

# **LOWER MISSISSIPPI RIVER AQUATIC RESOURCE MANAGEMENT PLAN**



**The Lower Mississippi River Conservation Committee**

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This plan for restoring aquatic resources in the Lower Mississippi River ecosystem was developed by the Lower Mississippi River Conservation Committee, an organization chartered in 1994 by 11 natural resource conservation and water quality agencies in Arkansas, Louisiana, Kentucky, Mississippi, Missouri and Tennessee.

## PLAN GOALS

- **Restore Aquatic Habitat and Biological Resources**
- **Improve Water Quality**
- **Form Strategic Partnerships**
- **Increase Public Awareness**
- **Promote a Sustainable Economy**

## PLAN BENEFITS

- **Conservation of Nationally Significant Natural Resources**
- **Increased Outdoor Recreational Opportunities**
- **Enhanced Water Quality in the Lower Mississippi Valley & Gulf of Mexico**
- **Expanded Employment Opportunities in the Mississippi Valley**

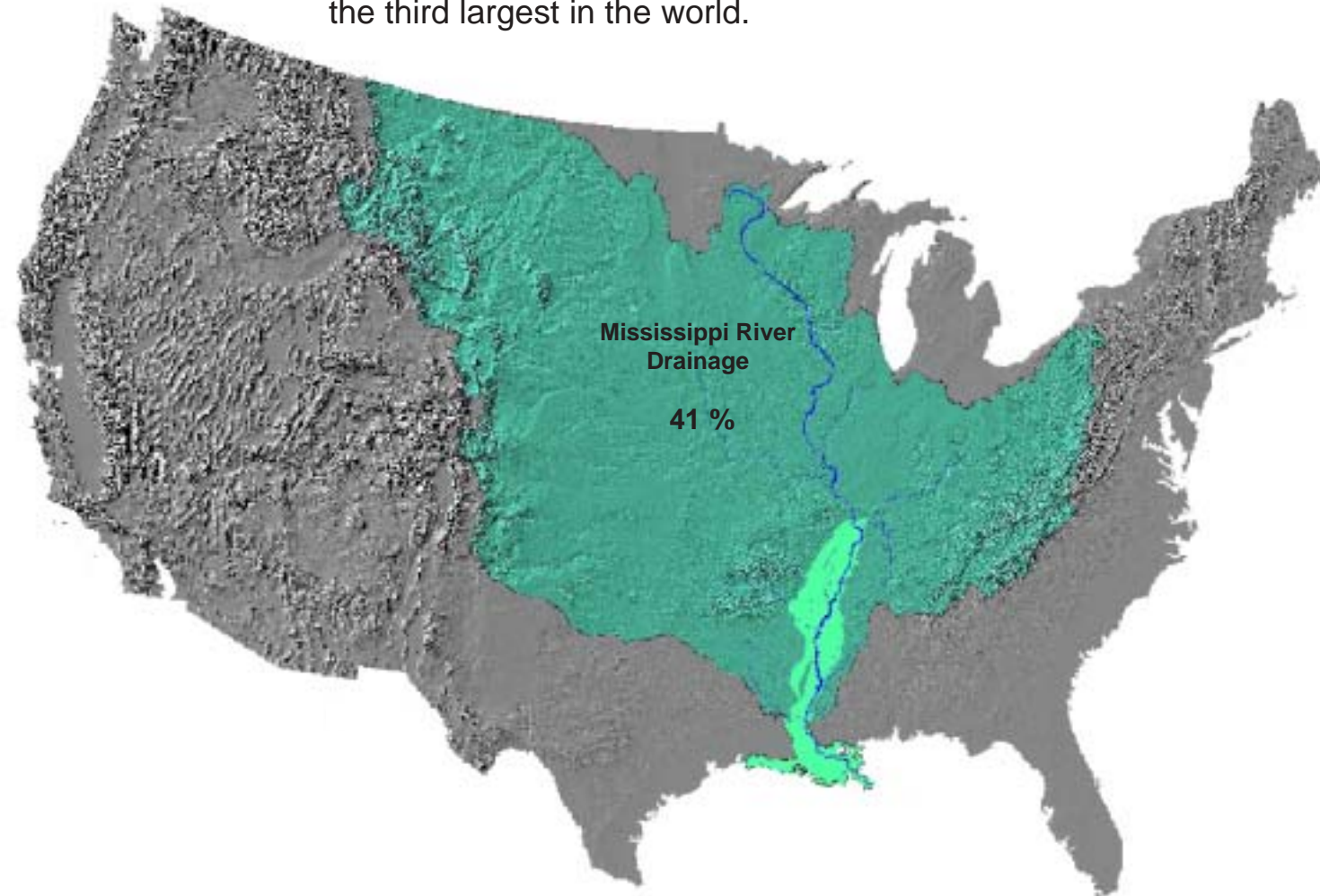


This document was prepared by Brad Miller, GIS Analyst, and Ron Nassar, Coordinator, of the Lower Mississippi River Conservation Committee with the assistance of the organization's Executive Committee. Funding for development and publication of the Aquatic Resource Management Plan was provided through grants from the Ohrstrom Foundation, United States Environmental Protection Agency, Region IV and VII, and the United States Fish and Wildlife Service, Region 4. Copies are available from the Lower Mississippi River Conservation Committee, 2524 South Frontage Road - Suite C, Vicksburg, MS 39180-5269 (601-629-6604).



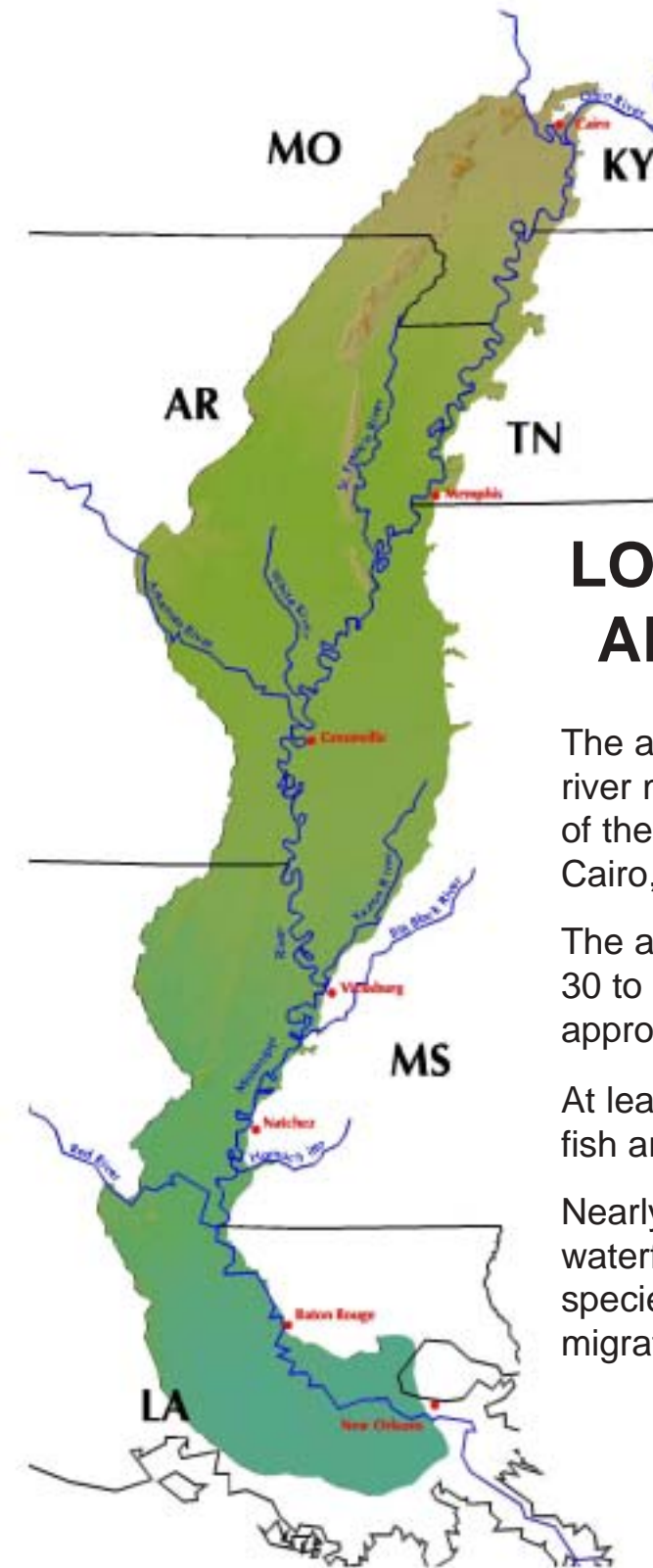
# THE MISSISSIPPI RIVER

Encompassing an area of more than 1.2 million square miles (41% of the continental United States) in all or part of 33 states and two Canadian provinces, the Mississippi River Drainage Basin is the third largest in the world.



The Mississippi River is the fourth longest river in the world, flowing 2,339 miles from its headwaters in Lake Itasca, Minnesota, to the Gulf of Mexico.

The Mississippi River's discharge of 420 billion gallons per day ranks seventh among the world's rivers.



## LOWER MISSISSIPPI ALLUVIAL VALLEY

The alluvial valley extends 954 river miles from the confluence of the Ohio and Mississippi rivers at Cairo, Illinois to the Gulf of Mexico.

The alluvial valley ranges from 30 to 110 miles wide and encompasses approximately 22 million acres.

At least 91 species of freshwater fish are found in the valley.

Nearly 40% of North America's waterfowl and 60% of all bird species in the United States migrate through the valley.

# HISTORIC LOWER MISSISSIPPI ALLUVIAL VALLEY ECOSYSTEM



Baldcypress along a Delta bayou

The Mississippi River was one of the dominant ecological forces in North America. Its 22 million acre alluvial valley was a bottomland forest traversed by numerous streams and bayous.

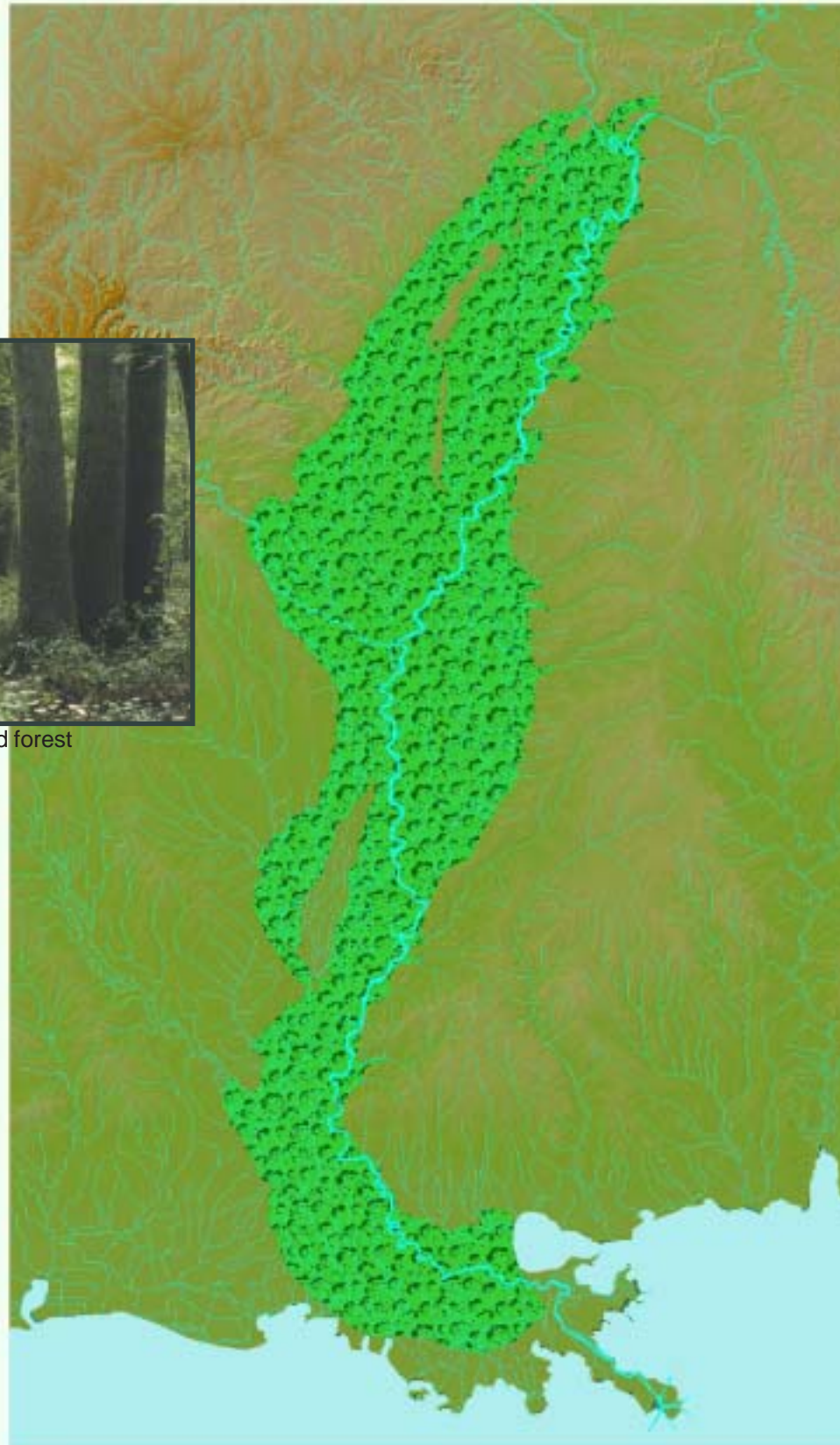


Bottomland hardwood forest



Egrets on a Mississippi River tributary

Almost annually, the Mississippi River and its tributaries flooded vast areas of the alluvial valley for several months. The floodplain was able to store the equivalent of 60 days of discharge.



Wandering through the alluvial valley in a 10 to 20 mile wide meander belt, the Mississippi River continually created new channels and abandoned old ones, which in turn, formed floodplain lakes.



Meander belt of the Mississippi River above Greenville, Miss.



Oxbow lake formed by an abandoned river channel

The Lower Mississippi River ecosystem, with its highly diverse aquatic habitat, was the most productive freshwater fishery in North America. It is estimated that the river once supported more than 150 species of fish.

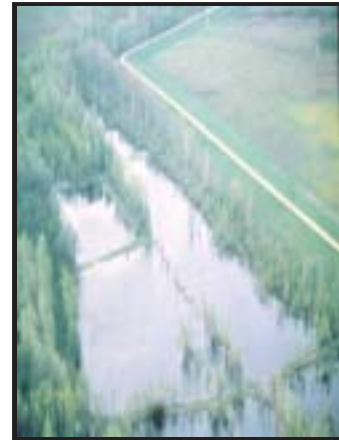
Striped bass



Miss. Museum of Natural Science

Sturgeon

## LEVEES



Earthen embankments have been constructed along much of the Mississippi River and its major tributaries to decrease flooding.



Early levee construction



Levee repair

## BANK STABILIZATION

1,056 miles of river bank have been lined with concrete mattresses (revetment) to prevent bank erosion and shifting of the river channel.



# ECONOMIC DEVELOPMENT OF THE LOWER MISSISSIPPI ALLUVIAL VALLEY

Despite an abundance of natural resources, significant economic development of the Lower Mississippi Alluvial Valley required: 1. Controlling floods and 2. Improving the navigability of the river.



Old Courthouse Museum, Vicksburg, MS

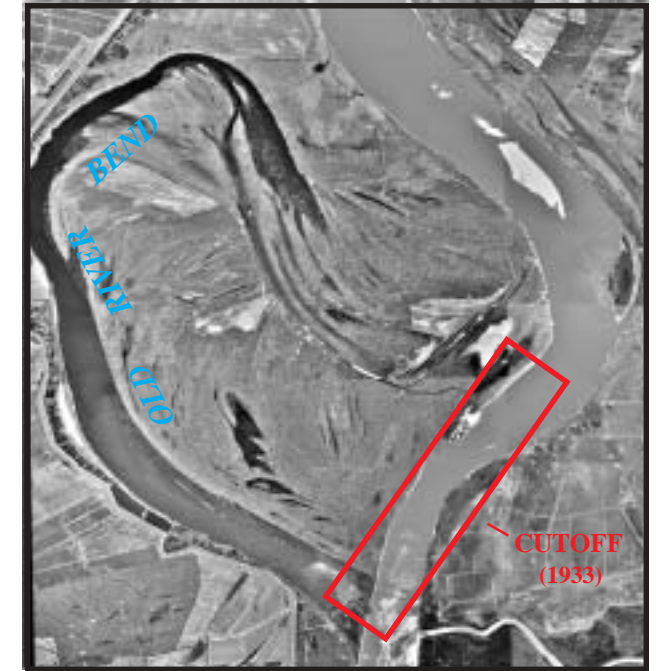
Levee construction and other river engineering efforts began as early as the 1700s. However, not until the Great Flood of 1927, which inundated more than 16 million acres for six months, did the Federal Government implement a comprehensive plan of flood control, channel stabilization and river regulation.

## ROCK DIKES

Rock barriers, some of which are more than a mile long, are constructed to redirect the flow of water into the navigation channel during periods of low flow. 125 separate rock dike systems totaling 206 miles have been constructed in the lower river.



## CUTOFFS



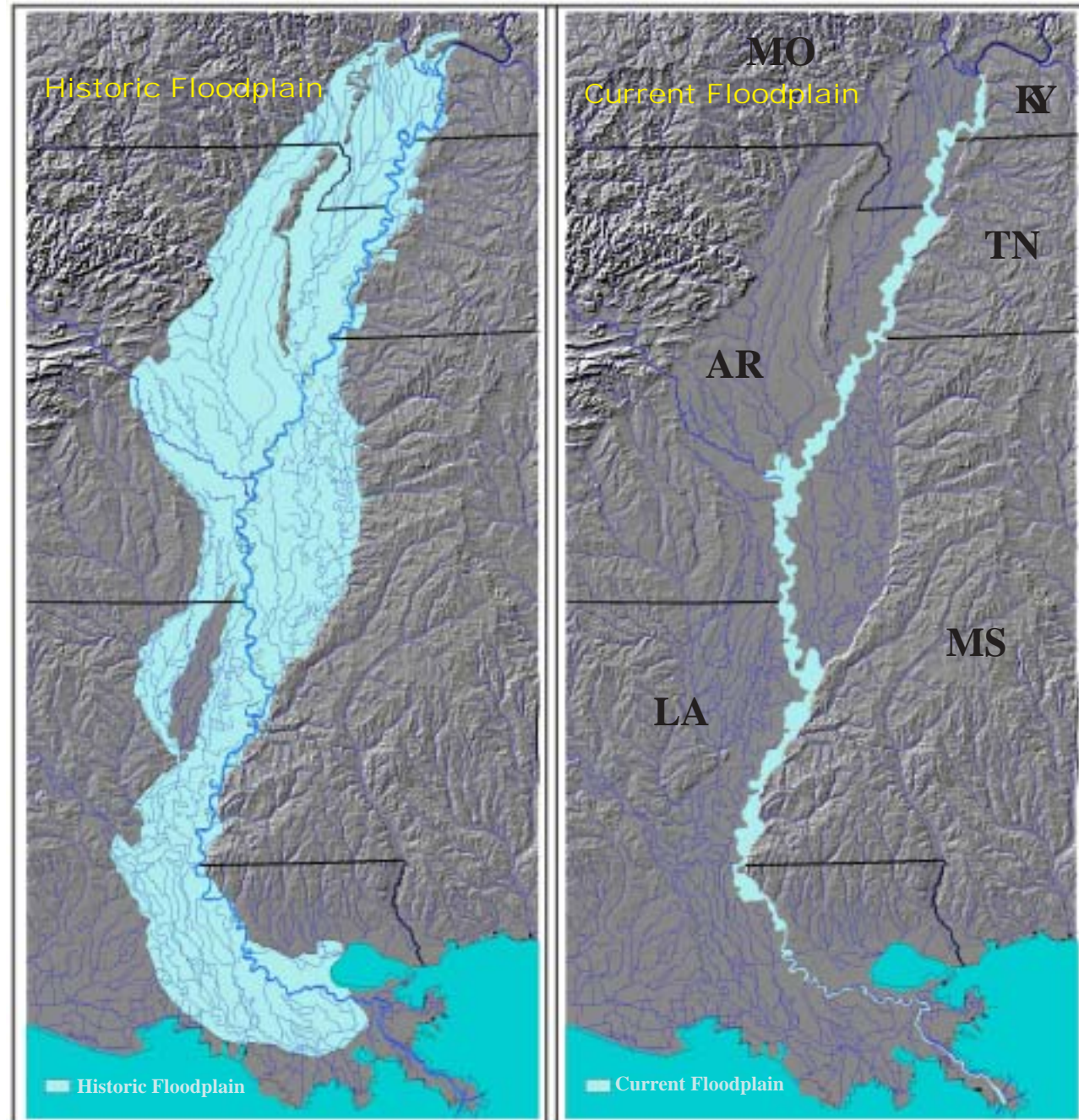
Glasscock cutoff

Cutoffs are excavated channels that eliminate loops or bends in natural river channels. By shortening the river they speed the flow of water through the channel but disconnect the bends from the river during periods of normal flow. Sixteen cutoffs were constructed between Helena, AR and Angola, LA, reducing the river's length by 152 miles.



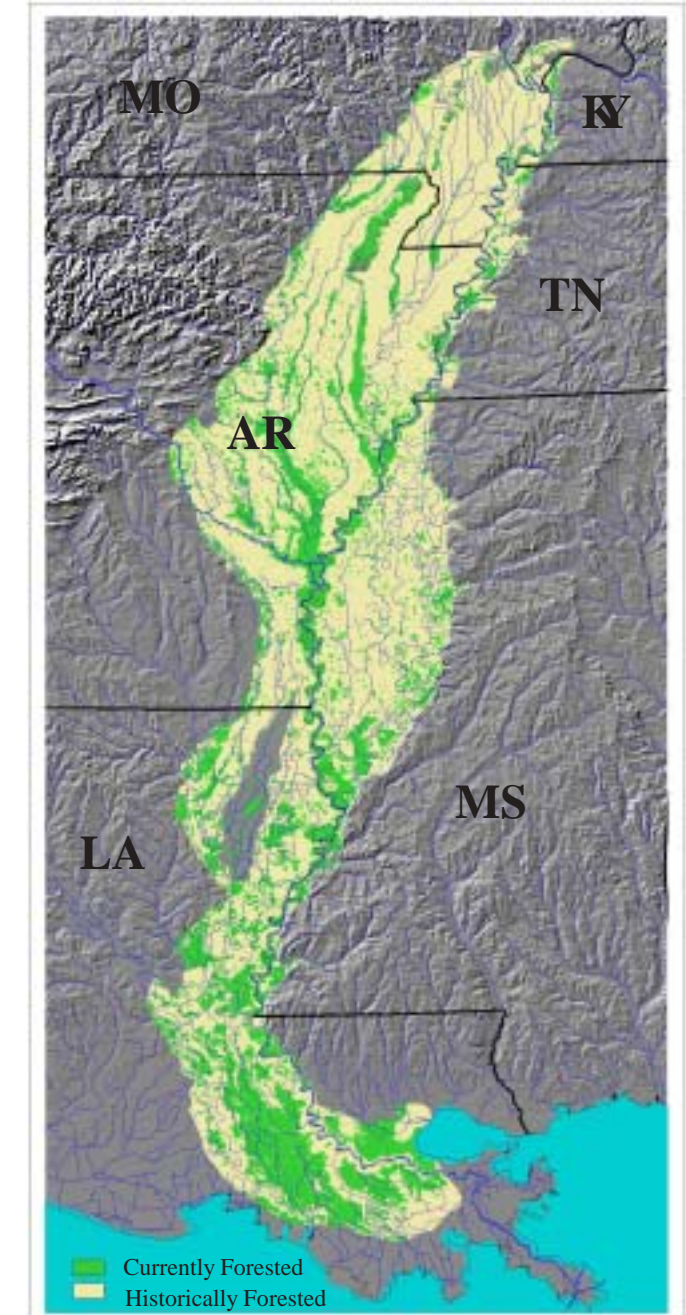
# ENVIRONMENTAL IMPACTS OF ECONOMIC DEVELOPMENT IN THE LOWER MISSISSIPPI ALLUVIAL VALLEY

## Loss of Floodplain Connectivity Due to Levees



Construction of levees along the Mississippi River and many of its tributaries has severed the river from over 90% of its floodplain, denying fish and other aquatic species access to millions of acres of foraging, spawning and nursery habitat.

## Land Clearing



The control of flooding allowed the clearing of the floodplain forest and the valley's conversion to agriculture. Approximately 80% of the original 22 million acre forest in the valley has been cleared. The vast majority of the remaining forest has been logged repeatedly leaving only several hundred acres of old growth forest.

## LOSS OF AQUATIC HABITAT

### Meander Belt



Historically, the Mississippi River continually eroded its banks, cutting new channels and filling old ones. River flow was often divided into two or more channels, providing a wide diversity of aquatic habitat. Over the centuries the river created a swath of abandoned channels and floodplain lakes.

River-control structures have largely locked the river in place. Virtually no new habitat is being created while existing floodplain lakes and secondary channels are gradually being lost due to sedimentation.

### Degrading Secondary Channels

More than 125 secondary or side channels in the Lower Mississippi River provide critical habitat for many recreationally and commercially important fish. However many of these channels are being lost to siltation due to dikes.



Growth of trees on sediment behind dikes.



As water levels decline during the summer, many secondary channels are cut off from the main river.

### Decline of Oxbow Lakes



Water levels in many oxbow lakes decline significantly during late summer and fall, creating poor habitat conditions for fish and other aquatic organisms.

## HYPOXIC ZONE

Each summer several thousand square miles of the Gulf of Mexico become depleted of oxygen (hypoxia). While some species flee the area, less mobile marine life die in vast numbers.

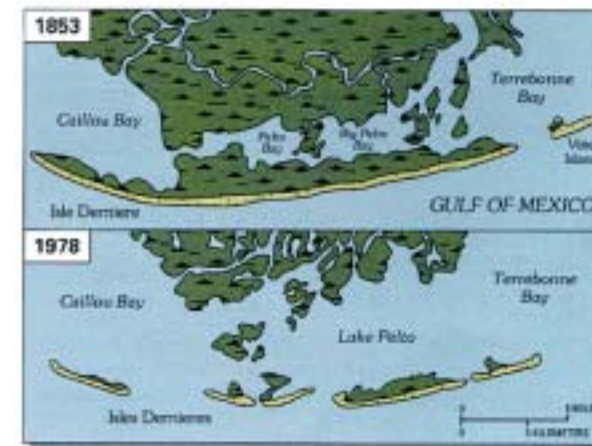
### Causes of the Hypoxic Zone

1. Each year the Mississippi River receives runoff in which the nutrient load has been enriched by sewage/industrial wastewater treatment plants, agricultural operations and emissions from automobile exhaust and fossil-fueled power plants.
2. The destruction of nitrogen-absorbing wetlands and the channelization of the Mississippi and its tributaries have resulted in the rapid transport of nutrient-rich waters into the Gulf of Mexico.
3. Nutrient-rich waters entering the Gulf of Mexico via the Mississippi River stimulate the growth of phytoplankton (microscopic plants or algae) in its surface waters. As they die and sink to the bottom, this dead plant material depletes the Gulf's deeper waters of oxygen.



## LOSS OF COASTAL MARSHES

Most of the sediment carried by the Mississippi River is channeled over the Continental Shelf rather than being allowed to flow into and rebuild the Louisiana coastal marshes. This results in an average loss of 25 to 35 square miles of marshland per year or one acre every 24 minutes.



### Importance of the Louisiana Coastal Marshes

Provides nursery grounds for North America's largest estuarine fishery and the foundation of the billion dollar Gulf seafood industry.

Absorbs excess water and destructive energy associated with high tides and tropical storm surges.

Improves water quality by filtering pollutants and absorbing excess nutrients.



Louisiana coastal marsh

# ACHIEVING THE GOALS OF THE AQUATIC RESOURCE MANAGEMENT PLAN

State natural resource management agencies in the Lower Mississippi Alluvial Valley have established primary objectives required to achieve the Plan's goals to: 1. Rehabilitate Aquatic Habitat and Biological Resources 2. Improve Water Quality 3. Promote a Sustainable Economy 4. Build Strategic Partnerships and 5. Increase Public Awareness

## AQUATIC HABITAT AND BIOLOGICAL RESOURCES

**OBJECTIVE:** Restore 50% of the degraded secondary channels in the Lower River



Notching rock dikes provides additional habitat to benefit fisheries without affecting the navigation channel or flood control.

**OBJECTIVE:** Restore 60% of the lakes in the leveed floodplain



Maintaining water levels in floodplain lakes improves habitat for aquatic resources.

**OBJECTIVE:** Restore, manage and conserve the biological diversity of aquatic species



Monitoring is imperative to evaluate the effectiveness of management and restoration activities.

## WATER QUALITY IMPROVEMENT

Implement Clean Water Act Strategies

**OBJECTIVE:** Restore hydrology on 80,000 acres of degraded wetlands



**OBJECTIVE:** Reforest 130,000 acres of cleared wetlands



**OBJECTIVE:** Determine short- and long-term water quality trends



## STRATEGIC PARTNERSHIPS

**OBJECTIVE:** Ensure coordinated management of the Lower Mississippi River ecosystem through involvement of management agencies, commercial interests and resource user groups in planning and implementing management activities



The Lower Mississippi River Conservation Committee, comprised of 11 member state natural resource management agencies, is working cooperatively with Region 4 of the U.S. Fish and Wildlife Service, Regions IV, VI and VII of the U.S. Environmental Protection Agency, the Mississippi Valley Division of the U.S. Army Corps of Engineers, U.S. Department of Agriculture, and the Water Resources Division of the U.S. Geological Survey to develop and implement the Aquatic Resource Management Plan.



## PUBLIC AWARENESS

**OBJECTIVE:** Improve public awareness of natural resource issues



The Mississippi River Foundation website provides a wide range of technical and general information on the ecosystem and recreational opportunities.



Newsletters, guides and pamphlets reach a wide range of stakeholders in the Lower Mississippi River ecosystem.

**OBJECTIVE:** Increase public involvement in conservation issues



Public meetings involving biologists, government representatives, land-owners and concerned citizens will increase awareness and build support for implementation of the Aquatic Resource Management Plan.

# SUSTAINABLE ECONOMIC DEVELOPMENT

**OBJECTIVE:** Maintain economic impact of outdoor-related recreation

**OBJECTIVE:** Increase economic growth by providing more outdoor-related recreation opportunities



U.S. Fish and Wildlife Service



U.S. Fish and Wildlife Service

## Annual Economic Value of Fishing and Wildlife-Related Recreation

In 1996, 10.8 million people in the Lower Mississippi Alluvial Valley participated in fishing and wildlife-related outdoor recreation (excluding hunting). They spent \$5.9 billion on such items as food, fuel, lodging and equipment.

ARKANSAS	Annual Participants	Annual Expenditures
Angling	739,000	\$301,829,000
Bird/Wildlife Watching	658,000	\$579,845,000
<b>TOTAL</b>	<b>1,397,000</b>	<b>\$881,674,000</b>

MISSISSIPPI	Annual Participants	Annual Expenditures
Angling	487,000	\$703,692,000
Bird/Wildlife Watching	458,000	\$299,336,000
<b>TOTAL</b>	<b>945,000</b>	<b>\$1,003,028,000</b>

KENTUCKY	Annual Participants	Annual Expenditures
Angling	772,000	\$517,029,000
Bird/Wildlife Watching	951,000	\$336,522,000
<b>TOTAL</b>	<b>1,732,000</b>	<b>\$853,551,000</b>

MISSOURI	Annual Participants	Annual Expenditures
Angling	1,138,000	\$702,978,000
Bird/Wildlife Watching	1,623,000	\$507,926,000
<b>TOTAL</b>	<b>2,761,000</b>	<b>\$1,210,904,000</b>

LOUISIANA	Annual Participants	Annual Expenditures
Angling	815,000	\$824,340,000
Bird/Wildlife Watching	861,000	\$198,679,000
<b>TOTAL</b>	<b>1,676,000</b>	<b>\$1,023,019,000</b>

TENNESSEE	Annual Participants	Annual Expenditures
Angling	767,000	\$474,724,000
Bird/Wildlife Watching	1,507,000	\$439,583,000
<b>TOTAL</b>	<b>2,274,000</b>	<b>\$914,307,000</b>



U.S. Fish and Wildlife Service



1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. U.S. Department of the Interior, U.S. Department of Commerce and Bureau of Census

# LMRCC EXECUTIVE COMMITTEE

The members of the Lower Mississippi River Conservation Committee Executive Committee agree with the purpose, goals and strategies contained within the Plan and are committed to its long-term implementation. This commitment, recognizing that funding is subject to the annual budgetary constraints and process of each individual agency or organization, does not obligate funding at any prescribed level.

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