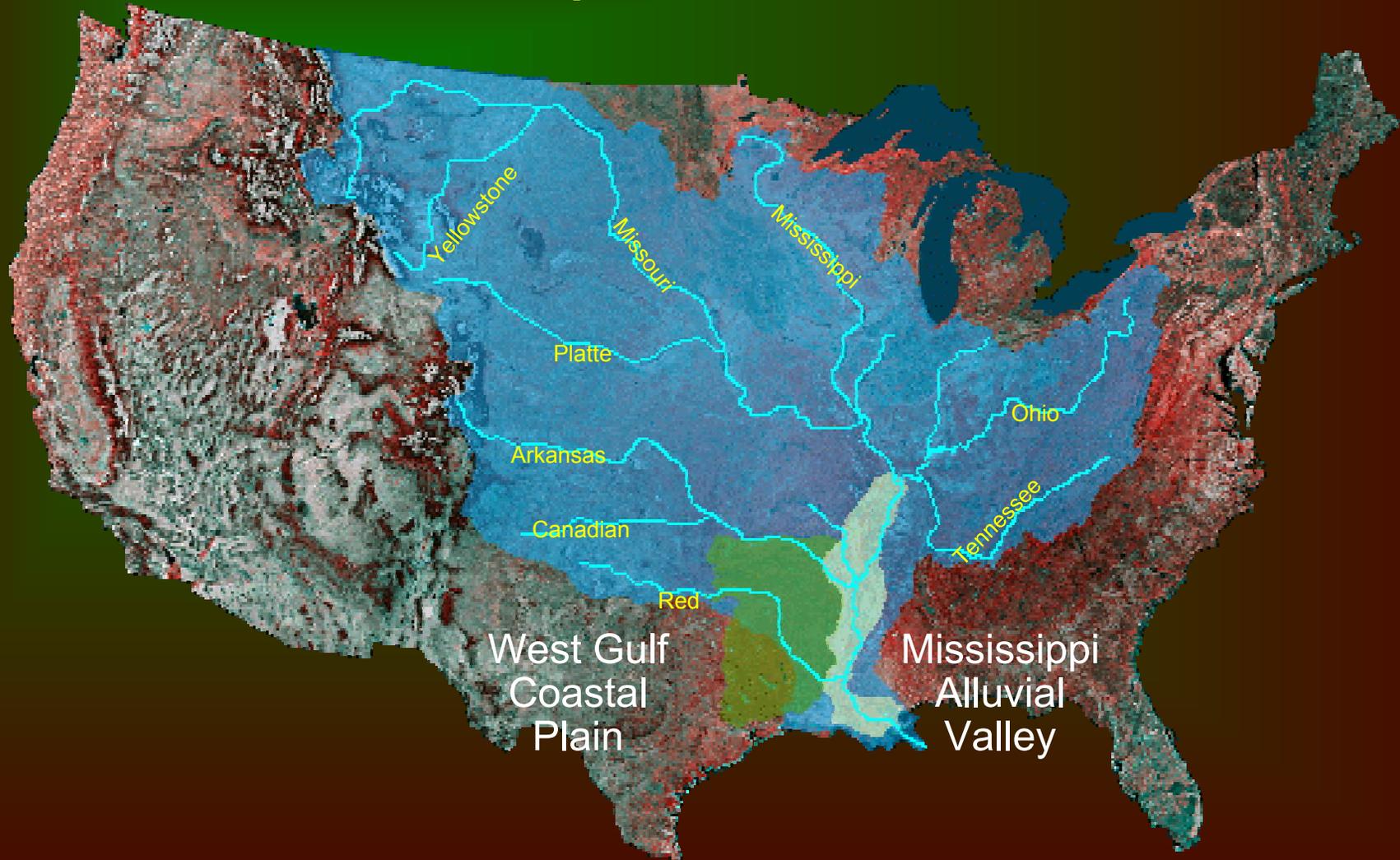
# Forest Wetland Restoration in the Mississippi Alluvial Valley



# Three Topics...

- A View from the Wildlife Community on Agriculture's Role in Offsetting GHG Emissions
- How the Wildlife Community is Positioning Itself to Support Agriculture's Role
- A "Context for Coordination"

# Lower Mississippi Valley Carbon Sequestration Initiative



# Carbon Sequestration in Terrestrial Ecosystems

Pathways to Ecologically Sound  
Economically Sustainable  
Carbon Sequestration

in the  
Mississippi Alluvial Valley  
and West Gulf Coastal Plain

Lower Mississippi Valley  
Joint Venture  
June 2002

# Lower Mississippi Valley Joint Venture Decision Support Models For the Mississippi Alluvial Valley

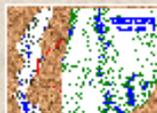
## Habitat

### Background

- Focused on Area-sensitive Species (e.g., black bears and forest-interior songbirds).

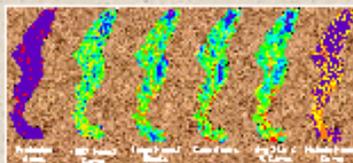


- Deforestation since the turn of the century has resulted in:



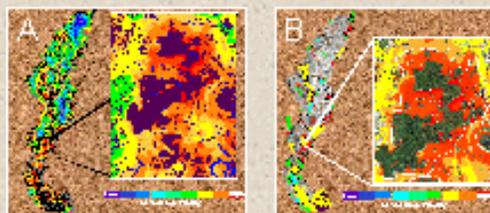
- 75% reduction in forested area
- Fragmentation of remaining 25% into 35,000+ blocks
- 99% of these blocks are incapable of supporting source populations of forest-breeding birds

### Model Development



- Model landscape characteristics known to limit reproductive success of area-sensitive songbird species using spatial analyses.

### Product



- (A) A decision support model that identifies priority areas for reforestation that maximize benefits to forest-breeding birds. (B) High priorities can be aggregated into Forest Block Restoration Areas to establish habitat objectives and further focus reforestation (e.g., building larger forest blocks and increasing "core" habitat).

## Water Quality

### Background

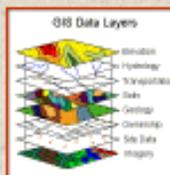
- Each summer nitrogen and phosphate washing from farmlands in the Mississippi River Basin enter the Gulf of Mexico, creating an extensive "dead zone" covering up to 20,000 km<sup>2</sup>—threatening economic and environmental resources.



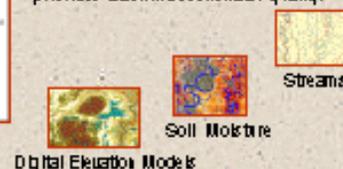
- In the MAV, agricultural runoff is the largest non-point source pollutant.

- "Ditched" topographic depressions, stream banks, internal lake systems and exposed agricultural lands are priority areas for hydrology restoration or reforestation to improve the water quality of our aquatic resources in the MAV.

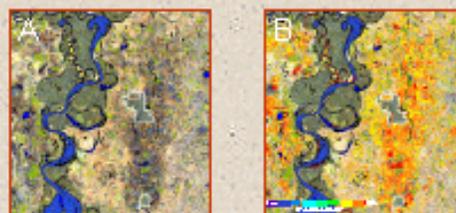
### Model Development



- Obtain and develop spatial data necessary to model hydrology and vegetation restoration priorities that will benefit water quality.



### Product



- A decision support model that identifies priorities for hydrology restoration and reforestation. Here, A satellite image depicts (A) cleared denitrifier hot spots and (B) an example of how the water quality decision support model will help define high priority restoration sites with denitrifier hot spots.

## Hydrology

### Background

- Historic flood pulse of the Mississippi River and its tributaries inundated millions of acres with nutrient rich alluvium. Flood control and drainage projects have significantly altered aquatic resources.



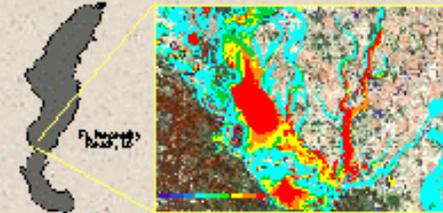
- Natural flood basins provide a myriad of ecological and socio-economic benefits, such as improved flood storage and habitat for wintering waterfowl.

### Model Development

- Classify extent of natural flooding from Landsat TM satellite imagery that corresponds to a range of river gauge readings.



### Product

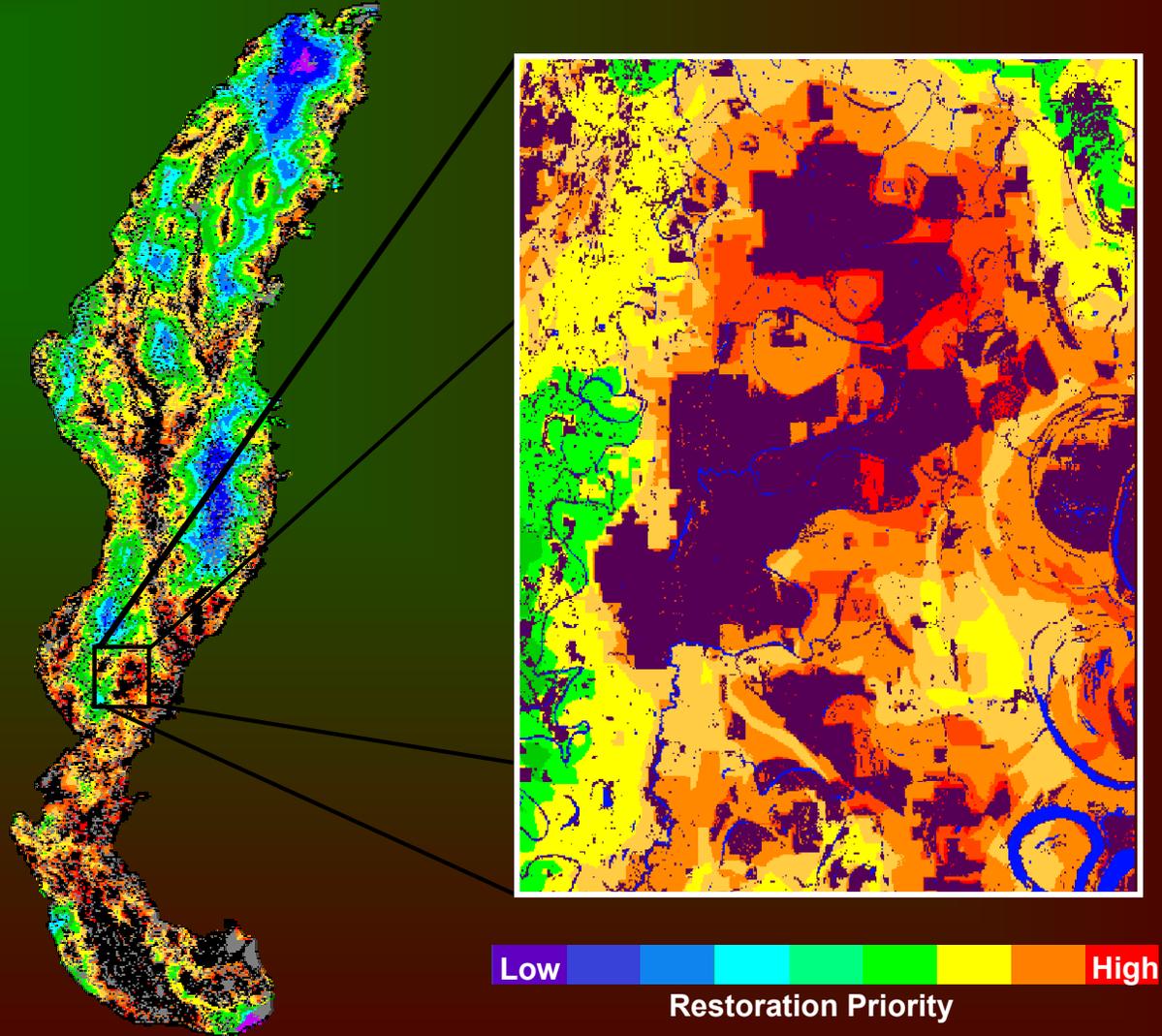


- A decision support model that identifies reforestation priorities focused on natural flood storage for high frequency events. Here, observed flood events derived from satellite imagery are interpolated to predict the continuation of flood events with higher frequency events receiving higher restoration priorities.

# Reforestation Priorities for Forest Breeding Birds

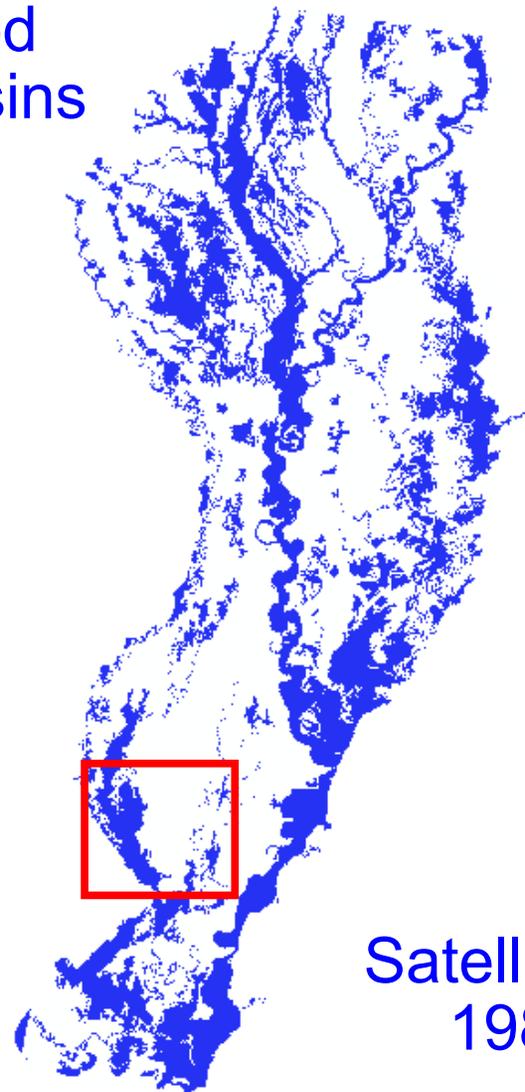


Science-based Priorities  
and  
Decision Support Models



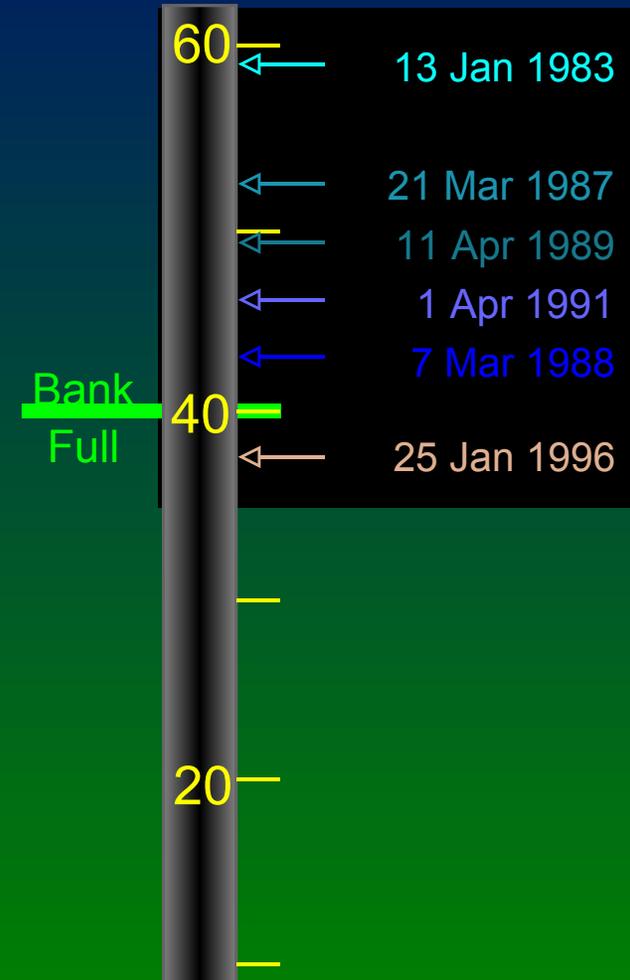
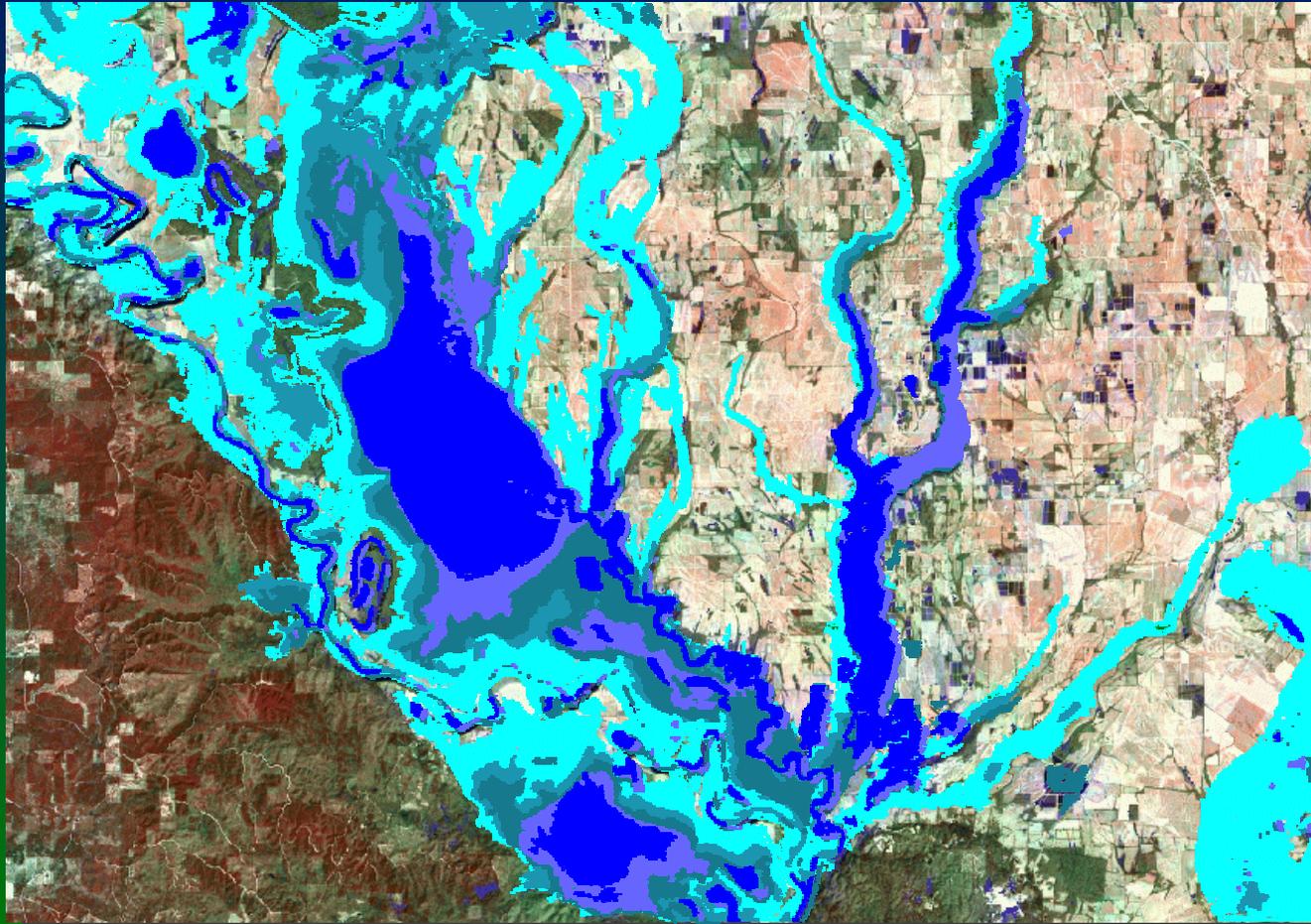
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# Natural Flood Storage Basins



Satellite Imagery  
1983-1999

# Flood Modeling Pilot Project Lower Boeuf River, Louisiana



# Reforestation Tracking and Monitoring Capabilities

## The LMVJV Reforestation Tracking System



Cleared lands restored through reforestation

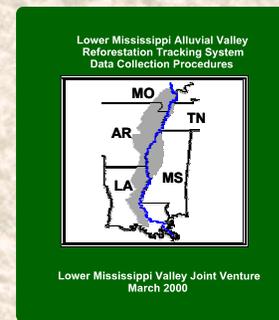


GIS



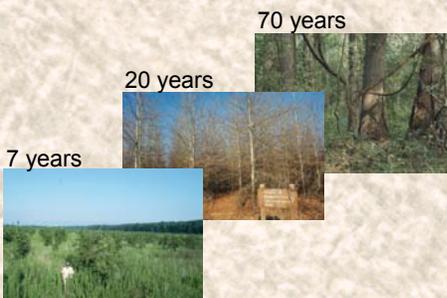
GPS

GIS and GPS used to delineate geographic location of reforested area.



Critical planting event information documented using RTS Procedures for tracking and evaluation purposes

*The Lower Mississippi Valley Joint Venture Reforestation Tracking System (RTS) is designed to provide a means of reporting and tracking reforestation, to establish baseline conditions for monitoring and evaluation purposes, and to deliver a spatial depiction of forest changes over time in order to assist with planning at multiple spatial scales.*



Monitoring programs designed to evaluate the success of planting strategies readily established within the framework provided by the RTS

	Reforested Acres
ARKANSAS	18,512
ILLINOIS	661
LOUISIANA	47,491
MISSISSIPPI	28,817
OKLAHOMA	172
TENNESSEE	1,632
TEXAS	1,192

Hard copy maps, data queries, and statistical summaries can be easily derived from the RTS



Tabular Databases

MS Access

Spatial Databases

ESRI ArcView



Resulting product is geospatial information linked with attribute data in a relational database system



Automated Reporting System

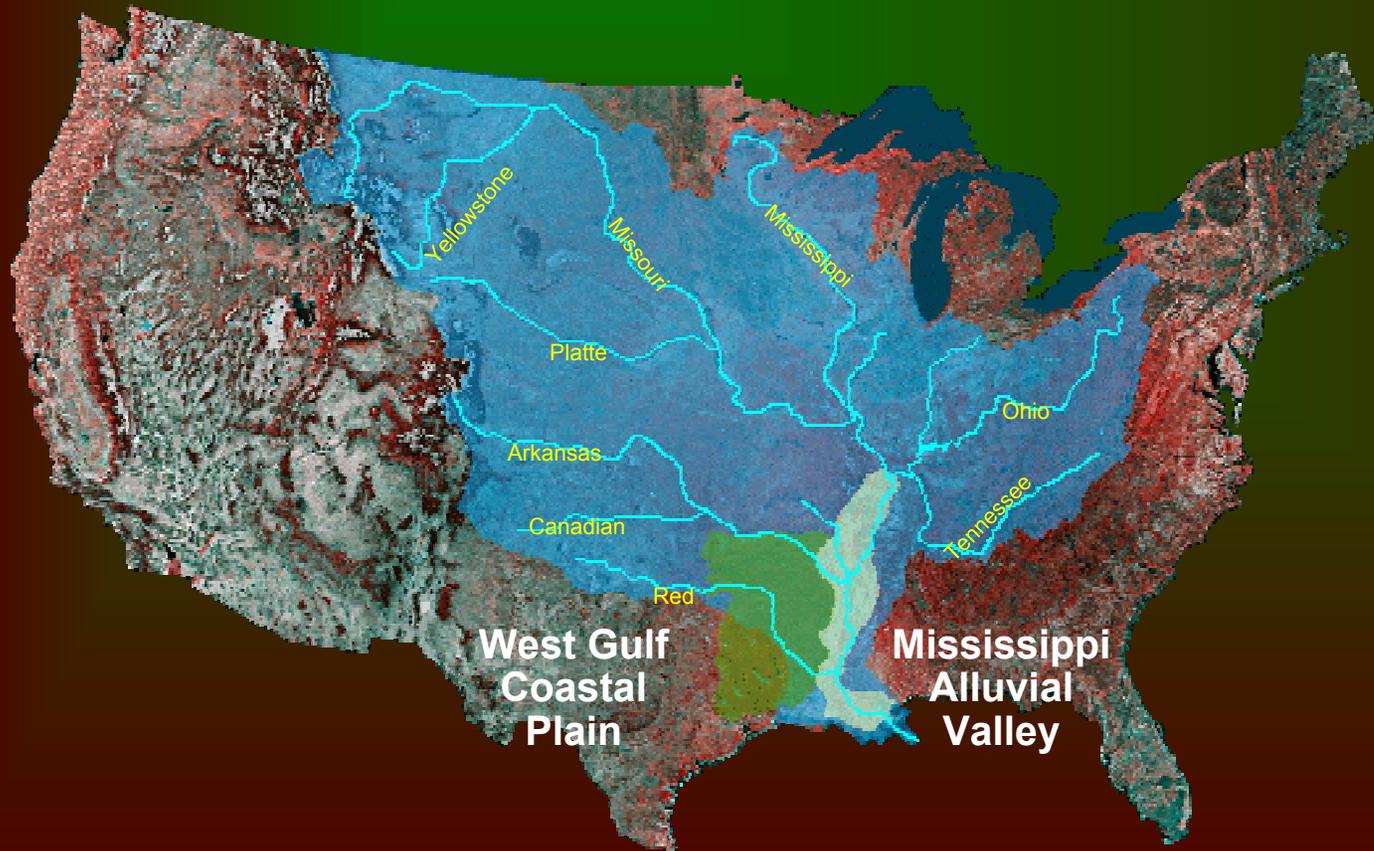
Internet-accessible data entry tables provide the reporting forester with user-friendly forms and links for easy data entry updates to the RTS database

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- How the Wildlife Community is Positioning Itself to Support Agriculture's Role
- A “Context for Coordination”

# A "Context for Coordination"

Linking energy, agricultural, and environmental policies and programs in support of ecologically and economically sustainable restoration



## Energy



## Environment



## Agriculture

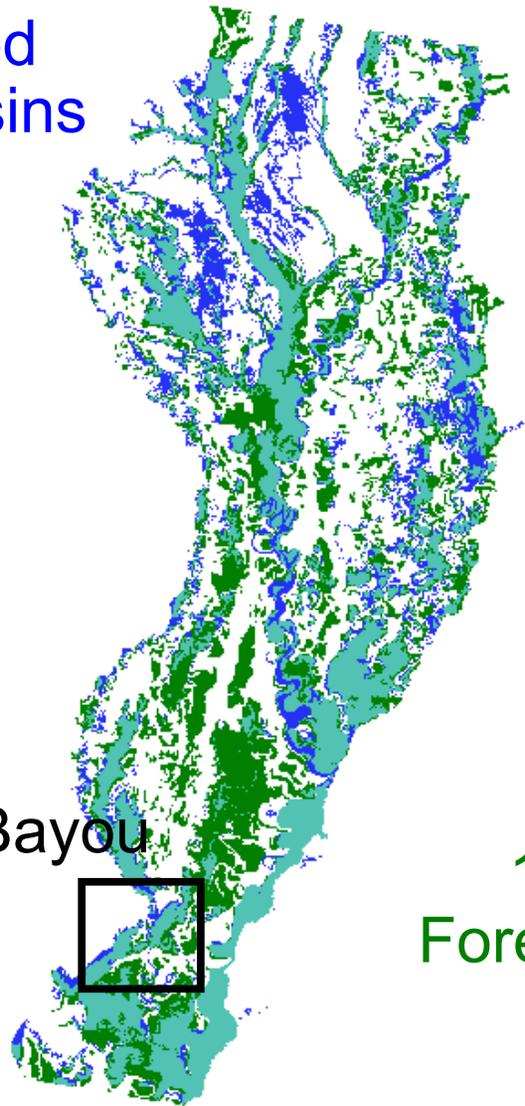


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Natural Flood Storage Basins

Bushley Bayou Area

1950's Forest Cover



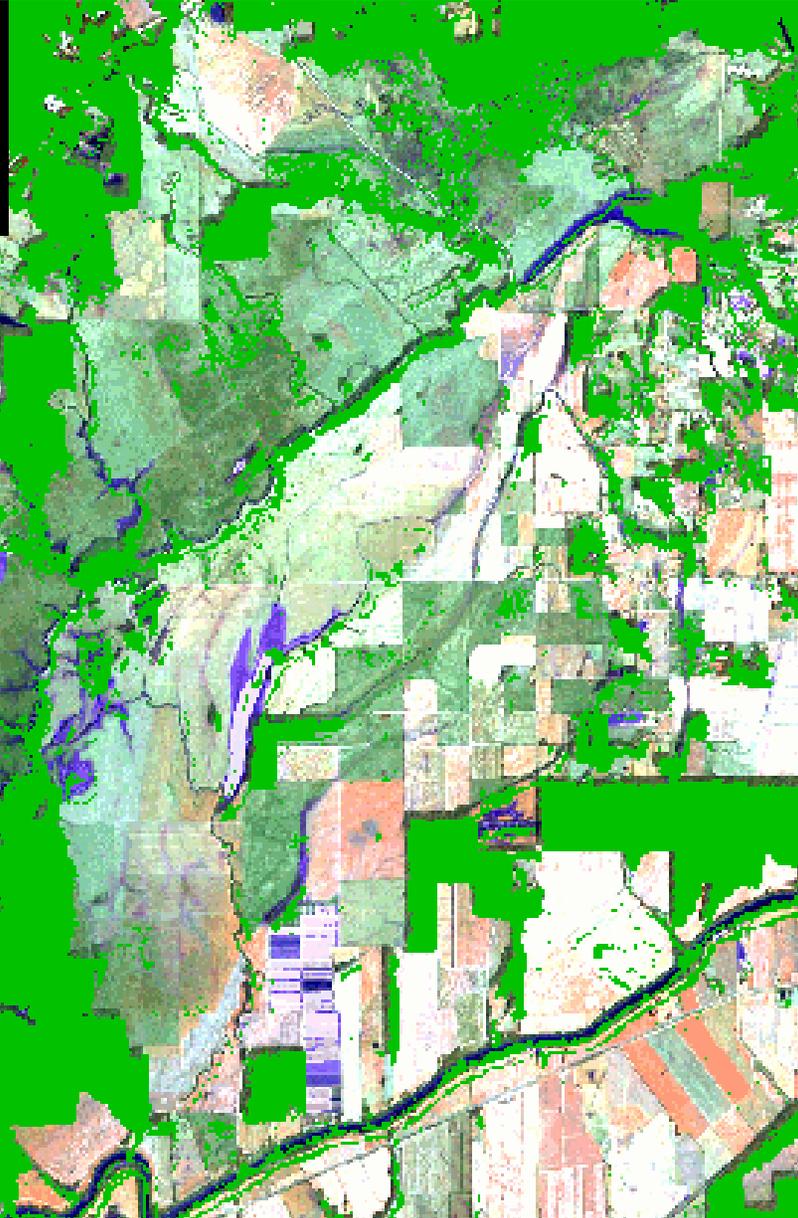
# Bushley Bayou Area



Bushley Bayou  
Louisiana

3 miles

North



1992 Forest Cover

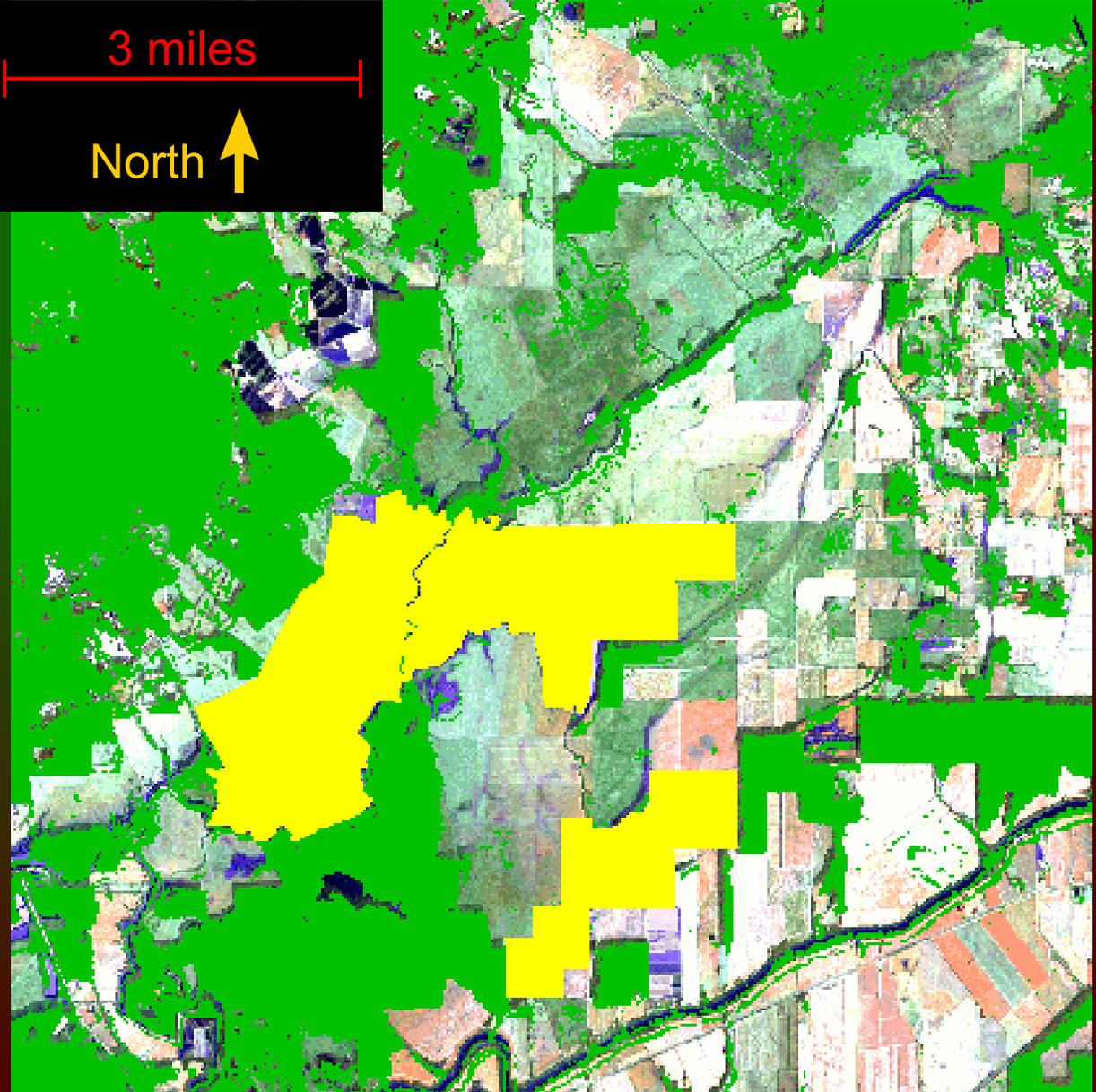
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Bushley Bayou  
Louisiana

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1992 Forest Cover

Wetland Reserve Program

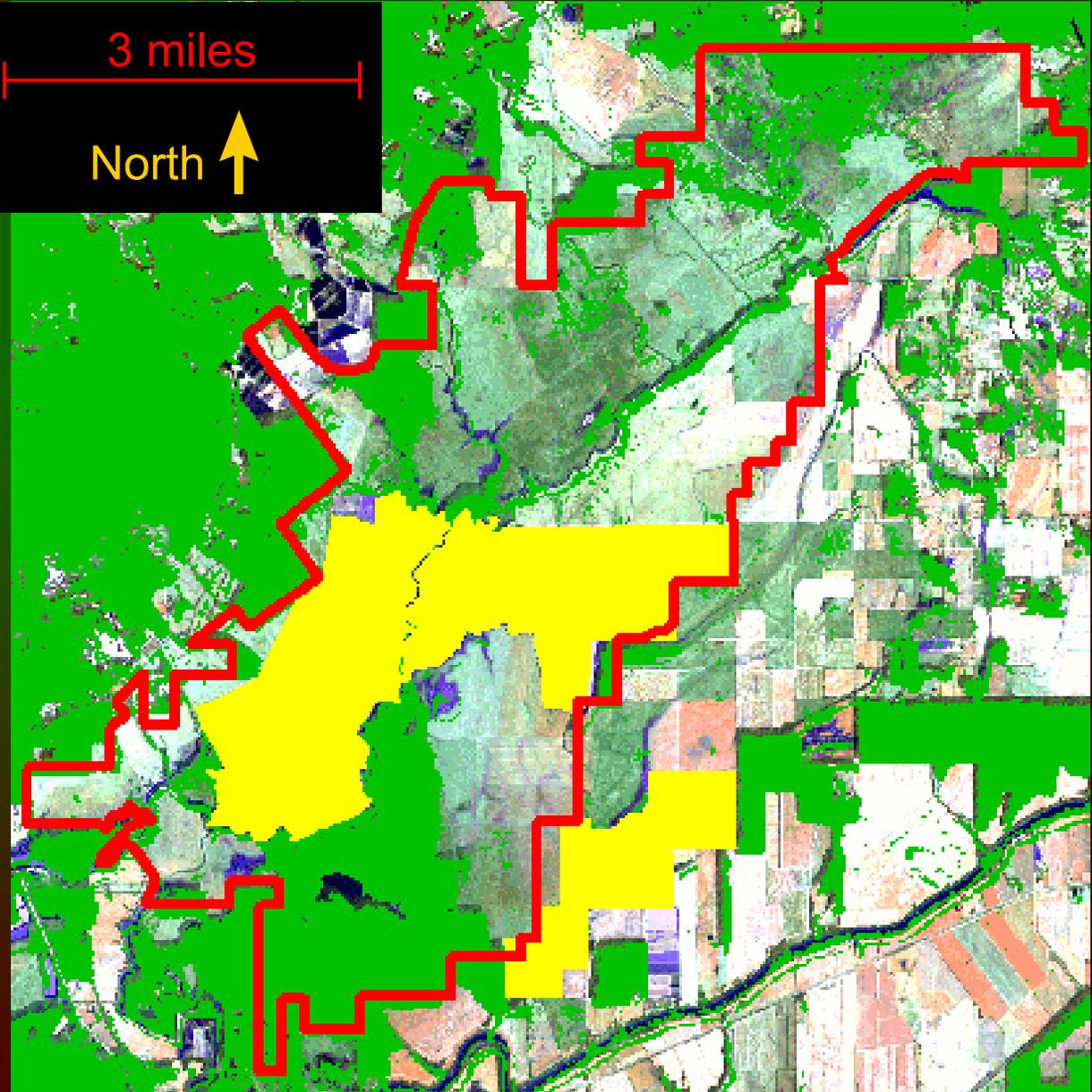
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Bushley Bayou  
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3 miles

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1992 Forest Cover

Wetland Reserve Program

AEP/FWS Acquisition

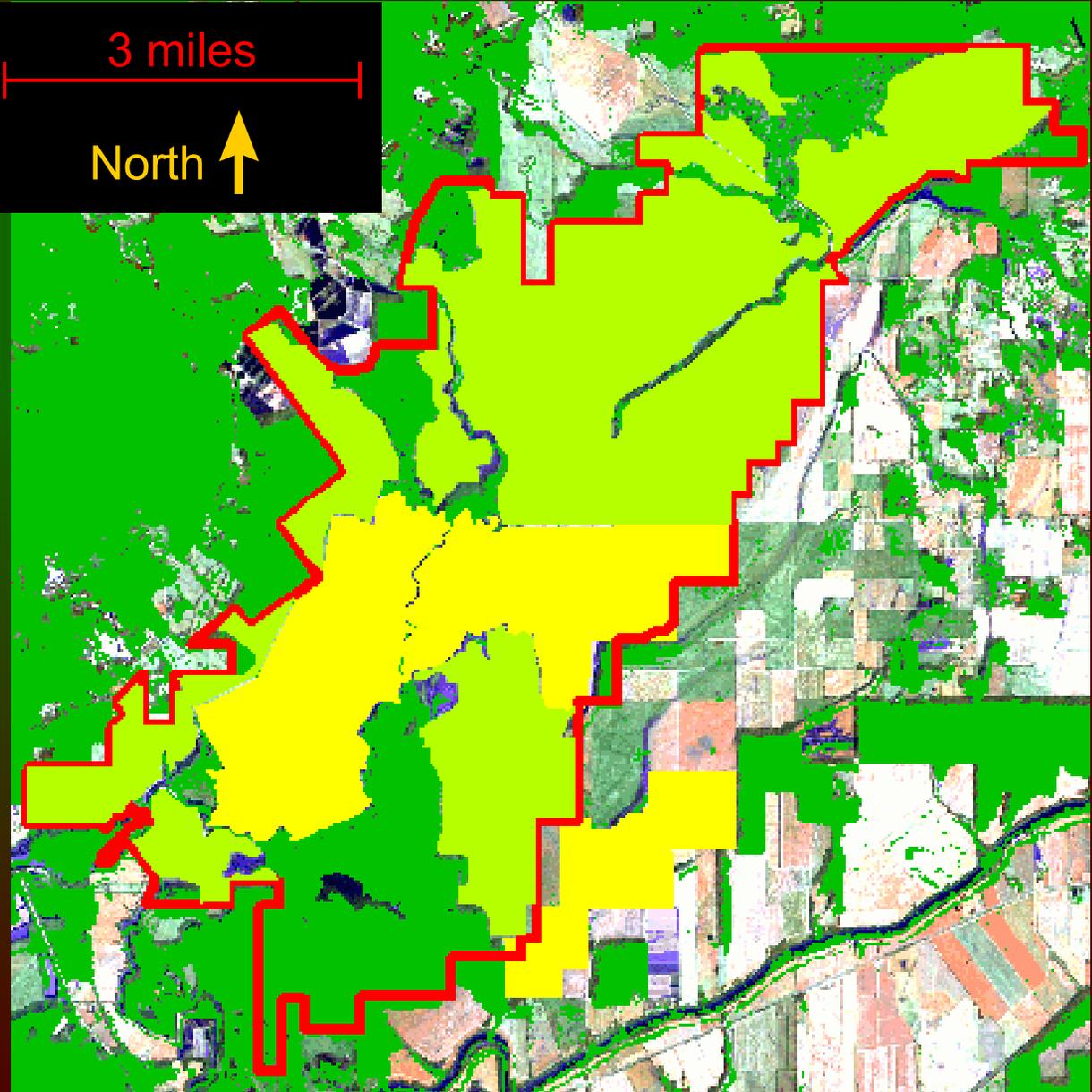
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Bushley Bayou  
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1992 Forest Cover

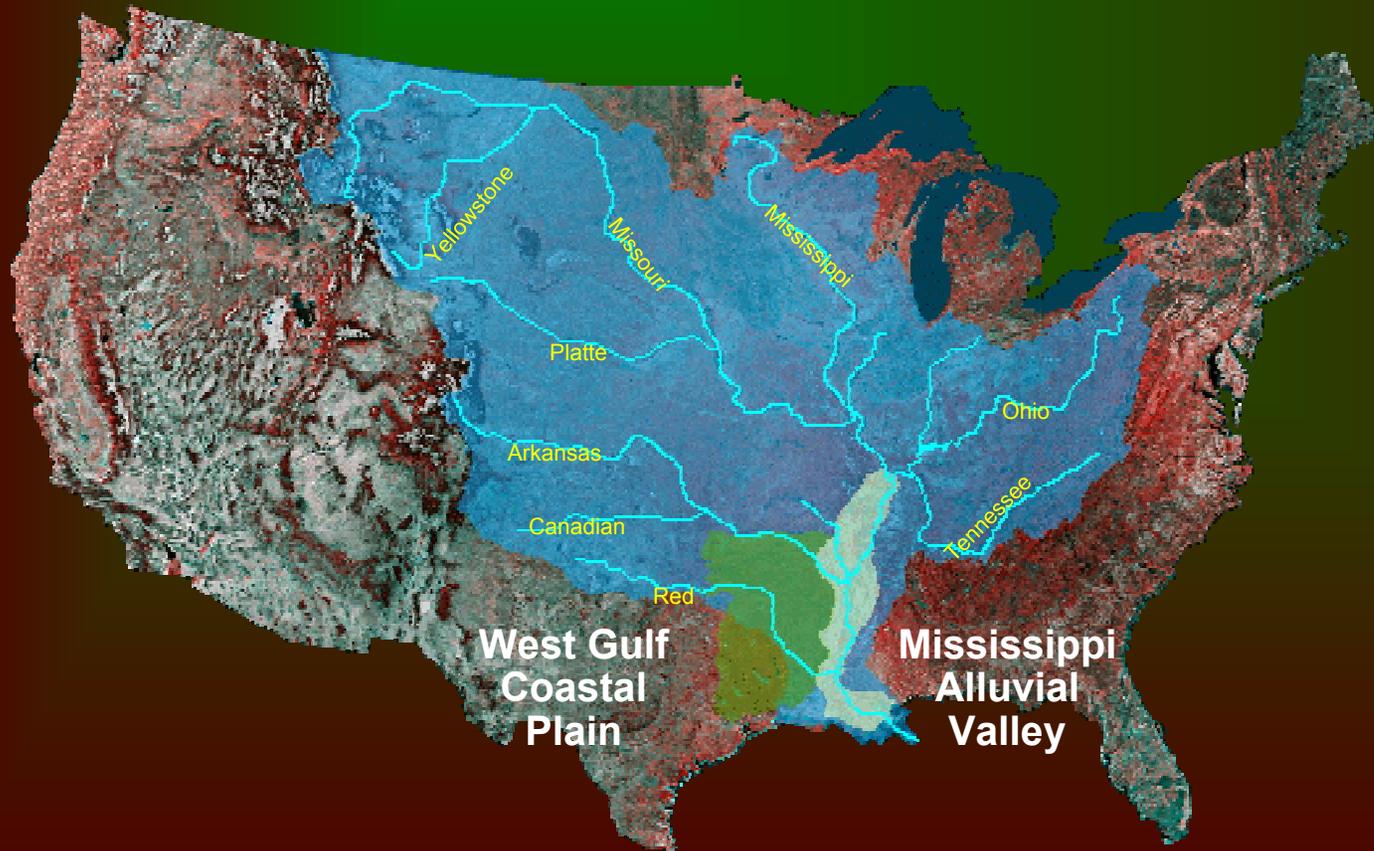
Wetland Reserve Program

AEP/FWS Acquisition

AEP Reforestation

# A "Context for Coordination"

Linking energy, agricultural, and environmental policies and programs in support of ecologically and economically sustainable restoration



## Energy



## Environment



## Agriculture



