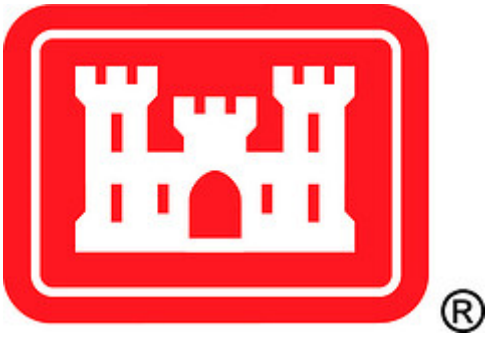
Final Assessment
In Response to Section 402 of WRDA 2000

Final
July 2015



The information presented in this report is to provide a strategic framework of potential options to address problems within the watershed. Options identified will follow normal authorization and budgetary processes of the appropriate agencies. Costs presented were rough order magnitude estimates used for screening purposes only.

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Executive Summary

Congress authorized the Lower Mississippi River Resource Assessment to examine river management information, habitat, and recreation; identify needs for each of these; and make recommendations for meeting those needs. The Assessment of Information Needed for River-Related Management found that information about sediment and water quality was lacking, data storage and availability need to be better managed, and a better understanding of tributaries would benefit management of the Mississippi River. The Assessment of Natural Resource Habitat Needs found there was a need to better understand water quality, restore the native vegetative mosaic, reconnect secondary channels, manage invasive species, improve the quality of floodplain habitats, inventory river islands, restore main channel habitats, support coastal wetland restoration, and develop plans to comprehensively restore entire river reaches. The Assessment of the Need for River-Related Recreation and Access identified the need for more and better boat ramps, bicycle trails, outfitter and guide services, lodging and dining options, riverside parks, interpretation, riverboat landings and marketing.

This Lower Mississippi River Final Assessment accumulated the needs identified in the previous assessments and found overlap among many of them. In fact most river related recreation is directly related to the natural resources and habitats on the river. This assessment recommends three programs to address the needs on the river. Each of these programs includes multiple studies and projects. The recommendations leverage existing programs and encourage both public and private investment in the river. All recommendations are compatible with navigation and flood risk management.

The recommended Data Information Science and Communications Program would create an interagency center to store and share information, support the ongoing sediment studies, establish a comprehensive water quality monitoring program, conduct studies on tributary watersheds, and complete ecological inventories of river islands and potential natural vegetation. This program would rely on the U.S. Army Corps of Engineers; U.S. Geological Survey; U.S. Fish and Wildlife Service; U.S. Environmental Protection Agency; the states of Illinois, Kentucky, Missouri, Tennessee, Arkansas, Mississippi, and Louisiana; and non-governmental organizations to implement. The program would benefit a variety of habitats and the species that rely on them, recreational users, local economies, navigation, flood risk management, and other river resources.

Data Science and Communications Program				
Recommendation		**Lead Organization**	**Cost[1]**	**Value**
DISC 1	Science Technology Information Center	USGS – lead; USACE, EPA, NPS, USFWS, states and NGOs	$2 million/year	Promote interagency cooperation, encourage research, foster public interest, and support other recommendations.
DISC 2	Sediment Study	USACE	$4 million/year	Support management plans, better manage dredging and coastal restoration.
DISC 3	Water Quality Monitoring Program	USGS & EPA	$2 million/ year	Provide clean water for people, industry, and habitat.
DISC 4	Tributary Watershed Studies	USACE	9 @ $1-$5 million each	Develop plans to manage tributaries for habitat, water quality, sediment, water supply, navigation and recreation.
DISC 5	Ecological Inventory	USACE & USFWS	$1.7 million	Provide information to support restoration.

[1] Costs presented were rough order magnitude estimates used for screening purposes only and are not for authorization or budgetary purposes

The recommended Habitat Restoration and Management Program would support restoration of river reaches, numerous individual aquatic habitat restoration projects, terrestrial habitat restoration, and invasive species management. This program would primarily rely on the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and the Lower Mississippi River Conservation Committee with their cooperating agencies, partners and states – Illinois, Kentucky, Missouri, Tennessee, Arkansas, Mississippi, and Louisiana. The program would benefit a variety of habitats and the species that rely on them, recreational users, local economies, and other river resources.

Habitat Restoration and Management Program				
Recommendation		**Lead Organization**	**Cost**[1]	**Value**
HRMP 1	Conservation Reach Studies	USACE	8 @ $3 million each	Restore aquatic (side channel, oxbow, main channel, islands, and sandbars) and terrestrial (wetlands, bottomland hardwoods, and floodplain) habitats for native species and especially federally listed species.
HRMP 2	Aquatic Habitat Restoration Projects	USACE & USFWS	125 @ $200,000 to $ 15 million (maximum)	Restore individual sites for native species.
HRMP 3	Terrestrial Habitat Program	USDA & LMVJV	$18,000,000	Restore floodplain habitat.
HRMP 4	Invasive Species Program	MICRA & ANSTF	Part of larger effort	Promote and protect native species.

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The recommended Recreation Program would support construction of boat ramps, bicycle trails, riverfront parks and riverboat landings; encourage coordinated marketing and interpretation; and entice lodging, dining and outfitter guide businesses. The program would rely on entrepreneurs to provide commercial services, and local community governments and organizations with assistance from the National Park Service to build public infrastructures. The program would benefit recreational users and local economies and would add visibility to all of the other resources of the river.

Recreation Program				
Recommendation		**Lead Organization**	**Cost**[1]	**Value**
RP 1	Boat Ramps	LMRCC and others	$50,000 - $750,000 each	Increase safety and meet recreation demand.
RP 2	Bicycle Trails	NGOs	variable	Increase safety and meet recreation demand.
RP 3	Riverfront Parks	Local Communities	variable	Promote community cohesiveness and meet demand.
RP 4	Riverboat Landings	Local Communities	variable	Provide safe, accessible opportunities and support local economic development.
RP 5	Marketing	NPS, MRPC, NGOs	$2 million	Promote river use and encourage economic development.
RP 6	Lodging and Dining	Private Enterprise	variable	Meet demand and support economic development.
RP 7	Outfitters and Guides	Private Enterprise	variable	Increase safety, meet demand and support economic development.

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I. Introduction

This report is the final assessment for the Lower Mississippi River Resource Assessment. It follows three previous reports. The first examined the river to determine the information needed for river-related management. The natural resource habitat needs and the recreation and access needs were examined in the next two reports. This final assessment combines those results and recommends projects and programs to meet the identified needs in concert with the ongoing navigation and flood risk management programs on the Lower Mississippi River. These documents are available at: http://www.mvm.usace.army.mil/Missions/Projects/LMMRA.aspx

The Mississippi River is an American icon. The statistics about the river are impressive: drains all or parts of 31 states and 2 Canadian Provinces; is the third largest watershed in the world overlying one of the three most productive agricultural zones on the planet; provides drinking water for more than 18 million people; transports 62 percent of our Nation's agricultural output; delivers nearly 400 million tons of coal and petroleum products annually; and directly supports one million jobs. The numbers tell part of the river's story, but not all.

A thousand years before Christopher Columbus, a new culture arose and spread across the Mississippi Valley and the southeast. The culture was concentrated along the Mississippi River and is now called "Mississippian." Mississippian Indians included many tribes speaking different languages, but most belonged to either the Caddoan group (west of the river) or the Muskhogean (east). Many other tribes eventually adopted the new way of life. These tribes built hundreds of mounds up and down the river (Lewis & Kneberg 1958). Many of these mound complexes still exist and some are now state parks.

The first European to explore the Mississippi River was Hernando De Soto, who died on its banks in 1542. Jacques Marquette and Louis Jolliet followed in 1673; and in 1682, Robert LaSalle claimed the river for France. France ceded the river to Spain in 1763, but took it back in 1800. In 1803, President Thomas Jefferson purchased the Louisiana Territory from France despite agreeing that the Constitution did not contain provisions for acquiring territory. Jefferson believed the Mississippi River was an important trade route and he wanted to remove France's influence in the region (Robards 2003).

Control of the Mississippi River was a key military objective of the Union during the Civil War. General Ulysses Grant's Union forces pushed down from Cairo, IL and up from New Orleans, LA and met at Vicksburg, MS for a six-week siege that ended July 4, 1863. Vicksburg National Cemetery is the largest interment of Civil War dead in the Nation. Port Hudson, LA was the last Confederate controlled fort on the river. The battle at Port Hudson was the longest siege in American history. It took 48 days, for 40,000 Union soldiers to defeat 7,500 Confederates. Shortly after the end of the war, Union soldiers who had been prisoners of war loaded onto the steamboat Sultana to go home. The steamship exploded near Memphis, TN and approximately 1,700 were killed. This tragedy is the largest maritime disaster in U.S. history.

John James Audubon was one of the first to document the incredible diversity of wildlife along the Mississippi River. He spent a great deal of time along the Mississippi River from St. Genevieve, MO to New Orleans. In 1821, he spent only four months at Oakley Plantation near

St. Francisville, LA but he made 32 bird paintings there. Audubon recognized that the Mississippi River is one of the most diverse river systems in the world and is rich in species and density of fish, birds, mammals, amphibians, reptiles, and invertebrates. Today, scientists know the Mississippi Flyway hosts the world's largest bird migration, and over 300 species of migrating birds use it.

Mark Twain is probably the best known ambassador of the Mississippi River. Twain grew up along the river and was a riverboat pilot. His *Life on the Mississippi* (1883) and *Huckleberry Finn* (1885) both chronicle life on the Mississippi prior to the Civil War. Although *Huckleberry Finn* was a work of fiction, it placed the Mississippi River into the consciousness of people around the world. Edna Ferber again brought the river to the public's attention with her 1926 novel *Show Boat* which became the Broadway show of the same name featuring Oscar Hammerstein's *Ol' Man River*.

Managing a river as large and powerful as the Mississippi has never been easy. Congress created the Mississippi River Commission in 1879 to advise lawmakers on the needs for flood risk management and navigation. The Federal Mississippi River and Tributaries Project levees, floodwalls, backwaters and floodways form the world's largest and most comprehensive flood risk management system. Navigation management began in the early 19th century and now Mississippi River commercial shipping is one of the Nation's valuable assets. On the upper Mississippi River, locks and dams were built to facilitate navigation. These features are not needed below the confluence with the Missouri River.

The Lower Mississippi River (LMR) begins at the confluence of the Mississippi and Ohio Rivers in southern Illinois and meanders southward 954 miles to Head-of-Passes, LA, where the channel subdivides into several distributaries to the Gulf of Mexico. The LMR has two distinct reaches. From the mouth of the Ohio River south to Baton Rouge, LA the river has well-defined point bars and forested floodplains adjacent to the river (Baker et al. 1991). The navigation channel is maintained at a minimum of 9 feet, but is authorized for 12 feet. Below Baton Rouge, the river flows through the Deltaic Plain to the Gulf. The channel is deeper to accommodate ocean-going traffic (45 feet), and there are few meander loops, sandbars, and little floodplain (Baker et al. 1991).

The LMR floodplain is a dynamic freshwater ecosystem that changes with the river's annual hydrologic regime. The nearly 3 million-acre floodplain is interspersed with abandoned channels, meander scars, and large expanses of forested wetlands. These areas provide a diverse array of aquatic habitat types and are connected to the river at high water. The LMR supports over 90 freshwater fish species and several federally listed threatened or endangered species. People flock to the river to watch birds and other animals.

The Mississippi River is an economic powerhouse for the region. It generates over $150 billion dollars a year in revenues and employs over 580,000 people in the LMR area. Agriculture generates nearly $9 billion a year, navigation generates $4 billion, and river-dependent manufacturing brings $106 billion. Recreation and tourism within the LMR corridor generate nearly $17 billion in annual spending, support thousands of businesses and employ over 240,000 people (IEc & Dziegielewska-Parry 2014).

Interest in the Mississippi River as an economic engine, tourist destination and ecological resource is growing. Government agencies, industries, municipalities and non-governmental organizations are joining forces through America's Inner Coast Summit, America's Watershed Initiative, and the Mississippi River Cities and Towns Initiative (MRCTI), to promote the river and highlight its needs. In 2013, the MRCTI signed a Memorandum of Common Purpose with the U.S. Army Corps of Engineers (USACE) with a goal to "perpetuate an era of cooperation and collaboration between the Mayors on the main stem Mississippi River and the U.S. Army Corps of Engineers, to protect, sustain and enhance the natural attributes and economic vitality of the Main Stem Mississippi River."

The Mississippi River Commission developed a 200-year working vision for the river to insure that people can continue their lives on the Mississippi River. The vision balances the Nation's needs for security and flood damage reduction with environmental sustainability and recreation, infrastructure and energy, water supply and water quality, and navigation. They committed to five goals for the river to insure its value for future generations. This final assessment builds on these goals and the success of other efforts to manage the Mississippi River.

Lead secure lives along the river or tributary

Enjoy fresh air and the surrounding fauna, flora, and forests while hunting, fishing, and recreating

Travel easily, safely, and affordably

Drink from and use the abundant waters of any river, stream, or aquifer

Choose from an abundance of affordable basic goods and essential supplies that are grown, manufactured, and transported along the river to local and world markets

Congressional Authority

The Lower Mississippi River Resource Assessment (LMRRA) is authorized by Section 402 of the Water Resources Development Act of 2000, Public Law 106-541. It reads:

(a) ASSESSMENTS- The Secretary, in cooperation with the Secretary of the Interior and the States of Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee, shall undertake for the Lower Mississippi River system--

> *(1) an assessment of information needed for river-related management;*
>
> *(2) an assessment of natural resource habitat needs; and*
>
> *(3) an assessment of the need for river-related recreation and access.*

(b) PERIOD- Each assessment referred to in subsection (a) shall be carried out for 2 years.

(c) REPORTS- Before the last day of the second year of an assessment under subsection (a), the Secretary, in cooperation with the Secretary of the Interior and the States of Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee, shall transmit to Congress a report on the results of the assessment to Congress. The report shall contain recommendations for--

> *(1) the collection, availability, and use of information needed for river-related management;*
>
> *(2) the planning, construction, and evaluation of potential restoration, protection, and enhancement measures to meet identified habitat needs; and*
>
> *(3) potential projects to meet identified river access and recreation needs.*

(d) LOWER MISSISSIPPI RIVER SYSTEM DEFINED- In this section, the term `Lower Mississippi River system' means those river reaches and adjacent floodplains within the Lower Mississippi River alluvial valley having commercial navigation channels on the Mississippi mainstem and tributaries south of Cairo, Illinois, and the Atchafalaya Basin floodway system.

(e) AUTHORIZATION OF APPROPRIATIONS- There is authorized to be appropriated $1,750,000 to carry out this section.

Plan Purpose

The purpose of this final assessment is to develop a strategic approach to managing habitat restoration, recreational opportunities and the information needed to make river management decisions. Historically, the navigation and flood risk management systems have received most of the attention on the LMR. Habitat and recreation have not been managed as systems on the LMR, but planning for these uses is starting to receive focus from many entities.

Goal

The goal of this Final Assessment is to summarize the needs for information, habitat, and recreation identified in the three previous assessments and develop a strategy to meet those needs. The strategy should be holistic and sustainable; reconnect Americans with the great outdoors and the country's rich legacy of rivers; develop a comprehensive plan for habitat restoration, protection and enhancement; and promote collaboration between the public and private sectors to leverage investments.

Problems

Extensive structural changes on the river's main stem have disrupted the once dynamic ecosystem. The Mississippi River Levee system has disconnected much of the floodplain from the river. There is less available habitat for threatened and endangered species including interior least tern, pallid sturgeon, and fat pocketbook mussels. The region is underutilized for recreation and underappreciated for its cultural legacy. Additionally, information has not been gathered, stored or analyzed to enable strategic decision-making. The specific problems in the LMR are:

- Data is scattered among diverse government agencies, environmental organizations, industries and institutions.
- There is no integrated knowledge management database or decision support system.
- System-wide assimilation and assessment of data is difficult.
- Although water quality is generally good, localized problems occur and affect some listed species and high nutrient loads contribute to Gulf of Mexico hypoxia.
- Vegetative diversity has been reduced.
- Many side channels, backwaters, and oxbows are disconnected from the main channel.
- Native flora and fauna do not compete well against some invasive species.
- Some gravel bars and sandbars have been lost or degraded.
- The size of the floodplain and the associated habitat has been reduced.
- Mississippi River islands are a unique and limited habitat type, but their ecological importance is not fully understood.
- Coastal wetlands are declining.
- Habitat diversity in the main channel has decreased.
- There is a shortage of motorboat access in some areas.
- Existing access points are not conducive to canoeing and kayaking.
- There are not enough bicycling trails and very few in a natural or rural setting.
- Riverfront access is only available around urban areas.

- There are few interpretative centers/signs and they are scattered.
- There is no "one-stop" organization to provide information for all of the recreational facilities available in the region and market it as a recreational destination.

Opportunities

There are opportunities to restore habitat and ecosystem function in the LMR to benefit a variety of species, and to develop a recreation and access plan to improve facilities and promote recreation along this iconic river. There is also an increasing opportunity for public and private collaboration to restore habitat, increase recreation access and promote information sharing. The opportunities vary in different reaches of the river, and not all occur throughout the entire LMR. This final assessment generally recommends further, more in depth studies related to these opportunities. Some of the specific opportunities are:

- Identify the information river managers need to make strategic decisions.
- Compile river-related information and make it accessible.
- Manage water quality in the river better.
- Restore vegetative diversity in the active floodplain.
- Re-connect side channels, backwaters, and floodplain lakes where feasible.
- Promote native species restoration in areas where invasive species have become common.
- Restore and protect sandbars and gravel bars.
- Improve the quality of floodplain habitats.
- Inventory islands to understand their ecological value and develop management plans.
- Restore some habitat diversity in the main channel.
- Provide better motorboat access.
- Provide more canoeing and kayaking access.
- Provide more designated bicycling trails.
- Improve heritage tourism.
- Improve publicly accessible riverfront areas.
- Develop more and better interpretative services and facilities.
- Create informational and marketing materials the public can use to learn about and plan recreational activities.

Objectives

These objectives were developed to guide the analyses of needs and lay the foundation for the final assessment.

- Evaluate the information needs of Mississippi River resource managers.
- Identify information gaps that could be filled to better guide LMR projects for the foreseeable future.
- Compile a list of available information that may be of interest to river managers and users now and into the foreseeable future.
- Develop a strategy to make the river data accessible and maintain it for future users.

- Identify habitat needs on the LMR.
- Develop recommendations for habitat restoration studies and programs for the LMR.
- Develop recommendations to foster collaborative habitat management.
- Identify unmet recreation demands in the region.
- Develop recommendations for recreation facilities to meet demands in the region.
- Develop a conceptual strategy to market the region for recreational use.
- Identify mechanisms that will allow public – private partnerships to develop and promote recreational use on the region.

Study Area

The study area extends from River Mile 953 of the main stem Mississippi River channel south of Cairo, Illinois, downstream to River Mile 0 (Head of Passes) in Louisiana (see map on page 8). The area encompasses the main river channel and the area between the Mississippi River and Tributaries Project levees or natural high ground (batture), including the mouths of all tributaries between the levees. The study boundary extends up the following rivers and canals that have existing commercial navigation (i.e. commercial barge traffic) to the point of direct influence between each channel and the main stem Mississippi River: the White River upstream to Clarendon, AR; the Arkansas Post Canal upstream to Norrell Lock and Dam, AR; the Yazoo River upstream to Greenwood, MS; the Red River upstream to Lock and Dam No. 2, LA; the Ouachita/Black River upstream to Columbia Lock and Dam, LA; and the Old River from the Old River Lock to its confluence with the Red and Atchafalaya Rivers in Louisiana. For the recreation needs assessment, the study area was expanded to include recreational features and needs related to the Mississippi River that lie beyond the bounds of the active floodplain. The study area includes areas which can or do provide facilities necessary for recreational use along the river. The exact geographic extent is not definitive, but it covers the entirety of the counties touching the active floodplain and the Great River Road National Scenic Byway.

The Atchafalaya Basin Floodway System in Louisiana is also included within the authorized project area. Future public access areas and types of recreation features were already identified in the Atchafalaya Basin Floodway System Master Plan. The plan includes recommendations for public use lands, campgrounds, boat ramps, a visitor center and interpretive trails as well as recommendations for flowage easements, canal closures and water management units. There are ongoing state and Federal programs to manage and improve habitat within the Atchafalaya Basin. USACE has acquired over 350,000 acres in easements and 70,000 acres in fee land within the Atchafalaya Basin to preserve habitat and maintain public access. The State of Louisiana has developed an Atchafalaya Basin Program to oversee the state's Atchafalaya Basin Master Plan that brings together USACE, state agencies, and Basin parishes to protect and enhance the natural resources of the Atchafalaya Basin. Sedimentation in backwater areas is the biggest threat to the conservation of aquatic habitat in the Atchafalaya Basin. As such, restoration activities have mainly focused on sediment management to improve habitat and alleviate poor water quality in backwater areas. These ongoing projects address the needs in the Atchafalaya Basin and no further analysis was done for this study.

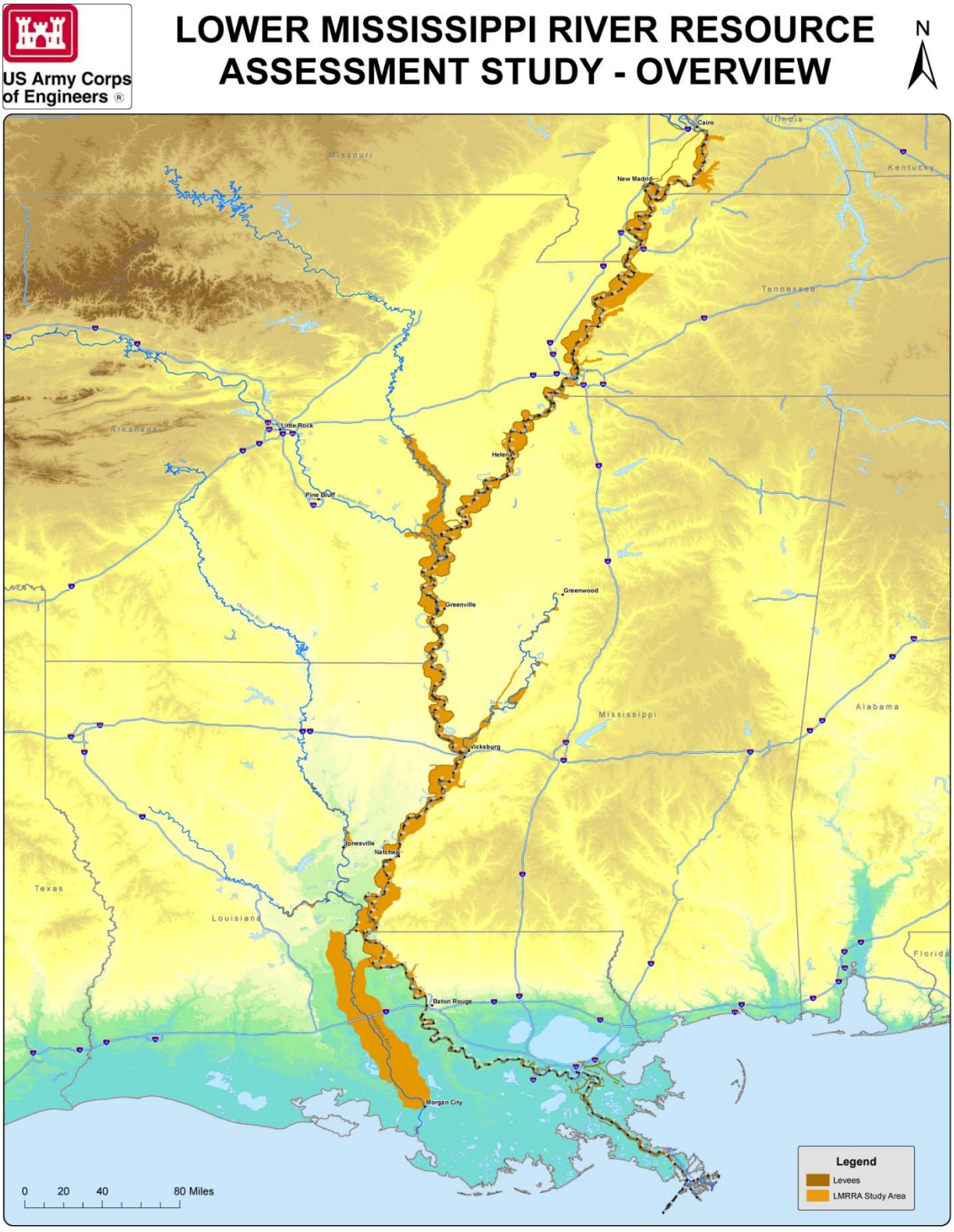

Figure 1. Study Area

Partnership

The Nature Conservancy (TNC) Great Rivers Partnership is the study cost-sharing sponsor. TNC signed agreements with a group of non-governmental organization partners who are providing work-in-kind study services. The study team includes staff from TNC North America Freshwater Program and TNC State Chapters in Tennessee, Louisiana and Mississippi, Lower Mississippi River Conservation Committee (LMRCC); National Audubon Society; and Mississippi River Corridor-TN. All of these groups focus on sustainable river management and conservation and collectively they represent thousands of river users.

The LMRCC is a coalition of 12 state natural resources conservation and environmental quality agencies from Arkansas, Kentucky, Louisiana, Mississippi, Missouri and Tennessee. It provides the only regional forum dedicated to conserving the natural resources of the Lower Mississippi River floodplain. LMRCC focuses on habitat restoration, landscape level conservation planning, and natural resource-based economic development. The U.S. Fish and Wildlife Service (USFWS) leads the effort and provides a full time coordinator. The U.S. Geological Survey (USGS), USACE, U.S. Environmental Protection Agency (EPA), and U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) are cooperating agencies.

Public Involvement

USACE completed multiple public scoping meetings and reviews for this project as mentioned in the summaries of each assessment that follow beginning on page 10. For this Final Assessment, USACE issued a Notice of Availability on 21 April 2015 with a 20 May deadline for receiving comments. Several organizations asked for an extension of the deadline and on 18 May 2015, USACE extended the comment period until 1 June 2015. USACE also held two public meetings, however only three people attended. Appendix D contains all 85 letters received during the public comment process.

II. SUMMARY OF NEEDS ASSESSMENTS

The three LMRRA needs assessments have already been completed. Each assessment identified needs, but did not include any recommendations to meet those needs. The executive summary of each assessment is presented here. The complete documents with references are available for review at: http://www.mvm.usace.army.mil/Missions/Projects/LMMRA.aspx

Assessment of Information Needed for River-Related Management

This assessment began in January 2012. Public scoping meetings were held in Memphis, TN in July 2012, Vicksburg, MS in August 2012 and Baton Rouge, LA in September 2012. The report was released for public comment in June 2013. USACE headquarters concurred with the final assessment in October 2013.

This report assessed information needed for river-related management on the Lower Mississippi River from its confluence with the Ohio River at Cairo, IL to the Head of Passes, LA.

The study team identified issues raised during scoping, examined river management activities, and collated information sources. These steps revealed four areas of information needs for river management. The information needs are related to sediment, water quality, data storage and availability, and tributary management.

Many of the world's great rivers have sediment monitoring and management plans, but there is not one for the Mississippi River. Sediment is both a management problem and a valuable asset in the river. Sediment monitoring has not been done consistently on the Lower River. A systematic monitoring and measuring protocol and the development of predictive sediment models would give river managers the tools to develop a sediment management plan. This would benefit flood risk management, navigation, fish and wildlife, coastal habitat, water supplies and Gulf of Mexico hypoxia.

Clean water is vital to the nation's economy. Water quality in the Mississippi River is generally good and continues to improve, but monitoring is not well coordinated among the seven states along the Lower River. The sources and fates of nutrients, pathogens and contaminants in the river have not been clearly delineated. A coordinated water monitoring and analysis program for the river and tributaries would give managers the tools to make informed decisions and develop comprehensive management plans to continue improving water quality. This would benefit fish and wildlife, recreation, water supplies, coastal habitat and Gulf of Mexico hypoxia.

Data availability is important for all river management. Much of the data for the Lower River is held in agency files and databases. A substantial amount of historic data only exists as paper files and maps that can only be accessed in person. River managers either make decisions without some information or invest resources to generate information that may already exist. A centralized data management system that stores some information and provides linkages to the rest would give river managers and the public access to the best information available. This is vital to improved management of water quality and sediment.

Tributaries are some of the most significant sources of nutrients and sediment to the main-stem of the Lower Mississippi River. There has been very little geomorphic analysis of tributary

streams to better understand how they interact with the river. Comprehensive watershed management will be a necessary part of enhanced water quality and sediment monitoring programs and tributary river restoration. It is important for water quality, sediment, hypoxia, habitat, and fish and wildlife management.

Assessment of Natural Resource Habitat Needs

This assessment began in July 2013. Public scoping meetings for both the natural resource habitat and recreation assessments were held in Dyersburg, TN in July 2013, and Helena, AR and St. Francisville, LA in August 2013. The report was released for public comment in November 2014. HQUSACE concurred with the final assessment in April 2015.

This report assessed the natural resource habitat needs for the Lower Mississippi River from its confluence with the Ohio River at Cairo, IL to the Head of Passes, LA.

The Mississippi River and the land between the levees are a dynamic ecosystem that changes markedly in response to the river's annual hydrologic regime. The nearly 3 million-acre floodplain is interspersed with abandoned channels, meander scars, and large expanses of forested wetlands. These areas provide a diverse array of aquatic and terrestrial habitat types.

The Mississippi Flyway hosts the world's largest bird migration, connecting life from the Arctic to South America. Over 300 species of migrating birds and approximately 70% of the Nation's migratory waterfowl use the flyway. The river also supports over 90 freshwater fish species.

This assessment found nine areas of habitat needs on the Lower River and identified several plans that have already been developed to answer some of these needs.

The Mississippi River receives water from 31 states. The water contains many contaminants and nutrients. Water quality is not a major limiting factor in the river ecosystem, but there is very little information about localized water quality effects, especially in backwaters, and side channels. There is a need to better understand water quality in secondary and tertiary habitats that are important for some life stages of fish and mussels.

The need to restore bottomland hardwood in the Lower Mississippi River Valley has long been recognized and is a priority for many entities, but other vegetation types have also declined. There is a need for research to examine current hydrology, soils and historic vegetation within the batture and develop tools to direct restoration species selection. This information would increase the success of restoration efforts. There is also a need to control or eliminate invasive plant species where they threaten restoration or preservation efforts.

There is a need to reconnect backwaters, side channels and floodplain lakes with the main channel at normal water levels. The Restoring America's Greatest River Initiative identifies specific opportunities for restoring some of this habitat. The federally listed interior least tern, pallid sturgeon, fat pocketbook mussel, and many other species in the Lower Mississippi River would benefit.

Most of the species native to the Lower Mississippi River are still present and their populations are viable, but the species abundance of many has declined. Habitat changes along the main stem and up the tributaries have caused most of the changes for mammals and birds, but the main factor driving aquatic population changes has been the introduction of exotic aquatic species such as carp and zebra mussel. There is a need for comprehensive studies of tributaries to understand their habitat value to the overall Lower Mississippi River system and there is also a need to control invasive species especially where they threaten native species.

Dynamic river forces form, enlarge, erode, move, and destroy sandbars and gravel bars. On established sandbars, high water removes existing vegetation and deposits new sand. Sandbars are the primary habitat component used for interior least tern nesting. Gravel bar habitats are important as spawning substrate for pallid sturgeon and other fish species. There is a need to protect and restore gravel and sand bars. The Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel addresses management and restoration of these features and the Restoring America's Greatest River initiative also identifies the need to conserve and restore them.

The Mississippi River active floodplain is now 80% smaller than it was historically (Baker et al 1991). The decrease in area inundated impacts water quality, habitat and species. The floodplains of tributary rivers may have become more important since the Mississippi River floodplain has been reduced. Cities, farms, highways, factories and other developments have moved into the historic floodplain. There is a need to assess tributary rivers to determine how their floodplains can be better managed to compensate for some of the loss of floodplain area. On the main stem Mississippi River, there is a need to restore the quality of habitat within the batture.

Many Mississippi River islands have been lost or altered. Islands offer important edge habitat. Since the islands are isolated from the bank, they afford many species safe places for sensitive life cycle events such as nesting. There is a need for an ecological inventory of islands in the LMR to determine their value for habitat and potential for restoration.

Preserving and rebuilding coastal wetlands is a recognized need and projects and programs are in place to address the problems. *Louisiana's Comprehensive Master Plan for a Sustainable Coast* sets forth a long term plan to address coastal needs in that state.

Habitat in the Mississippi River main channel was once very diverse, and provided a variety of substrates and flow conditions. Habitat complexity in the main stem has been reduced. Fish species, such as pallid sturgeon, primarily use the main channel of the river and rely on the diverse habitats for their various life stages. There is a need to restore some of the diversity in the main channel of the Mississippi River where it is compatible with navigation.

The Mississippi River ecosystem is a dynamic system with interactions between the terrestrial and aquatic systems, main channel and side channel areas, mudflats, backwaters, tributaries and islands. There is a need to examine the Mississippi River and batture at an ecologically meaningful scale. There are some priority reaches of the river where there are opportunities to enhance a broad spectrum of features, i.e. restorable side channels, backwaters, and oxbows, a

wide floodplain, large islands, populations of threatened and endangered species and sand bars. These areas should be examined holistically to develop plans for restoring all of the vital ecological elements.

Assessment of River Related Recreation and Access Needs

This assessment began in March 2013. Public scoping meetings for both the natural resource habitat and recreation assessments were held in Dyersburg, TN in July 2013 and Helena, AR and St. Francisville, LA in August 2013. The report was released for public comment in July 2014. HQUSACE concurred with the final assessment in December 2014.

This report assessed the need for river-related recreation and access on the Lower Mississippi River from its confluence with the Ohio River at Cairo, IL to the Head of Passes, LA.

More than 140 million Americans participate in outdoor recreational activities. The outdoor recreation industry supports 6.1 million American jobs and generates $646 billion in spending each year. In the Lower Mississippi River Region, outdoor recreation and tourism combine to generate nearly $17 billion annually and over 240,000 jobs (Yellowwood 2013).

The study team identified eight areas of need on the Lower River: boat ramps, bicycle trails, outfitter and guide services, lodging and dining, parks and vistas, interpretation, riverboat landings and marketing. Addressing some of the recreation and access needs on the Lower River would add to residents' quality of life, and bring increased revenues and jobs to the region and the nation.

Fishing and paddling generate nearly 900,000 American jobs and $9 billion in Federal and state tax revenues annually. The biggest obstacle to expanding fishing and paddling use of the Lower Mississippi River is the lack of well located boat ramps. There are only 129 boat ramps along the 954 miles of the Lower Mississippi River. Many ramps were designed for large boats and are not safe for small craft.

More than 60 million Americans ride bicycles. Bicycling generates 1.1 million American jobs, and $81 billion in annual spending. Cities are designating more bicycle lanes in urban areas and the public would like to link these urban systems to trails in more rural settings with less traffic.

Outfitter and guide services in the Lower Mississippi River Region can provide safe, convenient options for people who want to hunt, fish, paddle and bicycle. The services are very limited but the increasing popularity of paddling and bicycling along with hunting and fishing create a good opportunity for small businesses all along the River.

Lodging and dining are readily available in urban areas, but are lacking in rural areas. Long distance bicyclists and paddlers, hunters and fishermen, and families visiting cultural and historic sites could all use more lodging and dining options in rural areas.

Many of the small towns on the Lower Mississippi River have no public space along the riverfront for picnics or even good views of the River. The topography of the Lower River limits the number of natural vistas providing broad views of the River and some of the places that could provide a view are not accessible. Riverside parks are excellent areas for interpretive

centers that tell the story of the River and its habitat, value for navigation, and flood risk management system.

Riverboats are making a comeback on the Mississippi River. The boats dock at small towns and big cities along the length of the River and offer excursions to see cultural and historic sites, participate in local activities, and take guided trips into natural areas. Many small towns do not have adequate docking facilities and miss the revenue from riverboat visits when the River is too high or too low.

The Lower Mississippi River passes seven states and many cities. There are many opportunities for outdoor recreation and tourism, but there is no single entity marketing the Mississippi River for tourism. Many visitors to the region come for a single purpose and are unaware of other opportunities.

III. CUMULATIVE CONCLUSIONS

The three needs assessments were narrowly focused, and each one identified needs specific to that focus. Most of the identified needs touch on other needs, and there are interactions among them. This section describes each need, which assessments identified it, what other needs it interacts with and the benefits of addressing the need. The next section of the report includes recommendations to meet the needs. Plans that are already in place to address the needs are also described.

Water Quality

All three assessments identified a need for better water quality monitoring and management. This need is related to sediment, data management, tributary management, vegetative mosaic, side channel, faunal community, floodplain, coastal wetland, main channel habitat, interpretation, marketing, and safety issues.

Water quality regulations were set forth in the Clean Water Act of 1972. The EPA delegates most of the responsibility for enforcing the Act to the individual states. Each state has broken the Mississippi River into segments and designated uses for each segment. Water quality standards are set to protect the existing and designated uses. The states conduct water quality monitoring and periodically report the compliance status of the water quality standards. Not all of the states conduct monitoring on the LMR. The Clean Water Act spurred more water quality monitoring for the LMR, but there is still no comprehensive monitoring program. A centralized data repository would be necessary to support a comprehensive program.

Nutrients and contaminants enter the Mississippi River from both point and non-point sources including air deposition. Contaminants are sometimes bound with sediment. There are storm sewer systems, industrial discharges, and agricultural runoff. Contaminated water affects fish and amphibians, requires more treatment for drinking water, and carries human pathogens. Endangered pallid sturgeon are long-lived fish and contaminants can bioaccumulate in them even if the contaminant levels in the water are moderate to low. Recent studies point to this as one cause for sturgeon decline (Divers et al. 2009, USFWS 2009, Blevins 2011, Schrey et al. 2011).

Excess nutrients lower dissolved oxygen and cause eutrophication in side channels and oxbows. Nutrients attenuate as the river spreads out over the floodplain, but the floodplain area is now over 80 % smaller than it was historically (Baker et al. 1991). Research indicates most of the excess nutrients are coming from the upper and middle river; but reforestation in the batture and restoration of side channels and backwaters could attenuate some nutrients, reduce hypoxia, and improve overall water quality. Tributary watersheds are nutrient and contaminant sources and must be addressed to improve water quality in the river.

Water quality is an important aquatic habitat variable in the LMR (Baker et al. 1991). Low oxygen levels impact fish species richness and abundance in river backwater areas, river channels, and lakes (Killgore & Hoover 2001). There are localized problems such as chemical spills or instances of low dissolved oxygen in backwaters or harbors that kill fish, but there is very little documentation of these events.

Coastal wetlands and the hypoxic zone in the Gulf of Mexico are outside the study area, but they are dependent on Mississippi River water. The LMR collects and transports water, sediment and nutrients from the entire Mississippi River watershed to the Gulf of Mexico. Some of the water and sediment is diverted to replenish coastal wetlands, but levees direct most of it out to deeper water. The hypoxic zone forms in the northern gulf every summer. It has been as large as 5.5 million acres. Hypoxic conditions stress and kill bottom-dwelling organisms and drive fish from the area (EPA 2007, MRGOWNTF 2008, Bianchi et al. 2010, Kroger et al. 2012).

Although water quality in the Mississippi River is relatively good and steadily improving, for example total nitrogen has decreased from its high in 1990 (Turner et al. 2007), the general public perception is that water quality in the river remains poor. The combination of nutrients and contaminants can lead to changes in water color and odor that can be off-putting to recreational users. Conflicting advisories on fish consumption add to the public's misperception. There are public concerns about the safety of water contact while fishing or paddling on the river. Marketing and interpretative tools are needed to address public concerns and promote the Mississippi River for recreation.

Improving water quality monitoring and management would benefit fish and wildlife, fishermen, paddlers, municipal water supplies, industries and others who rely on the Mississippi River for clean water. Clean water is vital to the economy of the nation and the quality of life in the Lower Mississippi River Valley.

Delivering water and treating wastewater is an energy-intensive effort. The water is treated, pumped to homes and businesses, and pumped to wastewater facilities to be treated again. The water supply and sewerage industry generates an estimated $385 million in annual revenue (IEc & Dziegielewska-Parry 2014).

The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force was established in 1997 to understand the causes and effects of eutrophication in the Gulf of Mexico; coordinate activities to reduce the size, severity, and duration of the hypoxia; and ameliorate its effects. The Task Force includes five Federal agencies – USACE, USDA, Department of the Interior, EPA, and National Oceanic and Atmospheric Administration – twelve states, and the National Tribal Water Council. The primary priority of the Federal agencies is to provide broad support to the development and implementation of the state prepared nutrient reduction strategies.

The Task Force has identified five priorities: 1) monitoring to demonstrate water quality progress; 2) in-basin and Gulf modeling to demonstrate water quality progress; 3) regulatory program activities; 4) outreach, education, and initiatives; and 5) innovation to expand partnerships and technical assistance. A variety of programs and tools are being used and improved to accomplish these priorities.

Sediment

The information and habitat assessments identified a need for better sediment monitoring and management. This need is related to water quality, data management, tributary management, sandbar, floodplain, and coastal wetland issues. A centralized data repository would be necessary to support a comprehensive program. Tributary watersheds are nutrient and contaminant sources and must be addressed to manage sediment in the river.

Prior to the 1930's, most of the sediment in the Mississippi River came from caving banks and was stored primarily within the channel as sandbars and regular sediment input maintained coastal wetlands. Since that time, revetments have reduced bank caving limiting sediment input. Dikes now trap much of the bedload and levees limit the overbank areas (Kesel 2003). Sandbars are now rarer, and there is less sediment available to replenish coastal wetlands.

The Mississippi River is a naturally turbid system and the native species are adapted to it. Lower levels of suspended sediments may favor non-native species. Deposition of finer sediments can cover spawning substrate making it unusable for some fish species, and it is less stable for mussels and other invertebrates (Krinitzsky 1949, Harmar 2004, Harmer et al. 2005, Nittrouer et al. 2010, Allison et al. 2012). Sandbars are the primary habitat component endangered interior least tern use for nesting (Sidle et al. 1992, Thompson et al. 1997, Friedman et al. 1998, Johnson 2000, Leslie et al. 2000, Wiley & Lott 2012).

Sediment management is a vital and costly endeavor on the LMR. USACE spends up to $170 million annually dredging sediment in the Lower Mississippi River to maintain navigation. Louisiana's Comprehensive Master Plan for a Sustainable Coast calls for more than $25 billion to be spent on a variety of projects, most involving water and sediment management. Understanding sediment dynamics is important for river management. Sediment management plans are in place for many of the world's great rivers: the Rhine (Europe), the Blue Nile (Africa), the Yangtze (Asia), the Columbia (North America), and the Darling (Australia). These plans benefit coastal areas, navigation, hydropower, and land conservation around the world.

Data Storage and Availability

The information assessment identified the need for a data management program to capture, store and make available all of the existing and future data for the LMR. The habitat assessment noted the need for more research and public education on several topics, and a central information system would respond to that need. The recreation assessment found there was a need for public education about the river, better interpretative facilities, a comprehensive marketing program, and safety information. When taken together, these conclusions point to the need for a public facility to house scientific, social, commercial, historical and other information about the river. The center needs to have the ability to support outreach programs and promote the LMR for research, tourism, outdoor recreation, and a variety of other uses.

Tributary Management

All three assessments identified a need to understand and manage the tributaries that provide water, sediment, fish, habitat, and recreational access to the river. There are over forty tributary watersheds to the LMR that are large enough to have significant impacts on the river. Tributary management is related to sediment, water quality, faunal community, floodplain, boat ramp, and bicycle trail issues. The sheer size of the Mississippi River presents a management challenge to state and Federal agencies. Tributaries cross fewer state boundaries than the main stem river and are a manageable scale for comprehensive assessments.

A majority of LMR tributaries have been altered to facilitate drainage (Benz & Collins 1997). Channelization has reduced or eliminated natural stream functions in many tributary systems. These functions include but are not limited to providing habitat for freshwater mussels, crayfish, fish, amphibians, reptiles, mammals, and birds. Studies have documented population declines to all of these resources as a result of habitat loss (Benz & Collins 1997). Channelization in tributary rivers has also altered geomorphology and changed sediment dynamics.

During storm events, rain is quickly drained from the floodplain and the timing and duration of flood pulses in the tributary rivers have changed (Baker et al. 2004). Nutrients have less opportunity to attenuate on the floodplain. Tributary rivers are important habitats for fish and mussels, and the watersheds contain forested patches. Conversion of forests to crop lands has disconnected forest patches and altered biotic community structure and function, but there are opportunities to increase habitat connectivity between the river and some of the larger tributaries.

The Mississippi River also exerts an influence on tributaries, and many experience some backwater flooding. Changes in the Mississippi River can cause aggradation or degradation in the tributary channels (Biedenharn et al. 2000).

Tributary rivers provide opportunities to meet recreation demands. They offer calm areas to launch canoes, kayaks, and small fishing boats. Bicycle trails within the tributary watersheds would be a valuable addition to the overall network of trails and could provide access points to the planned Big River Parkway bicycle trail.

Vegetative Mosaic

The habitat assessment identified the need to conduct a potential natural vegetation study and use the results to maintain and reestablish the vegetative mosaic within the batture. The information and habitat assessments both noted the value of native vegetation in attenuating nutrients. The recreation assessment acknowledged that the diverse habitats in the batture supported exceptional, year-round wildlife watching. The vegetative mosaic in the LMR is related to side channel, faunal community, floodplain, and outfitter and guide issues.

Historically, a variety of vegetative communities was interspersed throughout the floodplain. The soil and hydrologic regime influenced what species occurred in any given area. Bottomland hardwoods (oak, hickory, pecan, tupelo, bald cypress, et al.) were the most common species in the floodplain, but softwoods (cottonwood, elm, ash, hackberry, et al.) were also present. Forest

types included cypress-tupelo, cottonwood-willow-sycamore, white oak-red-oak-hickory, hackberry-elm-ash, and many others (Klimas 1988, Stanturf et al. 2000, Gardiner et al. 2005). Drastic vegetation changes began after the levee system was complete and soybean prices rose in the 1950's. Between the 1950's and 1970's, nearly 300,000 acres were cleared and converted to agriculture every year (King et al. 2006).

Threatened Louisiana black bears depend on large, complex forest structure for forage, nesting or bedding sites, and successful reproduction (USFWS 1995). The flood prone forest species that now dominate the batture are less complex and not as suitable for black bear. Reptiles, amphibians, and many mammals, including the Indiana and gray bats, also depend on bottomland hardwood forests for cover, food, and successful reproduction. Forest interior song birds are dependent upon large expanses of bottomland hardwood forests. Fragmentation, human disturbances, and high edge to area ratios are causing songbird populations to decline (Twedt et al. 2002, Twedt et al. 2008). Game species that depend on diversity of habitat include white-tailed deer, wild turkey, squirrel, rabbit, and many species of waterfowl (LMVJV 2012). Many species, like American woodcock, rely on the early successional stages of bottomland hardwoods (Kelley et al. 2008).

River cane or giant cane was once common in the valley, but approximately 98% of this ecosystem has been lost throughout its range to agriculture, altered fire regimes, altered flood regimes, and grazing (Brantley & Platt 2001). Canebrakes are prime habitat for several species including the Louisiana black bear, Swainson's warblers, and several species of butterflies are also known as cane obligates (Platt & Brantley 1997, Brantley & Platt 2001, Hendershott 2002, LMVJV 2007).

The floodplain of the LMR has emergent, floating, and submersed aquatic vegetation, but their occurrence and distribution is dependent on the flow regime and elevation relative to the main stem river. Areas near the main channel are usually devoid of vegetation due to the scouring effect of moving water, except for duckweed that can become abundant after early isolation from the river. Submersed aquatic vegetation occurs in waterbodies furthest removed from the main stem river, such as borrow pits (personal communication, Dr. Jack Killgore, ERDC).

Invasive plant species pose a serious risk to native species. Kudzu was first introduced to the U.S. in 1876, and the erosion control programs of the 1930's to 1950's caused its spread. It now covers 2 million acres of forest land in the southern United States (Forseth & Innis 2004). Kudzu is an aggressive, fast growing vine and is very heavy. It covers other plants blocking out sunlight, girdling stems, breaking branches and even uprooting trees (Forseth & Innis 2004, NPS 2010). Privet was introduced to the U.S. in the mid-19th century as an ornamental shrub. It has invaded many areas in the LMR that are now drier than they were historically. It crowds out native understory vegetation (Merriam & Feil 2002). Neither of these plants provides suitable habitat for native species.

The diverse habitats in the valley support valuable recreational activities. In 2011, nearly 72 million people 16 years old or older spent about $55 billion on wildlife watching. There are 46.7 million bird watchers. Waterfowl, raptors, and songbirds attract the most interest. In 2011, hunting trips accounted for 22% of all outdoor recreation trips in the region. There are nearly 14

million hunters in the United States and they spend over $30 billion every year (USDI 2011) and generate 323,000 American jobs (Yellow Wood 2013). There are 8.3 million hunting trips taken in the area each year (IEc & Dziegielewska-Parry 2014).

The Lower Mississippi Valley Joint Venture (LMVJV) is a self-directed, non-regulatory private, state, and federal conservation partnership. LMVJV's goal is sustaining bird populations and their habitats within the Lower Mississippi Valley and West Gulf Coastal Plain regions. They implement and communicate the goals and objectives of relevant national and international bird conservation plans (LMVJV 2002). The Lower Mississippi Valley Joint Venture Plan was formulated to address problems that traditionally confronted wetland conservation in the region; namely, clearing of forests for agriculture and extensive alterations of wetland hydrology resulting from basin-wide flood control and drainage.

The NRCS provides technical and financial assistance to landowners for water quality and wetlands improvement projects. NRCS has established the Mississippi River Basin Healthy Watersheds Initiative to improve the health of the Mississippi River Basin. Through this Initiative, NRCS and its partners help producers in selected watersheds in the Mississippi River Basin voluntarily implement conservation practices that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity. They plan to restore over 11,000 acres of wetland habitat and prevent sediment and nutrients from entering waterways, decrease flooding, and improve bird and fish habitat. Approximately two thirds of the work is within the batture. The Wetlands Reserve Enhancement Program, part of the agency's Wetlands Reserve Program, provides the funding. Between 2010 and 2013, the NRCS formalized agreements with 47 landowners in the basin, investing $17.8 million in long-term conservation easements and wetland restoration projects.

Side Channels, Backwaters and Oxbows

The habitat assessment identified the need to restore side channels, backwaters and oxbows. The recreation assessment noted that these areas are good places for boat ramps. Side channel, backwater, and oxbow needs are related to water quality, vegetative mosaic, faunal community, boat ramp, outfitter and guide, and safety issues.

Historically, the Mississippi River meandered across the alluvial floodplain forming cut-offs and secondary channels. Secondary channels were gained and lost as the river formed new courses to the Gulf of Mexico (Williams & Clouse 2003). Levees, revetment, and dikes have stabilized the river and limited the formation of new secondary channels. Secondary channels have become a finite resource. Sedimentation and loss of connectivity with the main channel continue to reduce the quality and quantity of side channels (Guntren et al. 2012, Killgore et al. 2012, USACE 2013). The total number of secondary channels in the LMR depends on river stage. At high discharge, water moves laterally and reconnects numerous secondary or tertiary channels that are dry at lower stages.

Floodplain waterbodies are not connected to the channel when it is confined below banks. During low-water, secondary channels may remain connected to the main channel. At low water, fish and other aquatic fauna may be confined to the main channel where deep water and

high velocities can impair survival and growth. Secondary channels offer greater habitat diversity compared to the main channel (Killgore 2012, USACE 2013). Secondary channels function similarly to both main channel and floodplain habitats. There are areas of strong current with substrates of sand and gravel, and other areas of slackwater with connections to backwaters and lakes. Flowing water supports fishes such as suckers, minnows, and darters that are relatively intolerant to habitat changes. Overall habitat heterogeneity in secondary channels supports a diverse assemblage of invertebrates and fishes and contributes to the overall health of the aquatic system (Baker et al. 1991, Simons et al. 2001).

Dense alluvial clays dominate in these backwater areas that historically supported extensive wetlands. Natural levees form along the banks of the LMR. The riverbank can be 10 to 15 feet higher than the lowlands farther back from the river. Because of these natural levees, drainage within the floodplain, frequently flows away from the Mississippi River to lower elevations near the valley walls, except near tributary confluences (Kleiss et al. 2000). Slackwater areas, access to backwaters, structurally complex riverbanks, and other habitats are important for biotic integrity of aquatic communities (Killgore 2012, USACE 2013).

The endangered fat pocketbook mussel was probably common in oxbows and sloughs (Miller & Payne 2005). In the LMR, mussels are found in a mixture of sand, silt, and mud substrates in side channels (USFWS 2012). Backwaters provide nursery areas for fishes (Parmalee 1967, Harris & Gordon 1987, USFWS 1989, Harris & Gordon 1990, Watters et al. 2009, USFWS 2012). Many oxbow lakes are now outside of the levee system and turbidity, sedimentation, water quality, and land use impact habitat quality (Miranda & Lucas 2004).

Secondary channels support fishing, paddling, hunting and bird watching. There are 33 million anglers in the U.S., and they spend around 550 million days fishing annually. Anglers spend over $40 billion every year (USDI 2011) and support nearly 600,000 American jobs (Yellow Wood 2013). Between 2006 and 2011, the popularity of fishing rose 3%. Fishing is popular across all demographic groups – ethnicity, age, gender, and education levels. There are 1 million anglers over the age of 75. Fishing accounts for 67% of the outdoor recreational activity in the region (USDI 2011).

The LMRCC developed and continues to update the Restoring America's Greatest River (RAGR) initiative. RAGR is a plan to implement aquatic habitat restoration and river-access improvement projects within the river's active floodplain from Cairo to the Gulf of Mexico. LMRCC and its partners have identified projects to address side channels, backwaters and oxbows, sand and gravel bars, islands, and main channel habitat. LMRCC has implemented 14 projects since 2006 with cooperation from USACE, USFWS, state agencies, and the Mississippi River Trust. These projects have restored flow to 56 miles and thousands of acres of side channel habitat. These projects are valuable to pallid sturgeon, fat pocketbook mussels, interior least terns, and many other species.

Invasive Species

The habitat assessment identified a need to manage native species and control invasive species. The recreation assessment noted the importance of these species for hunting, fishing and wildlife watching. The needs for faunal communities are related to water quality, data management, tributary management, vegetative mosaic, floodplain, sandbar, island, outfitter and guide, boat ramp, interpretation, and marketing issues.

Habitat changes have affected the relative abundance of native species in the LMR. Habitat changes have driven most of the population changes for birds and mammals, but the introduction of invasive species has caused significant impacts to native aquatic species. A variety of exotic aquatic species are established in the LMR. These species disrupt native species assemblages. Predation or competition with exotic species jeopardizes almost half of the species listed as threatened or endangered in the U.S. (ANSTF 2012).

Common carp were introduced in the early 20th century and have become so well established that they are often overlooked in discussions of invasive species. The four more recently introduced carp species (bighead, black, silver, and grass) garner most of the attention and management focus, but all of the carp species have had negative impacts on native fishes (Conover et al. 2007). Bighead carp adversely impact mussels, larval fish, and several adult fishes such as gizzard shad, bigmouth buffalo, and paddlefish. Black carp pose a threat to many of the remaining populations of federally listed threatened and endangered mussels. Competition between black carp and native freshwater drum, the host for the endangered fat pocketbook mussel, is significant (Conover et al. 2007). Grass carp prefer a diet of submerged plants with soft leaves, but will also consume detritus, insects, small fish, earthworms, and other invertebrates. Grass carp can damage native aquatic vegetation. Silver carp lack a true stomach so they feed almost continuously and competition with native planktivores is a major concern (Conover et al. 2007, Fuller 2013a). The carp are also hazardous to boaters because they jump out of the water in response to boats. Northern snakeheads are not known to be in the Mississippi River, but they have been found in the White River, AR and have potential to spread.

Zebra mussels are very prolific and can reach high population densities (MDC 2007, Fuller 2013b). They can reduce the density of phytoplankton, which is food for many native fish and mussels. An estimated $200 million is spent annually to maintain intake pipes and screens that become clogged with zebra mussels (MDC 2007, Fuller 2013b).

The U.S. Congress passed the Nonindigenous Aquatic Nuisance Prevention and Control Act in 1990 to establish a broad national program to stop the introduction of nuisance species and control the spread of species already present. This legislation was reauthorized and expanded when the National Invasive Species Act was enacted in 1996 (ANSTF 2012). The Aquatic Nuisance Species Task Force (ANSTF) comprised of 13 Federal agencies and 13 ex-officio representatives (i.e., Mississippi Interstate Cooperative Resources Association or MICRA) is devoted to preventing and controlling aquatic invasive species (ANSTF 2012). The ANSTF Strategic Plan 2013-2017 focuses on prevention, monitoring, and control of aquatic nuisance species, and increasing public awareness of aquatic invasive species and their impacts (ANSTF 2012). Controlling nuisance species is primarily achieved through prevention, early detection,

and rapid response. Public education, awareness, and collaboration are vitally important to control aquatic nuisance species.

Sandbars and Gravel Bars

The habitat assessment identified the need to manage sandbars primarily for the benefit of the federally listed endangered least tern, but they also benefit pallid sturgeons. The needs for sandbars are related to sediment, faunal community, and side channel issues.

Gravel bar habitats are important as spawning substrate for pallid sturgeon as well as other fish species. Sandbars generally are dynamic features of the natural river landscape. Dynamic river forces form, enlarge, erode, move, and destroy sandbars. On established sandbars, high water removes existing vegetation and deposits new sand. Properly deposited dredged material can also create sandbars.

Sandbars are the primary nesting habitat for endangered interior least tern. When sandbars become fully vegetated, terns will not use them (Thompson et al. 1997). Flooding can scour vegetation from sandbars and convert them to suitable nesting habitat. If perennial woody vegetation becomes well-established and high flows can no longer remove vegetation, sandbars succeed to forest and permanently lose nesting value (Sidle et al. 1992, Friedman et al. 1998, Johnson 2000, Leslie et al. 2000, Wiley & Lott 2012). Terns do not nest in proximity to tall vegetation or other high features, or where channels become narrow (Jorgensen et al. 2012, USACE 2011).

USACE and USFWS worked together to develop the *Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel in the Lower Mississippi River (Endangered Species Act, Section 7(a)(1))*. The Endangered Species Act requires Federal agencies to use their authorities as appropriate to carry out programs for the conservation and recovery of endangered and threatened species. USACE, USFWS, and state conservation agencies identified issues associated with USACE flood risk management and navigation projects on the LMR. These projects have caused the most significant impacts to the river, but offer the best, most cost-effective tools to address these issues. USACE will incorporate ecological engineering concepts in the design of channel improvement and channel maintenance projects. This should provide localized improvements in habitat function and value, with little to no effect on flood risk management, navigation, or project cost. USACE will continue to partner with other agencies to implement cost-effective secondary channel restoration where possible. These actions have already benefitted endangered species habitat in the channel. This plan describes the programmatic mechanisms USACE can use to implement recovery and conservation measures in the Channel Improvement Program of the Mississippi River and Tributaries project.

Floodplain

The habitat assessment noted the importance of floodplain habitats for a variety of species. The needs for the floodplain are related to sediment, water quality, tributary management, vegetative mosaic, side channel, and faunal community issues.

The LMR floodplain provides valuable habitat for waterfowl, resident fish, river fish, and other wetland and other species, such as freshwater mussels. Floodplain connectivity is important for fish, aquatic insects, mussels, turtles, birds, and mammals (Winemiller 2003).The construction of the Mississippi River levee system altered natural patterns of surface water drainage within the region and reduced the floodplain area over 80% (Baker et al. 1991). Fish and other aquatic species no longer have access to millions of acres of foraging, spawning, and nursery habitat. Mississippi River water no longer spreads out over the historic floodplain. There is less opportunity for nutrients to attenuate and for water to percolate through the soil (Winemiller 2003). Wetland quantity and quality has been reduced in the region.

The remaining floodplain with its backwater areas is a dynamic freshwater ecosystem. The active LMR floodplain varies in width from 1 to 15 miles. The nearly 3 million-acre floodplain is interspersed with abandoned channels, meander scars, borrow pits, and large expanses of forested wetlands, and tributary mouths (Baker et al. 1991). These areas provide a diverse array of aquatic habitat types and are connected to the river at high water. Flooding is necessary about once every two years to maintain populations of some fish and lack of flooding may result in successive reproductive failures (Barko et al. 2006). Changes in timing and extent of flooded acreage affect migratory waterfowl and shorebirds. The floodplain, at high water, provides nutrition, secure roosting, cover in inclement weather, loafing sites, protection from predators, and isolation for pair formation.

The floodplains of tributary rivers may have become more important since the Mississippi River floodplain has been reduced. Cities, farms, highways, factories, and other developments have moved into the historic floodplain. Opportunities to restore land to the floodplain will likely be rare and small scale. On the main stem Mississippi River, restoration efforts should focus on restoring the quality of habitat within the batture as discussed in the vegetative mosaic and side channels, backwaters and oxbows sections.

Islands

The habitat assessment identified the need to inventory islands to determine their ecological value. Islands are related to data management, vegetative mosaic, side channel, and faunal community issues.

Mississippi River islands are unique habitats. Islands afford many species safe places for sensitive life cycle events such as nesting. There is a need for an ecological inventory of islands in the LMR to determine their value for habitat and potential for restoration. At least two Mississippi River islands have been offered for sale in the last two years. State, federal or non-governmental conservation organizations have shown some interest in acquiring these, but there is not enough information about their ecological value.

RAGR includes some island conservation opportunities.

Coastal Wetlands

Although coastal wetlands are dependent on fresh water and sediment from the river, they are outside of the project area, and this report includes no recommendation for them. Any program to manage water quality and better understand sediment will benefit coastal management. Preserving and rebuilding coastal wetlands is a recognized need. Congress authorized the Louisiana Coastal Area program in 2007 and Louisiana's Comprehensive Master Plan for a Sustainable Coast sets forth a long term plan to address coastal needs.

Main Channel Habitat

The habitat assessment identified a need to provide some habitat diversity in the main channel. The recreation assessment mentioned the popularity of fishing and boating in the channel and the safety concerns associated with it. The main channel needs are related to sediment, water quality, tributary management, side channel, sandbar, island, outfitter and guide, boat ramp, riverboat landings, and safety issues.

Habitat in the main stem of the Mississippi River is less diverse than it was historically. Channel cut-offs reduced the number of bendways, which shortened the river causing a major loss in channel habitat including pointbars and gravel bars. Dike fields and the associated sediment accretion between dikes reduce aquatic surface area. However, dikes associated with outside bends often scour sediments and increase pool habitat. Revetment construction has reduced naturally steep banks (Baker et al. 1991). However, channel habitat and transitional areas between the thalweg and shoreline (i.e., channel borders) have persisted over time and continue to provide habitat diversity in the main stem LMR.

Pallid sturgeons occupy the deep water of large, turbid rivers, particularly the main channel (Kallemeyn 1983). They mostly occupy the sandy main channel, but are also found over gravel substrates (USFWS 1993; Bramblett & White 2001; Hurley et al. 2004; Garvey et al. 2009; Koch et al. 2012). Much of the natural habitat throughout the range of pallid sturgeon has been altered and this is thought to have had a negative impact on this species (USFWS 1993). Habitats were once very diverse, and provided a variety of substrates and flow conditions (Baker et al. 1991; USFWS 1993). Extensive modification of the Mississippi River over the last 100 years has changed the form and function of the river (Baker et al. 1991; Prato 2003). Today, habitats are reduced and fragmented; and much of the Mississippi River basin has been channelized to aid in navigation and flood risk management (Baker et al. 1991). The impact of habitat alteration on pallid sturgeon throughout its range is unknown, but recent studies have shown suitable habitat is available (USFWS 2007).

There is a need to restore some of the diversity in the main channel of the river in areas where it is compatible with navigation. The Restoring America's Greatest River initiative and the Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel in the Lower Mississippi River both include opportunities for restoring some of this habitat.

Outfitters and Guides

The recreation assessment identified a need for more outfitters and guides. Outfitter and guide companies can benefit from more boat ramps, well managed habitats, information services, marketing and interpretation. Although there are world-famous tourist destinations in the region, the river itself has not been marketed as a destination. New initiatives to draw people to the region will create opportunities for outfitters and guides. Many visitors to the region may be interested in spending a day bird watching, bicycling, fishing or canoeing in the area, and will need equipment, transportation, guides and other services. Outfitters and guides can help people with varying abilities enjoy the river safely.

Boat Ramps

The recreation assessment identified the need for more and better boat ramps on the river. Boat ramps are related to side channel, main channel, outfitter and guide, and safety issues.

There are 129 boat ramps on the LMR. Many of the ramps are located in fast water areas near the commercial navigation channel and are not safe for smaller craft including canoes. More boat ramps located near side channels and back channels would encourage more and safer river use for paddling, fishing and general boating. Canoes and kayaks can be launched anywhere with a parking area, access to the water's edge and a gentle slope into the water. Motorboats require a hardened boat ramp and a larger parking area to accommodate trailers.

The Louisiana Department of Wildlife and Fish found that there are not many safe and suitable public launches into the Mississippi River south of Baton Rouge. The few that do exist do not offer safe harbor/docking facilities for boats at various river stages. River stages change substantially with season and engineering "safe harbors" for boats at various river stages is difficult. LDWF has received several requests from the public for suitable launches and docking facilities for boats into the Mississippi River at various locations in Southeast Louisiana.

There are 24 million paddlers in North America and the popularity of kayaking is growing. Paddling generates over 300,000 American jobs (Yellow Wood 2013). Paddling canoes and kayaks is becoming more popular in the area. Non-local paddlers spend an average of $503 per excursion and anglers spend $1,261 every year (Yellow Wood 2013). Anglers spend over $40 billion every year (USDI 2011) and generate nearly 600,000 American jobs (Yellow Wood 2013). Fishing accounts for 67% of the outdoor recreational activity in the region (USDI 2011), and many local communities depend on the money it generates for public and private income.

More ramps on the Mississippi River and large tributaries will increase access and safety and provide more opportunities for recreational paddlers and fisherman as well as outfitters and guides. The Restoring America's Greatest River initiative proposes some boat ramps.

Riverside Parks

The recreation assessment identified the need for more riverside parks in local communities and noted they would be good places for interpretation.

There is a need to improve undeveloped riverfront areas in many towns along the Mississippi River. A few simple improvements could increase the usability of these areas; namely designated parking, shelters, picnic tables, and routine mowing and trash pickup. Local residents would appreciate these small gathering spots and they would provide excellent venues to teach people about the river. Informational signs could offer historical information as well as information about navigation and flood risk management on the river.

Riverboat Landings

The recreation assessment identified a need for better riverboat facilities. The popularity of riverboat cruises is related to marketing and interpretation.

Port to port river cruises are again becoming popular on the Mississippi and worldwide. Over the past five years, international river cruises have enjoyed a 10% passenger increase. In 2011, the American Queen rejoined the Queen of the Mississippi to provide river cruises. Efforts are underway to return the Delta Queen to service and Viking River Cruises, well-known for European river cruises, has announced plans to come to the Mississippi River (Sullivan 2013).

The river cruises offer views of the wilderness, bluffs, historic cities and towns, and the river itself that are not seen from anywhere else. The riverboats dock at many towns along the river. These stops offer excursions for historic tours, nature tours, music shows, or culinary events depending on the area. Many small towns have inadequate facilities for the riverboats to dock and allow passengers of varying physical abilities to disembark. Riverboats stop at Columbus, KY to tour the Civil War Battlefield at Columbus-Belmont State Park, but there is no developed dock or tie off for the boat. Helena, AR lost revenue during the high water in 2011 and the extreme low water in 2012 because the river boats could not dock there. Chamber of Commerce representatives up and down the river envision future facilities that would ensure more consistent access for passenger vessels. These landings can incorporate restaurants and interpretive facilities and become community assets beyond being riverboat docks. For example, Beale Street Landing in Memphis links the world famous blues district with the Mississippi River.

Lodging and Dining

The recreation assessment identified a need for more lodging and dining in the region. This need is related to the need for better marketing of river attractions.

Lodging and dining are readily available along the interstate highway corridors, but are generally lacking along the more rural routes including the Great River Road National Scenic Byway. Agricultural land dominates the area, and there are few commercial developments to provide lodging, camping, food, or other services. There is a need for a variety of lodging types including RV parks, family motels, and bed and breakfast inns. Long distance bicyclists, people

experiencing the various Native American sites, touring Civil War sites and others would all benefit from more lodging options (Yellow Wood 2013).

Bicycle Trails

The recreation assessment identified a need for more bicycling trails. There are bicycle rental shops in downtown Memphis and New Orleans that provide equipment for riding around downtown areas. The expansion of levee trails in Louisiana, the Big River Parkway from New Orleans to St. Louis, and the completion of the Harahan Bridge project at Memphis will spur more opportunities for bicycling in the region. Tourists who come to the region for festivals, bird watching, and family vacations may be interested in renting bicycles for day trips across the river or along the levees. Use of the Mississippi River Trail for multi-day rides would likely expand if lodging and dining facilities were available closer to the trail.

There are 60 million American bicyclists. Bicycling is popular across all demographic groups – ethnicity, age, gender, education, and economic status. Recreational bicycling generates 1.1 million American jobs (Yellow Wood 2013). Americans spend more money every year on bicycling gear and trips ($81 billion) than they do on airplane tickets and fees ($51 billion) (OIA 2012). Bicycle trails and lanes in the major metropolitan areas are expanding. As bicycling is becoming more popular, the demand for linking existing trails and creating longer routes is growing.

Interpretation

The recreation assessment identified a need for more interpretation of the river and its resources. The need to provide the public with more information about water quality and the other natural resources of the river was noted previously. This need is related to water quality, data management, faunal community, boat ramp, park, riverboat, bicycling, and marketing issues. Interpretative signs can be a feature of any recreation facility.

Although the Mississippi River watershed drains all or parts of 31 states and 2 Canadian provinces and is the third largest watershed in the world, there is very little information provided to tourists or potential visitors. There are no signs to tell the public that the river creates $105 billion worth of U.S. Gross Domestic Product; provides drinking water for more than 18 million people; transports 62 percent of our nation's agricultural output; delivers nearly 400 million tons of coal and petroleum products annually; and directly supports one million jobs and indirectly supports millions more.

The Mississippi River and Tributaries Project levees, floodwalls, backwaters and floodways form the world's largest and most comprehensive flood risk management system. The 2011 Flood drew national and international media attention and travelers in the area stopped to take a look at the river where they could. There is a need for signs and brochures for the public that explain and describe levees, floodwalls and features of the system that protects 1.5 million homes and other structures, and, in 2011 alone, prevented $234 billion in damages.

Marketing

The recreation assessment identified a need for a comprehensive marketing program for the LMR. The need for marketing is related to water quality, data management, faunal community, outfitter and guide, boat ramp, riverboat, lodging and dining, bicycling and interpretation issues.

The Mississippi River Parkway Commission manages the Great River Road. Its website (experiencemississippiriver.com) offers a lot of information to help travelers plan trips, but there is a lot of information missing. There is also a need for more cross marketing to reach people who come to the area for a particular event, but might be interested in other activities if information is readily available. The National Geographic Society Geotourism Destination project may provide the needed marketing for the Mississippi River corridor.

GPS navigation units are becoming standard for most travelers. People depend on them to find hotels, restaurants, and other attractions. Scenic byways are not part of the standard package in most units, but some do have the option of downloading more features. The Great River Road is not a single highway route and can be difficult to follow if the roads signs are missing or not visible. GPS units are not programmed to follow the route. There are two commercial companies that collect and update the information available on navigation units. Marketing the LMR should include a dedicated effort to get its motor routes and attractions listed.

Safety

The information and recreation assessments both identified a concern about safety on the Mississippi River. Safety concerns are related to recreational uses of the river and should be considered in the development of new facilities.

Safety can never be taken for granted especially around water and on roadways. There is a constant need for programs to teach water safety, safe boating, life jacket use, helmet use, and rules of the road for bicyclists and drivers. Although water quality in the river is generally good and contact is unlikely to cause harm, people should be reminded that drinking the water from any stream or river is not safe. The message of the safety programs needs to compliment marketing information to let people know there are many recreational activities which can be safe if the proper precautions are taken.

The U.S. Coast Guard keeps records of accidents and provides safety training and information for boaters to avoid accidents. There were four collisions on the LMR in 2011 involving recreational vessels, three in Illinois and one in Missouri. All of these accidents involved motorized watercraft. There were no collisions on the river between recreational and commercial vessels. The location of boat ramps is a concern; many ramps are located in swift water areas very close to the commercial navigation channel. These ramps are less safe and usable for smaller crafts including canoes, kayaks, jon boats, and others with small engines. Most of the recreational users want to access the quieter side channel and back water habitats, but have to cross the navigation channel to reach those areas.

On-road bicycling with traffic can be dangerous. Quieter, less used roads in rural areas are preferred over main roads, but there is often a lack of services for emergencies and poor cell phone coverage. Bicyclists are safest on dedicated trails that have moderate bicycling traffic and services at frequent intervals. Programs to encourage helmet use and teach road sharing for both bicyclists and motorists are needed.

IV. RECOMMENDATIONS

The Mississippi River Commission's 200-year working vision for the Mississippi River seeks to leverage local citizens' input, international dialogue, science, engineering, technology and public policy to meet the Nation's needs for our largest river.

Lead secure lives along the river or tributary.

Enjoy fresh air and the surrounding fauna, flora, and forests while hunting, fishing, and recreating.

Travel easily, safely, and affordably.

Drink from and use the abundant waters of any river, stream, or aquifer.

Choose from an abundance of affordable basic goods and essential supplies that are grown, manufactured, and transported along the river to local and world markets.

Throughout public scoping and the development of the three needs assessments, the team, including USACE, USFWS, The Nature Conservancy, National Audubon Society, Mississippi River Corridor –TN, and LMRCC (representing the natural resource agencies in AR, KY, LA, MO, MS, and TN), met with the public, private businesses, National Park Service, Mississippi River Parkway Commission, USDA, and many other entities. This interagency team examined existing plans, programs, missions, and authorities related to the identified needs. The recommendations were formulated to work in concert with the ongoing initiatives to improve and promote the Lower Mississippi River for its ecological and cultural value

This assessment recommends the creation of three interconnected programs for the Lower Mississippi River that will further the goals of the vision. The success of these three programs will rely on interagency coordination, and public private partnerships. Within these three overall programs, there are recommendations for specific projects and studies. Each of these recommendations includes a description of what is being proposed, what agencies or entities are most appropriate to implement the action, which of the needs in the previous chapter the recommendation addresses, how much it is likely to cost and the value to the nation of addressing the needs. Each recommendation can be implemented as a standalone project, but many of them are interrelated and more benefits would accrue if they are implemented as a comprehensive program.

DATA, INFORMATION, SCIENCE AND COMMUNICATION PROGRAM

The Mississippi River is one of the nation's greatest assets. There are Federal agencies, state agencies, county and parish governments, cities, towns, non-governmental organizations, and commercial enterprises involved in projects and initiatives on the river. These entities have overlapping information needs. A Data, Information, Science and Communication (DISC) Program for the LMR is necessary to support the next 200 years of Mississippi River management. The following four recommendations define this DISC program.

Science, Technology and Information Center

Recommendation DISC 1: Create a Lower Mississippi River Information Center (LMRIC) to collect and store information about the LMR including: historical information, scientific data, management, and use. The LMRIC would locate all available information, perform quality assurance of the data and make it available online and in house. The LMRIC would be open to agencies, universities, researchers, users and the public. The LMRIC would also be a resource for river education outreach projects and science, technology, engineering and math career outreach. USGS has recently reorganized its programs to form the Lower Mississippi-Gulf Water Science Center. This reorganization accomplishes part of this recommendation.

Lead Organization and Partners: The USGS would be funded to lead an interagency working group including USACE, EPA, NPS, USFWS, state agencies and others to develop a plan for the LMRIC that addresses location, management, long-term funding, and other specifics. All of the above-mentioned agencies would need to commit to providing existing and future agency data to the LMRIC. The USGS, Kentucky Division of Water, Louisiana Department of Environmental Quality, Mississippi River Network, TNC – Louisiana, TNC – North American Freshwater Program, TNC – Tennessee, MICRA, and LMRCC support this recommendation (see Appendix D).

Needs Addressed: This recommendation directly addresses the need for better Data Storage and Availability. It would also be useful in addressing needs for better management of Water Quality, Sediment, Vegetative Mosaic, Invasive Species, Floodplain, Islands, Outfitters and Guides, Interpretation, Marketing and Safety.

Cost: The annual operating budget for the Upper Mississippi River Long Term Resource Monitoring Program on the Upper River includes approximately $2,000,000 a year for staff and overhead. The recommended center of the Lower River would have a broader mission, but costs would be similar.

Value: The LMRIC would be critical to leverage science, engineering, technology and public policy to meet the Nation's needs for our largest river. It would promote interagency cooperation, encourage research and foster public interest in the river.

Sediment Study

Recommendation DISC 2: Continue with sediment analysis of the Middle and Lower Mississippi River that was initiated in 2014 in a Mississippi River Geomorphic and Potamology Study. The analysis will determine sediment sources, sizes, quantities, fates, and transport parameters. It will build on the ongoing work in the Mississippi River Hydrodynamic and Delta Management Study and the work of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force.

Lead Organization and Partners: USACE initiated these studies under the Mississippi River and Tributaries Project and the Louisiana Coastal Area Mississippi River Hydrodynamic and Delta Management studies. USGS is participating in these studies and supports continuing them. The Arkansas Game and Fish Commission, Kentucky Division of Water, and TNC – North American Freshwater, TNC – Tennessee Program support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses the need for Sediment Management. It would also be useful in addressing Water Quality and Sandbars and Gravel bars.

Cost: The current studies have an annual cost of approximately $4,000,000. Ongoing studies would be expected to have similar costs.

Value: Understanding sediment dynamics is important for river management. Sediment management plans are in place for many of the world's great rivers: the Rhine (Europe), the Blue Nile (Africa), the Yangtze (Asia), the Columbia (North America), and the Darling (Australia). These plans are benefitting coastal areas, navigation, hydropower, and land conservation around the world. USACE spends up to $170 million annually dredging sediment in the Lower Mississippi River to maintain the navigation channel. Plans for the restoration of coastal wetlands in Louisiana call for more than $25 billion to be spent on a variety of projects, most involving water and sediment management.

Water Quality Monitoring Program

Recommendation DISC 3: Create a dedicated water quality monitoring program for the entire LMR. The new program would standardize collection techniques, timing, methodology and parameters. The data would be useful for developing localized, point-in-time water quality assessments and long term trend monitoring. Existing water quality information would be archived in the LMRIC. The LMRIC would be a valuable asset to support this program and assessments of historic water quality changes.

Lead Organization and Partners: This water quality monitoring program would exceed the capacity of any one agency to develop and manage. The USGS and EPA would lead the effort to create a comprehensive water quality monitoring program. USACE, USFWS, NOAA, the twelve states and the National Tribal Water Council that are part of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force would also be part. USGS would like to partner with EPA to implement this alternative. The Arkansas Game and Fish Commission, Kentucky Division of Water, Louisiana Department of Environmental Quality, Mississippi Department of Environmental Quality, LMRCC, TNC – Tennessee and TNC – North American Freshwater Program support this recommendation (see Appendix D).

Needs Addressed: This recommendation directly addresses the need for better Water Quality monitoring. The information generated would be important to recommendations for Data Storage and Availability, Sediment, Tributary Management, Vegetative Mosaic, Invasive Species, Floodplain, Interpretation, and Safety.

Cost: The Long Term River Monitoring Program for the Upper Mississippi spends approximately $2,000,000 annually for water quality monitoring including fish sampling and aquatic vegetation surveys. The LMR program would have similar costs.

Value: A water quality monitoring program would insure the Mississippi River provides good water for drinking, recreating, and industry. Water quality is important for the river itself,

coastal wetlands, fish, wildlife, water supply, groundwater, Gulf of Mexico hypoxia, recreation, and tourism. Clean water is vital to the economy of the nation and the quality of life in the lower Mississippi River Valley. The Gulf of Mexico hypoxic zone sits atop one of the most productive fisheries in the world, and the ecological and economic impacts of hypoxia are under study.

Tributary Watershed Studies (DISC 4)

Recommendation DISC 4a: Conduct Comprehensive Watershed Studies of the major tributary rivers of the LMR as authorized in Section 729 of the Water Resources Development Act of 1986. The following watersheds have been identified as priority watersheds:

Bayou de Chien – Mayfield Creek, KY
Obion River, TN
Forked Deer River, TN
Hatchie, River, TN
Bayou Pierre, MS
Big Black, MS

These watersheds were chosen because they have not received large scale water resources planning; they contain unique resources; there are opportunities for public/private partnerships to foster water resource management; there are problems and opportunities in the watershed that a comprehensive study could address; they are important to water quality and sediment management in the river; and they have the potential to provide valuable habitat and recreation connected to the Mississippi River. The USACE districts and potential local sponsors have previously discussed the potential for most of these studies and some have been included in budget requests. There are other LMR watersheds that may also possess these characteristics, and comprehensive studies could be done on them as well. Appendix A contains maps of each watershed listed above.

Lead Organization and Partners: USACE would lead these studies under Section 729 of WRDA 1986. Partners would vary by watershed but would likely include USFWS, USDA, state resource agencies, and NGOs. USGS would be available to support these studies. The Arkansas Game and Fish Commission, Kentucky Division of Water, Mississippi Department of Environmental Quality, LMRCC, TNC – Tennessee, and TNC – North American Freshwater Program support this recommendation and are interested in the specific watersheds in their areas (see Appendix D).

Needs Addressed: This recommendation directly addresses the need for better Tributary Management. Tributary Management may be important in addressing needs for Water Quality, Sediment, and Floodplains and may provide opportunities to meet needs for Boat Ramps and Bicycle Trails.

Cost: These studies would vary from approximately $1,000,000 for the smaller watersheds up to $5,000,000 for the largest.

Value: The Mississippi River cannot be separated from its tributaries. They are the source of water, contaminants, nutrients, and sediment. They provide important habitat for fish and

wildlife and provide recreation opportunities. Studies on the basins recommended would provide the information necessary to manage these watersheds to provide benefits locally and to the Mississippi River as a whole.

Recommendation DISC 4b: Conduct studies on larger tributary systems. These studies would focus on the active floodplain and existing water resources infrastructure and not on the entire watershed. USACE would need specific authorization to conduct these studies.

Recommendation DISC 4b.1 St. Francis Basin

Lead Organization and Partners: USACE would lead the study with participation from USDA, St. Francis Levee and Drainage District, Arkansas state resource agencies, and others. The Missouri Department of Conservation and the Arkansas Game and Fish Commission support this recommendation (see Appendix D).

Cost: $3,000,000

Recommendation DISC 4b.2 Arkansas River

Lead Organization and Partners: USACE would lead the study with participation from state and federal agencies in Arkansas, Oklahoma, Kansas, and Colorado. The Arkansas Game and Fish Commission supports this recommendation (see Appendix D).

Cost: $5,000,000 to $7,000,000

Recommendation DISC 4b.3 Ouachita River

Lead Organization and Partners: USACE would lead the study with the Ouachita River Valley Association. The Arkansas Game and Fish Commission, Louisiana Department of Environmental Quality, and TNC-Louisiana support this recommendation (see Appendix D).

Cost: $3,000,000

These three rivers were chosen because they contain water resources infrastructure critical to the Mississippi River. Each one is unique in its needs and contributions to the Mississippi River. USGS would be available to support other agencies in assessing existing water resources infrastructure critical to the needs of the Mississippi River. USACE is in ongoing discussions with the existing sponsors of water resources projects on these tributaries and the potential for further studies has been previously discussed. Appendix A contains more information for each river.

Ecological Inventory (DISC 5)

Recommendation DISC 5a: Island Inventory - Conduct an ecological survey of the islands on the Mississippi River to determine their uniqueness, ecological resources, and opportunities for restoration.

Lead Organization and Partners: With the approval of the landowners, the USGS and the USACE Engineer Research and Development Center would conduct the survey in cooperation with the USFWS. USGS, Arkansas Game and Fish Commission, Kentucky Division of Water, Missouri Department of Conservation, and TNC – Tennessee support this recommendation (see Appendix D).

Needs Addressed: This recommendation directly addresses the need for better information about Mississippi River Islands.

Cost: $500,000

Value: The ecological inventory of islands in the LMR would determine their value for habitat and potential for restoration.

Recommendation DISC 5b: Potential Natural Vegetation Study – Conduct research on the current hydrology, soils, and historic vegetation within the batture and develop a potential vegetation map to inform vegetative restoration.

Lead Organization and Partners: The USFWS could lead this effort as part of the National Wetlands Inventory or the Engineer Research and Design Center (ERDC) could lead the study in support of existing projects. USGS, Arkansas Game and Fish Commission, Kentucky Division of Water, Missouri Department of Conservation, Mississippi River Trust, and TNC – Tennessee support this recommendation (see Appendix D).

Needs Addressed: This recommendation directly addresses needs for restoring the Vegetative Mosaic and improving the quality of Floodplain habitat.

Cost: $1,200,000

Value: This information would be provided to landowners, non-governmental organizations, and agencies interested in restoring the vegetative mosaic of the valley.

HABITAT RESTORATION and MANAGEMENT PROGRAM

The Mississippi River Valley covers around 25 million acres (Saucier 1994). Historically, bottomland hardwood forests, swamps, marshes, and oxbow wetlands covered most of the valley. The LMR had a sinuous course with numerous meander loops, bends, and oxbow lakes (Baker et al. 1991) and shifted its channel frequently reworking parts of its alluvial meander belt (Saucier 1994, Amoros & Bornette 2002). These diverse habitats supported a rich biotic community including reptiles, amphibians, fish, freshwater mussels, birds, mammals, and plants.

Over the past 150-200 years, the alluvial valley, floodplain, and channel of the LMR have been altered (Baker et al. 1991). Forests have been cleared and drained for agricultural, municipal, residential, and industrial purposes. Levees reduce flooding in most of the valley and the channel has been realigned and constrained.

At least 90 species of freshwater fish (Baker et al. 1991) and around 50 species of mussels (Jones et al. 2005 & USACE records) are found in the LMR. Over 300 species of birds use the Mississippi River valley (Scott ed. 1983). The Mississippi Flyway is an important corridor for migratory waterfowl, shorebirds, and Neotropical migratory birds that require feeding and resting habitat during spring and fall migrations. Nearly 40% of North America's waterfowl and 60% of all bird species in the US migrate through the valley (Scott ed. 1983).

There are a variety of federally listed threatened and endangered species which are known or believed to occur in the LMR or its tributaries. They include mussels (Alabama heelsplitter, fat pocketbook, Louisiana pearlshell, scaleshell, rabbitsfoot), plants (decurrent false aster, Geocarpon minimum, pondberry), birds (interior least tern, red-cockaded woodpecker), mammals (Indiana bat, Louisiana black bear), and fish (pallid sturgeon, relict darter). The USFWS developed Recovery Plans detailing the life history, habitat needs, threats, and status for all of these species.

The LMRCC is a coalition of 12 state natural resources conservation and environmental quality agencies from Arkansas, Kentucky, Louisiana, Mississippi, Missouri and Tennessee. It provides the only regional forum dedicated to conserving the natural resources of the Lower Mississippi River floodplain. LMRCC focuses on habitat restoration, landscape level conservation planning, and natural resource-based economic development. USFWS leads the effort and provides a full time coordinator. USGS, USACE, EPA, and NRCS are cooperating agencies. The LMRCC coalition would be crucial to the success of any habitat program on the Lower River.

Conservation Reach Studies

Recommendation HRMP 1. Conduct eight conservation reach habitat restoration studies on the LMR. The Mississippi River ecosystem is a dynamic system with interactions among the terrestrial and aquatic systems, main channel and side channel areas, mudflats, backwaters, tributaries, and islands. These feasibility studies would examine the Mississippi River and batture to determine if there is Federal interest sufficient to justify construction of ecosystem restoration features. Eight reaches have been identified as priorities.

Wolf Island to Island 8 Reach RM 946 – 910 (36 mi.)
Hatchie/Loosahatchie Reach RM 775 – 736 (39 mi)
Islands 62/63 Reach RM 650 - 618 (32 mi.)
Arkansas River Reach RM 599 – 556 (43 mi.)
Possum (Worthington-Pittman) Reach RM 524 – 490 (34 mi.)
Palmyra River Reach RM 431 – 398 (33 mi.)
Lake Mary Reach RM 360 -322 (38 mi.)
Raccourci Cutoff Reach RM 300 -265 (35 mi.)

These reaches were chosen because they may provide valuable habitat for rare species; they each contain a channel crossing; the batture is wide in the reach; and there is a concentration of previously identified potential projects. ERDC identified the Islands 62/63 Reach in 2013 as a priority in 2013 and has already begun in depth geomorphic, sediment, hydraulic and biological surveys in the reach. Several of the reaches coincide with those the USACE Interior Least Tern

Working Group identified as priorities. ERDC and USFWS personnel participated in the selection of the reaches. Appendix B contains maps and more detailed descriptions of each reach.

Lead Organization and Partners: USACE would need specific authorization for this priority reach habitat program. Each reach study would be conducted separately and would require non-Federal sponsors and cooperation with other Federal agencies like the USFWS and USDA. The studies would also consider restoration of upland habitats within the batture that are outside of the USACE ecosystem restoration mission. LMRCC's Restoring America's Greatest River (RAGR) initiative has already identified 104 potential projects that fall within these reaches. The Arkansas Game and Fish Commission, Kentucky Division of Water, Louisiana Department of Environmental Quality, Mississippi Department of Environmental Quality, Missouri Department of Conservation, MICRA, LMRCC, Missouri Department of Conservation, Mississippi River Trust, TNC – Tennessee, and TNC – North American Freshwater Program support this recommendation (see Appendix D).

Needs Addressed: This recommendation directly addresses needs for restoration of Side Channels, Backwaters and Oxbows, Sandbars and Gravel Bars, Main Channel Habitat, Vegetative Mosaic, Floodplain and Island habitats. It may also be useful in addressing needs for Water Quality, Sediment, Data Storage and Availability, Invasive Species, Boat Ramps and Safety.

Cost: $3,000,000 per study

Value: Each reach has opportunities to enhance a broad spectrum of features, i.e. restorable side channels, backwaters, and oxbows, a wide floodplain, large islands, populations of threatened and endangered species, and sandbars. These eight reaches total 290 miles or nearly 30% of the LMR. These studies would consider recreation features along with ecosystem restoration.

Aquatic Habitat Restoration Studies

Recommendation HRMP 2. Conduct aquatic habitat restoration studies in areas outside the eight reaches mentioned above. Appendix C lists 125 projects that could be studied under one of two existing programs.

> **Recommendation HRMP 2a.** Conduct Aquatic Habitat Ecosystem Restoration studies using the existing USACE authority under Section 1135 of the Water Resources Development Act (WRDA) of 1986 or Section 206 of WRDA 1996. This program has already been used to restore habitat on the LMR, e.g. Tunica Lake.
>
> *Lead Organization and Partners:* USACE has the authority to conduct these studies at the request of a non-federal sponsor, i.e. a state or local agency or non-governmental organization. Arkansas Game and Fish Commission, Kentucky Division of Water, Louisiana Department of Environmental Quality, TNC – Tennessee, and MICRA support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses needs for restoration of Side Channels, Backwaters and Oxbows, Sandbars and Gravel Bars, Main Channel Habitat, and Island habitats. It may also be useful in addressing needs for Boat Ramps and Safety.

Cost: The Water Resources Reform and Development Act (WRRDA 2014) set a total per project federal cost limit of $10,000,000 for these two authorities; approximate total cost with cost share match is $15,000,000. Many of the listed projects can be completed for less than the limit, e.g. Tunica Weir Section 1135 was completed in 2005 for less than $1,500,000.

Value: These projects have the potential to restore important habitat.

Recommendation HRMP 2b. Use the existing USFWS National Fish Passage Program to restore side channels and other aquatic habitat on the Mississippi. This program has already been used to restore 56 miles of habitat on the LMR.

Lead Organization and Partners: LMRCC and the USFWS are the lead agencies. Fish Passage projects require a cost-sharing partner which can include private individuals; Federal, tribal, state, and local governments and agencies; and non-governmental organizations. Kentucky Division of Water, Missouri Department of Conservation, Louisiana Department of Environmental Quality, MICRA, Mississippi River Trust, and TNC – Tennessee support this recommendation and LMRCC stated its intent to continue with the program (Appendix D).

Needs Addressed: This recommendation directly addresses needs for restoration of Side Channels, Backwaters and Oxbows, Sandbars and Gravel Bars, Main Channel Habitat, and Island habitats. It may also be useful in addressing needs for Boat Ramps and Safety.

Cost: Projects implemented through the Fish Passage Program average approximately $200,000 each.

Value: These projects have the potential to restore important habitat.

Terrestrial Habitat Program

Recommendation HRMP 3: Terrestrial Habitat Program – Continue to implement programs that restore native vegetation to the batture. Most of the land within the batture is in private ownership. There are programs to assist landowners interested in reforestation.

Lead Organization and Partners: The NRCS provides technical and financial assistance to landowners for water quality and wetlands improvement projects. NRCS has established the Mississippi River Basin Healthy Watersheds Initiative to improve the health of the Mississippi River Basin. Through this Initiative, NRCS and its partners help producers in selected watersheds in the Mississippi River Basin voluntarily implement conservation practices that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity. Arkansas Game and Fish Commission, Kentucky Division of Water, Louisiana Department of Environmental Quality, Missouri Department of Conservation, Mississippi River Trust, and TNC – Tennessee support this recommendation (Appendix D).

The Lower Mississippi Valley Joint Venture (LMVJV) is a self-directed, non-regulatory private, state, and Federal conservation partnership. LMVJV's goal is sustaining bird populations and their habitats within the Lower Mississippi Valley and West Gulf Coastal Plain regions. They implement and communicate the goals and objectives of relevant national and international bird conservation plans (LMVJV 2002). The Lower Mississippi Valley Joint Venture Plan was formulated to address problems that traditionally confronted wetland conservation in the region; namely, clearing of forests for agriculture and extensive alterations of wetland hydrology resulting from basin-wide flood control and drainage. In an effort to further refine its conservation delivery infrastructure, the LMVJV partnership has chartered the development of geographically-explicit Conservation Delivery Networks as the forum for coordinating its on-the-ground actions. There are four networks overlying the Lower River.

Needs Addressed: This recommendation directly addresses needs for restoration of the native Vegetative Mosaic and quality Floodplain habitat. It would also be important for managing Water Quality.

Cost: The Wetlands Reserve Enhancement Program, part of the NRCS Wetlands Reserve Program, provides the funding. Between 2010 and 2013, the NRCS has formalized agreements with 47 landowners in the basin, investing $17.8 million in long-term conservation easements and wetland restoration projects.

Value: The initiative targets restoration of over 11,000 acres of wetland habitat and may prevent sediment and nutrients from entering waterways, decrease flooding, and improve bird and fish habitat. Approximately two thirds of the work is within the batture.

Invasive Species Program

Recommendation HRMP 4: Invasive Species - There are several plans in place to address invasive species on the river. Many of the species do not directly affect habitat, but they do impact native populations. Privet would be addressed site-specifically when developing forest restoration plans. USDA is doing research on kudzu control in the south. This research and control programs would continue. The Aquatic Nuisance Species Task Force (ANSTF) and Mississippi Interstate Cooperative Resource Association (MICRA) have both developed plans to manage and control carp and other aquatic nuisance species. These plans should be implemented.

Lead Organization and Partners: Both MICRA and ANSTF are interagency organizations. Implementing the aquatic nuisance species plans would require cooperation between the states and USFWS. Other agencies would play a role in limiting the spread of species. Arkansas Game and Fish Commission, Kentucky Division of Water, Louisiana Department of Environmental Quality, Missouri Department of Conservation, LMRCC, MICRA, and TNC – Tennessee support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses needs to manage Invasive Species. It would be important for restoring habitat quality in the Floodplain and reestablishing a native vegetative mosaic.

Cost: MICRA's *An Action Plan to Minimize Ecological Impacts of Aquatic Invasive Species in the Mississippi River Basin* estimates federal funding needs at $104,450,000 annually. This is a comprehensive plan for the entire Mississippi River Basin. The plan increment for the Lower Mississippi River is a small piece of the total.

Value: Invasive species have entered, and continue to enter and spread within the United States from a variety of sources. The strategy would minimize risk of new introductions and focus effort on containing and controlling established populations. Reducing the impact of invasive species may benefit native aquatic resources within the Basin.

RECREATION PROGRAM

Recreation and tourism are important economic sectors in the LMR. Outdoor recreation in the region generates over $1.3 billion in direct revenues and employs nearly 55,000 people. Tourism in the area generates $15.5 billion in direct revenues and employs over 190,000 people.

The Mississippi River Parkway Commission (MRPC) works collaboratively with other entities to promote travel to the Mississippi River, Great River Road National Scenic Byway and the surrounding ten states: Minnesota, Wisconsin, Iowa, Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana. It was established in 1938 to preserve, promote, and enhance the scenic, historic, and recreational assets of the Great River Road National Scenic Byway and foster economic growth in the corridor.

Within the U.S. Department of Transportation, the Federal Highway Administration (FHWA) has responsibility for the National Scenic Byways Program. The Program is a grassroots, collaborative effort established to help recognize, preserve and enhance selected roads throughout the United States. The Secretary of Transportation recognizes certain roads as America's Byways® - All-American Roads or National Scenic Byways - based on one or more archaeological, cultural, historic, natural, recreational and scenic intrinsic qualities. The law guiding implementation of the National Scenic Byways Program is in Section 162, Title 23 of the United States Code; 23 U.S.C. 162.

The Secretary of Transportation makes grants to States and Indian tribes to implement projects on highways designated as National Scenic Byways or All-American Roads, or as State or Indian tribe scenic byways. Projects submitted for consideration should benefit the byway traveler's experience, whether it will help manage the intrinsic qualities that support the byway's designation, shape the byway's story, interpret the story for visitors, or improve visitor facilities along the byway.

The National Park Service's Rivers Trails and Conservation Assistance (RTCA) program extends and expands the benefits of the National Park Service throughout the nation. They help connect all Americans to their parks, trails, rivers, and other special places. When a community asks for assistance with a project, RTCA staff provides free, on-location facilitation and planning

expertise. RTCA helps guide a project from conception to completion. RTCA draws from project experiences across the country and adapts best practices to a community's specific needs. The Mississippi River Connections Collaborative (MRCC) is a part of the RTCA.

The mission of the MRCC is to promote the magnificence and diversity of the Mississippi River as a national treasured landscape. This joint effort works to increase recognition of America's Great River, enhance the existing resources, acquire funding for conservation, and ensure that all Americans can enjoy these assets in the future. The MRCC coalition would be crucial to expanding recreation and tourism on the LMR.

Boat Ramps

Recommendation RP 1. Boat Ramps – Increase the number of boat ramps on the LMR. A boat ramp every 10 to 20 miles on the river would provide more opportunities for paddlers, fishermen and hunters and would increase the ability to conduct search and rescue operations. More ramps would be available to directly access backwaters and side channels. Ramps also provide locations for interpretive signs about the Mississippi River, environmental education and safety.

Lead Organization and Partners: LMRCC identified 23 potential boat ramps in RAGR. Local governments and private landowners could get permits from USACE and develop free or for profit ramps. RCTA and National Scenic Byway Grants may be available to help local communities plan and build boat ramps. Boat ramps may be added to other USACE projects under certain conditions, but this option may not provide enough ramps to meet the needs of recreational users. Arkansas Game and Fish Commission, Louisiana Department of Environmental Quality, Missouri Department of Conservation, LMRCC, and TNC – Tennessee support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses needs for more Boat Ramps and may help address needs for improved Safety.

Cost: Variable depending on size and location; $50,000 - $750,000 each.

Value: Boat ramps would provide recreational opportunities for paddlers, anglers, duck hunters and bird watchers. These users spend millions of dollars annually in the region and support manufacturing jobs nationwide. Existing ramps launch boaters into the main navigation channel. Ramps designed and located for recreational use would be safer and encourage people to recreate in the calmer side channel and backwater areas.

Bicycle Trails

Recommendation RP 2. Bicycle trails – Increase the total mileage of bicycle trails and especially trails where vehicles are not allowed (except as necessary for farming, etc.) The existing Mississippi River Trail extends the full length of the river, but lies mostly on public roads. The Big River Parkway is a planned trail extending from New Orleans, LA to St. Louis, MO on the levees. The Harahan Bridge over the Mississippi River will link Memphis, TN to this trail. This initiative will provide a unique opportunity for long distance riders. Shorter trails in

and around towns and linking to this longer trail may still be needed. The Old Vicksburg Bridge is used for bicycling and pedestrian events and could become a permanent bicycling asset.

Lead Organization and Partners: The Big River Strategic Initiative is leading the development of the Big River Parkway. Any trail on the levee would require approval of the local levee district and a permit from USACE. USACE has some authority to add recreational features to flood risk management and ecosystem restoration projects. These opportunities may be limited, but would be explored with the non-Federal sponsors of the projects. Many local communities are developing bicycling lanes on existing roads and developing new bicycle/pedestrian trails. The Louisiana Department of Environmental Quality and TNC – Tennessee support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses needs for more Bicycle Trails and would provide opportunities to meet the needs for Interpretation.

Cost: Bicycle trails and amenities are highly variable. Urban trails can cost around $1,000,000 per mile including land acquisition, earth moving and paving. Creating the bicycling path on the Harahan Bridge may cost over $30,000,000.

Value: Americans spend more money every year on bicycling gear and trips ($81 billion) than they do on airplane tickets and fees ($51 billion) (OIA 2012). Bike trails and lanes in major metropolitan areas are expanding. As biking is becoming more popular, the demand for linking existing trails and creating longer routes is growing. Bike trails on levees and converted railroad lines would likely provide a positive economic return on the investment. The expansion of levee trails in Louisiana, the Big River Parkway from New Orleans to St. Louis, and the completion of the Harahan Bridge project at Memphis may spur more opportunities for bicycling in the region.

Riverfront Parks

Recommendation RP 3. Riverfront Parks – Develop riverfront parks for the use of local communities.

Lead Organization and Partners: NPS can help local communities plan these types of amenities and Parkway grants may be available to help cities pay for them. USACE Planning Assistance to States Program may also be able to help plan for these facilities. Louisiana Department of Environmental Quality and TNC – Tennessee support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses needs for Riverfront Parks and would provide opportunities to meet the needs for Interpretation.

Cost: Varies based on site, size, and amenities.

Value: Local residents would appreciate these small gathering spots and they would provide excellent venues to teach people about the river. Informational signs could offer historical information as well as information about navigation and flood risk management on the river.

Riverboat Landings

Recommendation RP 4. Riverboat Landings – Develop more and better riverboat landings along the Lower River to provide reliable and accessible opportunities for riverboat passengers to visit and enjoy cities and towns all along the river. A USACE study examined the feasibility of a facility in West Feliciana Parish, LA. The study found the project would provide a positive benefit cost ratio, but it could not be implemented because the project benefits were entirely recreational. This project would be given high priority for implementation because it has already been found to be cost effective.

Lead Organization and Partners: Local communities would lead these efforts and the NPS RCTA program and the USACE Planning Assistance to States Program may be able to help in planning for these facilities. The Louisiana Department of Environmental Quality, TNC – Tennessee and the St. Francisville Area Foundation support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses needs for Riverboat Landings and would provide opportunities to meet the needs for Interpretation.

Cost: Varies based on site, size, and amenities.

Value: Better facilities for riverboats would provide more consistent access and allow passengers of varying physical abilities to disembark. As the number of riverboats increases, there may be more opportunities for small towns to host passengers for day excursions. This would have an economic benefit. These landings can incorporate restaurants and interpretive facilities and become community assets beyond being riverboat docks.

Marketing

Recommendation RP 5. Marketing

> **Recommendation RP 5a.** National Geographic Geotourism Destination – Continue developing the Mississippi River as a Geotourism Destination which may include gathering and publicizing information on lodging, restaurants, amenities, museums, festivals, events, tours, culture, ecology and other features.
>
> *Lead Organization and Partners:* MRCC and Big River Strategic Initiative are working with National Geographic and gathering a group of other partners to support this initiative. TNC – Tennessee and the Louisiana Department of Environmental Quality support this recommendation (Appendix D).
>
> *Needs Addressed:* This recommendation directly addresses the need for Marketing and may be valuable in addressing the needs for Lodging and Dining, Outfitters and Guides, Interpretation and Safety.
>
> *Cost:* $1,000,000

Value: The National Geographic Society Geotourism Destination project would provide a one stop source to highlight all of the cultural, historical, natural and musical features of the Mississippi River and link potential travelers with lodging, dining and other services.

Recommendation RP 5b. Great River Road – Pursue a National Parkway grant to develop a GPS feature for National Scenic Byways.

Lead Organization and Partners: The MRPC would work with a coalition of parkway commissions to get scenic byways included on GPS navigation systems. TNC – Tennessee and the Louisiana Department of Environmental Quality support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses the need for Marketing and may be valuable in addressing the needs for Lodging and Dining, Outfitters and Guides, Interpretation and Safety.

Cost: $1,000,000

Value: GPS navigation units are becoming standard for most travelers who depend on them to find hotels, restaurants, and other attractions. Scenic Byways are not programmed into GPS systems. The Great River Road does not follow a single highway route, and turn by turn directions are not included in the brochures. The route can be difficult to follow if the road signs are missing or not visible.

Lodging and Dining

Recommendation RP 6. Lodging & Dining - Develop more lodging and dining options on the LMR. Mobile food trucks at popular sites could meet some of the demand for dining on the LMR during peak usage, e.g. along the Big River Parkway on weekends. Most lodging would need to be developed outside of the batture, but there is some demand for camping along the river which could be met on State lands.

Lead Organization and Partners: Commercial interests would develop more lodging and dining options on the LMR. Local governments may have a limited role in permitting these services. TNC – Tennessee and the Louisiana Department of Environmental Quality support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses the need for more Lodging and Dining options.

Cost: Varies based on site, size, and amenities.

Value: Lodging and dining would enhance the recreational and tourism value of existing sites and encourage more visits to the area.

Outfitters and Guides

Recommendation RP 7. Outfitter and Guide - Establish more outfitter & guide services on the LMR.

Lead Organization and Partners: These may be mostly commercial enterprises, but non-governmental organizations like the National Audubon Society do sometimes offer guided field trips to view birds and other wildlife. Arkansas Game and Fish Commission, TNC – Tennessee and the Louisiana Department of Environmental Quality support this recommendation (Appendix D).

Needs Addressed: This recommendation directly addresses the need for more Outfitters and Guides and would improve Safety.

Cost: Varies based on services offered and geographic operating area.

Value: Outfitters and guides are needed to get visitors in the region to spend time on or near the Mississippi River. Many travelers may be interested in spending a day biking, fishing or canoeing in the area, but may not want to bring the equipment with them. Travelers and local residents may lack the required skills to safely experience the river on their own.

Table 1. Summary of Conclusions

Data Science and Communications Program				
Recommendation		**Lead Organization**	**Cost***	**Value**
DISC 1	Science Technology Information Center	USGS	$2 million/year	Promote interagency cooperation, encourage research, foster public interest, and support other recommendations.
DISC 2	Sediment Study	USACE	$4 million/year	Support management plans, better manage dredging and coastal restoration.
DISC 3	Water Quality Monitoring Program	USGS & EPA	$2 million/ year	Provide clean water for people, industry, and habitat.
DISC 4	Tributary Watershed Studies	USACE	9 @ $1-$5 million each	Develop plans to manage tributaries for habitat, water quality, sediment, water supply, navigation and recreation.
DISC 5	Ecological Inventory	USACE & USFWS	$1.7 million	Provide information to support restoration.
Habitat Restoration and Management Program				
Recommendation		**Lead Organization**	**Cost**	**Value**
HRMP 1	Conservation Reach Studies	USACE	8 @ $3 million each	Restore aquatic (side channel, oxbow, main channel, islands, and sandbars) and terrestrial (wetlands, bottomland hardwoods, and floodplain) habitats for native species and especially federally listed species.
HRMP 2	Aquatic Habitat Restoration Studies	USACE & USFWS	125 @ $200,000 to $ 15 million (maximum)	Restore individual sites for native species.
HRMP 3	Terrestrial Habitat Program	USDA & LMVJV	$18,000,000	Restore floodplain habitat.
HRMP 4	Invasive Species Program	MICRA & ANSTF	Part of larger effort	Promote and protect native species.
Recreation Program				
Recommendation		**Lead Organization**	**Cost**	**Value**
RP 1	Boat Ramps	LMRCC and others	$50,000 - $750,000 each	Increase safety and meet recreation demand.
RP 2	Bicycle Trails	NGOs	variable	Increase safety and meet recreation demand.
RP 3	Riverfront Parks	Local Communities	variable	Promote community cohesiveness and meet demand.
RP 4	Riverboat Landings	Local Communities	variable	Provide safe, accessible opportunities and support local economic development.
RP 5	Marketing	NPS, MRPC, NGOs	$2 million	Promote river use and encourage economic development.
RP 6	Lodging and Dining	Private Enterprise	variable	Meet demand and support economic development.
RP 7	Outfitters and Guides	Private Enterprise	variable	Increase safety, meet demand, support economic development.

*Costs presented were rough order magnitude estimates used for screening purposes only and are not for authorization or budgetary purposes.

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APPENDIX A

Proposed Watershed Studies

Recommendation DISC 4

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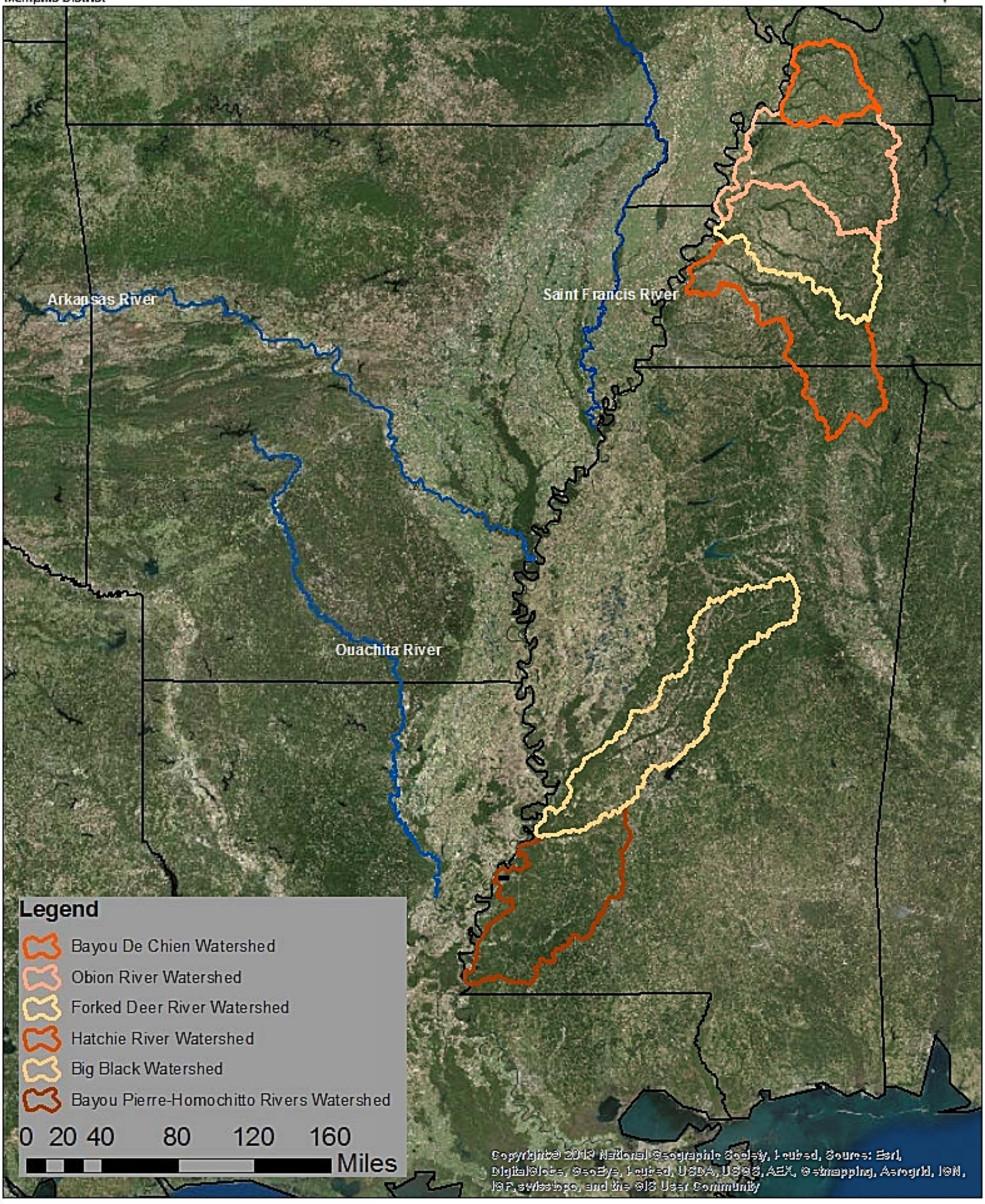
Tributary Watershed Studies



Watershed Name: Bayou de Chien-Mayfield

Watershed Size: 970 sq. mi.

Location: Bayou de Chien and Mayfield Creek arise in Graves County, KY and flow generally westward to the Mississippi River at Hickman, KY. Bayou de Chien flows into the Mississippi River at RM 922 forming Elvis Stahr (Hickman) Harbor. Mayfield Creek enters the river at RM 950.

Special Status Species: Relict darter (*Etheostoma chienense*), Indiana bat (*Myotis soldalis*)

General Description: The terrain along the upper portion of Bayou de Chien is rugged with narrow valleys that rise 50-100 feet along steep slopes to narrow ridges. Downstream of the Purchase Parkway, the valley along the main stem and major tributaries becomes quite wide. However terrain along smaller tributaries remains rugged with steep slopes rising in excess of 100 feet to narrow ridges. In the lower portion of the watershed, the slopes become less severe with elevation gains generally less than 50 feet. The north side of the watershed below Mud Creek is part of the Mississippi River floodplain where land is gently rolling with little elevation variance.

Land Use: The watershed is predominately agricultural. Forested areas are confined to wetlands and on the steeper slopes in the upper portion of the watershed. About 1200 acres of the Obion Creek Wildlife Management Area are located in the lower portion of the watershed. Residential, commercial, and industrial areas are located in and around Hickman. Residential areas are also located near Cayce, Crutchfield, and Water Valley.

Problems & Opportunities: Much of Bayou de Chien and its tributaries upstream of Highway 239 is an Outstanding Resource Water due to the presence of the relict darter. Much of the valley along the main stem is wetland.

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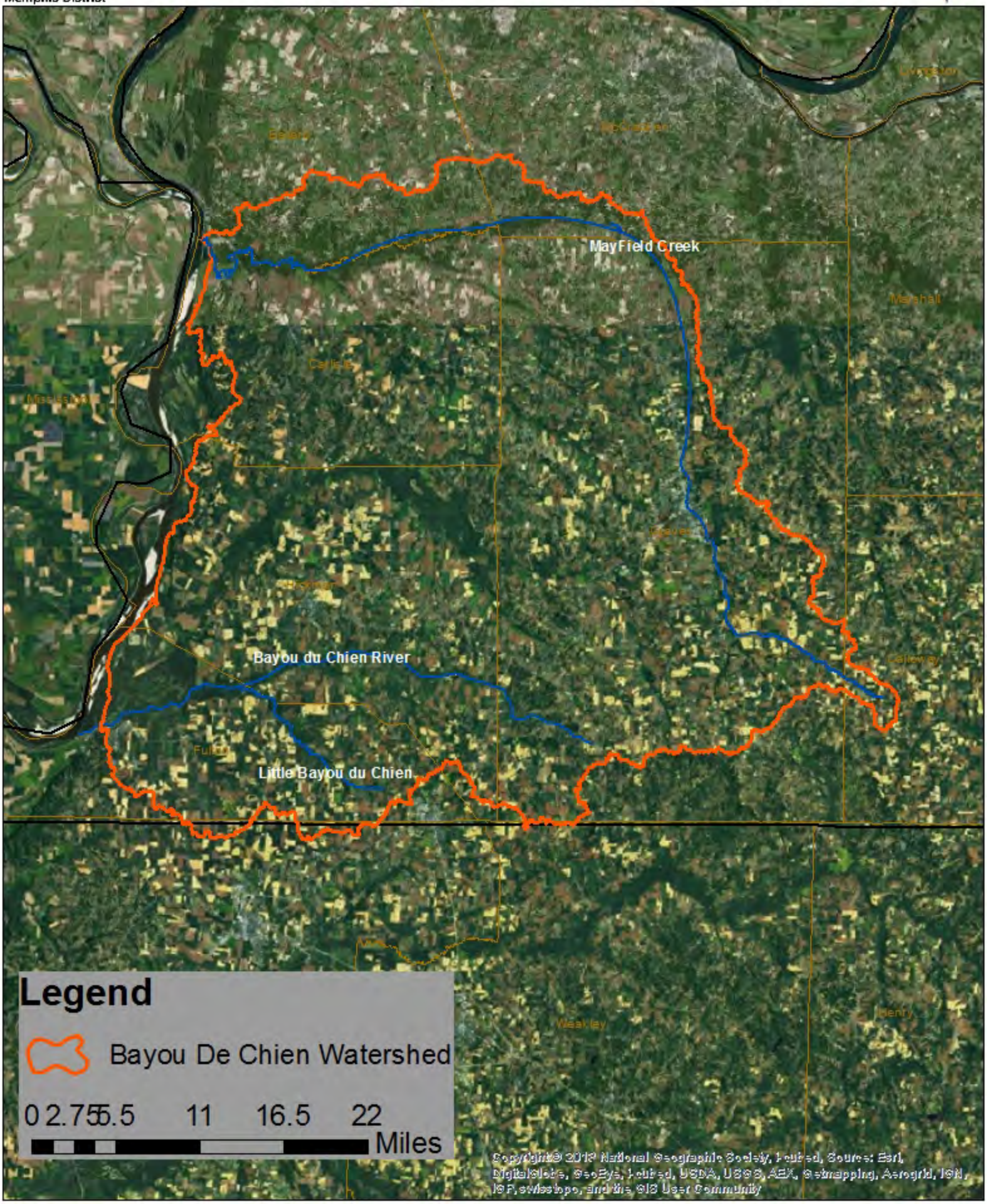
Bayou du Chien Watershed



Watershed Name: Obion

Watershed Size: (2473 sq. mi.)

Location: The Obion River is located in northwest Tennessee and includes parts of Carroll, Henderson, Dyer, Gibson, Henry, Lake, Lauderdale, Obion, and Weakley counties. It enters the Mississippi River at RM 819

Special Status Species: Pallid sturgeon (*Scaphirhynchus albus*), alligator snapping turtle (*Macroclemys temminckii*), alligator gar (*Lepisosteus spatula*), Indiana bat (*Myotis soldalis*), northern madtom (*Noturus stigmosus*), and the firebelly darter (*Etheostoma pyrrhogaster*).

General Description: The Obion River system is the primary surface water drainage system of northwest Tennessee and is comprised of four major forks, the North Fork, Middle Fork, South Fork and Rutherford Fork that each flow as separate streams for the majority of their lengths. The confluences of these forks are only a few miles above the mouth of the Obion's discharge into the Mississippi River.

Land Use: Lake Isom and Reelfoot Lake National Wildlife Refuges lie within the watershed as well as smaller wildlife management areas and refuges. The Obion River is separated into three watersheds: North Fork of the Obion, South Fork of the Obion and the Rutherford Fork of the Obion. Gooch Wildlife Management Area also lies in the watershed.

Problems & Opportunities: The Obion River, like many others in west Tennessee, has been heavily modified to alleviate the risk of flooding for residents and agriculture. Row-crop production and pasture land, dominate land use in the watershed. Best Management Practices, improved zoning guidelines, building codes, streamside buffer zones and greenways, and general landowner education could reduce sedimentation. Other management measures may include re-establishing bank vegetation to stabilize banks, and restoring wetlands and meanders to reduce water velocity and scouring.

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Obion Watershed

Watershed Name: Forked Deer

Watershed Size – (2086 sq. mi.)

Location: The Forked Deer River watershed covers several counties in West Tennessee. It originally entered the Mississippi River near RM 803, but the lower end of the river was rerouted into the Obion which enters the river at RM 819.

Special Status Species: Firebelly darter (*Etheostoma pyrrhogaster*), barking treefrog (*Hyla gratiosa*), Indiana bat (*Myotis soldalis*), and the Hatchie burrowing crayfish (*Fallicambarus hortoni*), as well as heron rookeries

General Description: The Forked Deer has three major branches, the North fork, Middle Fork and South Fork. Most of the system has been channelized. There are numerous small dams for flood detention and sediment storage.

Land Use: Land use in the Forked Deer River Watershed is predominately row crop agriculture and pasture. The Tigrett Wildlife Management Areas is over 7,500 acres and provides habitat for waterfowl, wading birds, bald eagle and Mississippi kite.

Problems & Opportunities: Excess sediment within the watershed has caused valley plugs to form within channelized reaches of the river, and they will likely continue to form as degradation of upstream reaches of the Forked Deer and its tributaries continues and the watershed struggles to reach equilibrium. Valley plugs can force the river into old meanders and cause higher flood elevations or ponding within wooded areas leading to tree mortality. Forested tracts of the Forked Deer River appear to have shifted from dominantly mixed oak, sweetgum, and bald cypress to a more disturbance tolerant mix of red maple, black willow, and river birch. Conditions within the watershed are not likely to substantially improve without major watershed-scale interventions such as meander restoration, restoration of hydrology, and bottomland hardwood restoration as well as sediment load reductions.

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Forked Deer Watershed

Watershed Name: Hatchie

Watershed Size: (2610 sq. mi.)

Location: The Hatchie River is located in west Tennessee and north Mississippi and includes parts of Hardeman, McNairy, Haywood, Madison, Tipton, and Lauderdale Counties in TN and Carroll, Henderson, Dyer, Gibson, Henry, Lake, Lauderdale, Obion, and Weakley counties. It enters the Mississippi River at RM 773

Special Status Species: Indiana bat (*Myotis soldalis*), naked sand darter (*Ammocrypta beanii*), rabbitsfoot mussel (*Quadrula cylindrica*), bald eagle (*Haliaeetus leucocephalus*), Swainson's, prairie and cerulean warblers.

General Description: The Hatchie River is the only undammed and unchannelized tributary to the LMR. Most of the Hatchie's 36 tributaries have been channelized or altered, and they are carrying heavy sediment loads into the Hatchie. The increased sediment from the tributaries threatens to create valley plugs in the Hatchie. The Hatchie River contains the largest forested floodplain in Tennessee.

Land Use: The area includes the Hatchie National Wildlife Refuge (11,500 + acres), Lower Hatchie River NWR (9,500 acres), the Chickasaw NWR (25,000 ac), Chickasaw State Forest (12,500 ac), Big Hill Pond State Park (5,000 ac) and the Fort Pillow State Historic Park, the site of an infamous Civil War battle. USDA has acquired Wetland Reserve Program Easements throughout the watershed.

Problems & Opportunities: The natural flood processes that drive the ecosystem are intact, sustaining the river and wetland habitats that support a rich ecological diversity. These habitats support more than 100 species of fish and 35 species of mussels. With 11 species of catfish, the Hatchie probably contains more species of catfish than any other river in North America.

USGS is actively studying the Upper Mississippi Embayment (groundwater), and the Hatchie watershed overlies part of the recharge zone. This aquifer supplies 17% of all water withdrawn from aquifers in the U.S. and is one of the most valuable natural resources in the region.

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Hatchie Watershed

Watershed Name: Bayou Pierre

Watershed Size: (1070 sq. mi)

Location: Bayou Pierre originates northwest of Brookhaven and along with the Homochitto and Buffalo Rivers drains much of Hinds, Lincoln, Franklin, Copiah and Claiborne Counties in MS. It enters the Mississippi River at River Mile 395. The Homochitto and Buffalo Rivers would be included in this study.

Special Status Species: Bayou darter (*Etheostoma rubrum*)

General Description: Bayou Pierre is experiencing an alarming land loss rate due to bank caving and head-cutting, directly impacting the endangered bayou darter and its habitat. Bayou Pierre is the only remaining habitat of the bayou darter and further degradation could jeopardize the continuing existence of the species. In addition, effluent runoff from poultry industry could lead to stream contamination and fish kills. The watershed investigation could lead to new alternatives to combat these problems and directly benefit the habitat of the bayou darter. Ross et al. (2001) noted extensive erosion throughout the system. The lower reaches of the watershed are recovering, but headcutting is ongoing in the upper reaches. Headcutting is a common problem in LMR tributaries (Shankman 1996). The Mississippi River has degraded in some reaches and caused headcuts to progress up the tributaries. Soils in the region are highly erodible and the rivers are not able to re-stabilize without intervention. Despite these conditions, the bayou darter population remains stable (Ross et al. 2001).

Land Use: Timberlands dominate the watershed, but, livestock grazing and row crop agriculture are also common. The 191,000- acre Homochitto National Forest lies in the watershed.

Problems & Opportunities: The Bayou Pierre Watershed Enhancement Group includes a group of landowners, agencies, and organizations striving to improve the quality of the water, land, and wildlife within the watershed.

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Bayou Pierre-Homochitto Watershed

Watershed Name: Big Black

Watershed Size- (3384 sq. mi)

Location: The Big Black River originates in Webster County near Eupora, MS and flows about 300 miles towards the southwest overlying Choctaw, Montgomery, Carroll, Holmes, Attala, Yazoo, Madison, Claiborne, Hinds, and Warren Counties, MS. It enters the Mississippi River at River Mile 409.

Special Status Species:

General Description: The estimated population within the Big Black River watershed exceeds 176,000, with residents primarily located around Jackson and surrounding communities. The Big Black River watershed includes 3 of the fastest developing residential and business areas in the state. The basin is also known for producing large whitetail deer.

Land Use: According to the U.S. Geological Survey, land cover in the watershed is approximately 56% forested and 39% agriculture, and the remaining areas are developed. Agricultural runoff results in large amounts of suspended sediments and turbid conditions, primarily in the northern part of the basin. Although most of the basin streams are turbid with low current velocity, other basin streams have swift current, sandy substrate, and relatively clear water. The site of the Civil War Battle of Big Black River Bridge lies in the watershed.

Problems & Opportunities: The Mississippi Department of Environmental Quality is currently investigating non-point source pollution control measures in the Big Black River Basin because water quality is significantly influenced in certain areas of the watershed by diverse land based urban development and stormwater runoff, agricultural activities, and sedimentation.

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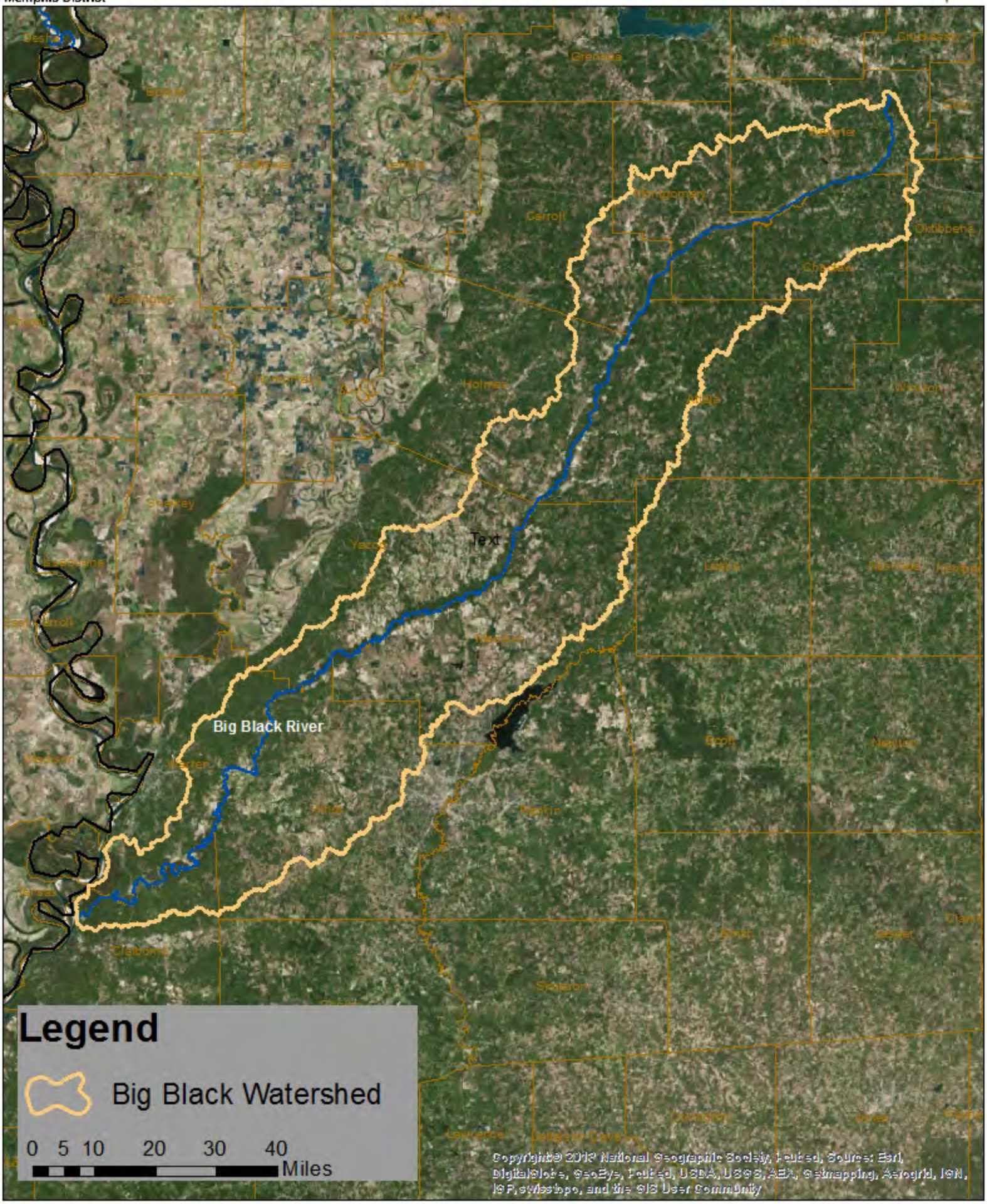
Big Black Watershed



River Name: St. Francis

River Location: the St. Francis River heads in Missouri, flows over 400 miles south through Arkansas, and enters the Mississippi River at RM 672.

Specific Proposal: Conduct a study of the water resources of the St. Francis River Basin to assess the opportunities for water reallocation among the various channels, ecosystem restoration, agricultural water supply, and recreation projects compatible with the existing flood risk management system. Most of the watershed now drains into the Mississippi River through the Huxtable Pumping Station near Marianna, AR.

Lead Organization and Partners*:* USACE would lead the study with participation from USDA, St. Francis Levee and Drainage District, Arkansas state resource agencies, and others.

Needs Addressed: This recommendation directly addresses the need for better Tributary Management. This recommendation will be important in addressing needs for Water Quality, Sediment, and Floodplains and may provide opportunities to meet the need for more Bicycle Trails.

Cost: $3,000,000

Value: The St Francis River basin covers over 7500 square miles in Arkansas and Missouri. The watershed contains valuable agricultural land and is one of the premier rice growing regions in the world. The rivers and streams have been altered to facilitate drainage. Despite the stream alterations, the basin still supports a healthy assemblage of mussels and many thriving populations of the federally listed fat pocketbook mussel. The historic meandering channel carries little water now, but still has several large mussel beds. The Arkansas Game and Fish Commission has specific concerns regarding fish entrainment that would be addressed in this study.

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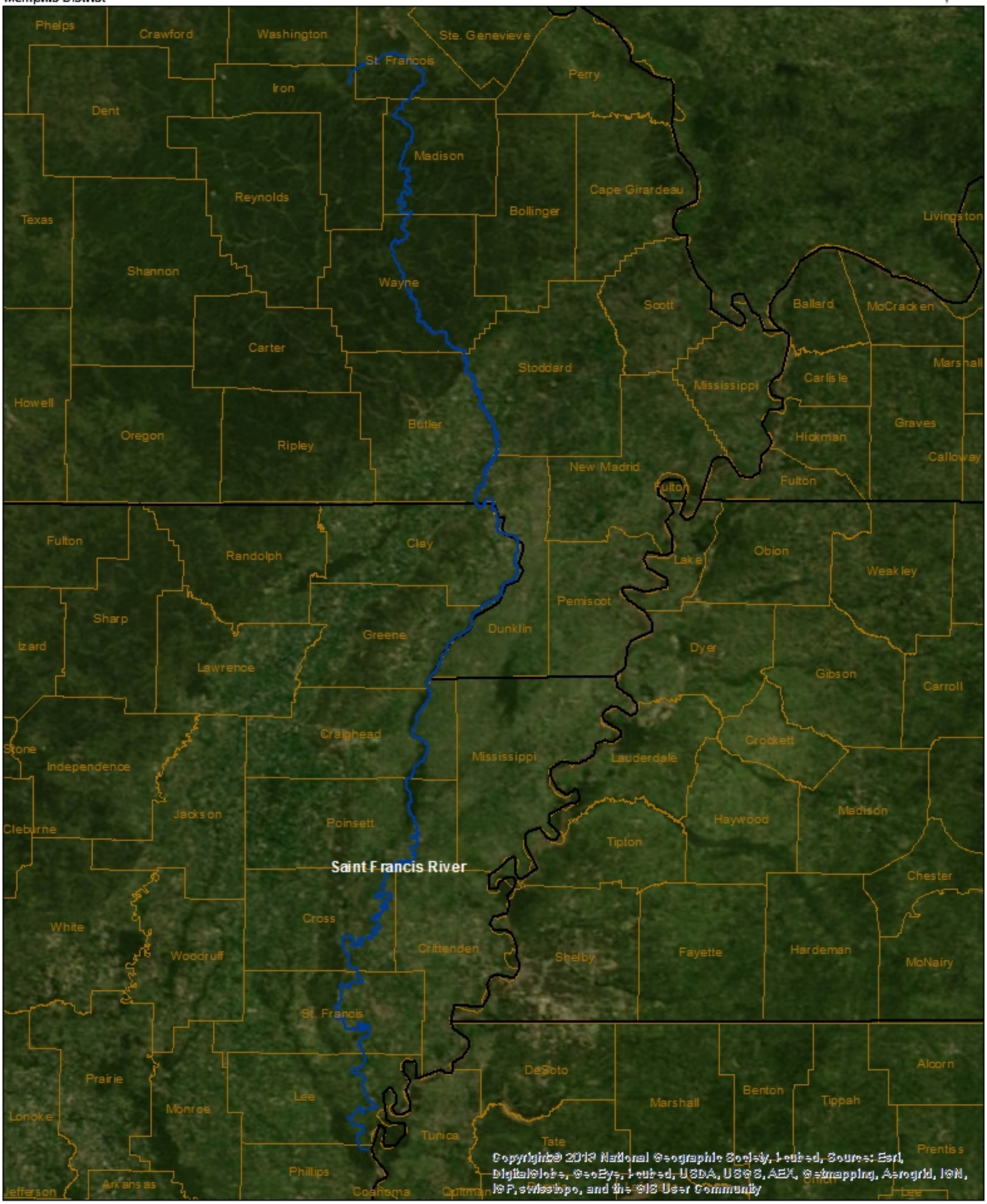
St. Francis River



River Name: Arkansas River

River Location: The Arkansas River heads at the Continental Divide in Colorado and flows over 1,400 miles southeast through Kansas, Oklahoma, and Arkansas and enters the Mississippi River at RM 580.

Specific Proposal: The Arkansas is the sixth longest river in the United States and the largest tributary of the Lower Mississippi River. It is important for habitat, recreation, navigation, and water supply. The upper end of the watershed includes several Bureau of Reclamation projects, and the middle and lower portions include large reservoirs for flood risk management and hydropower production and the McClellan-Kerr Arkansas River Navigation System. The recommended study would examine the immediate (or active) floodplain of the river and the existing water resources features and assess the need for projects to improve habitat, recreation, water supply, and other uses.

Lead Organization and Partners: USACE would lead the study with participation from state and federal agencies in Arkansas, Oklahoma, Kansas and Colorado.

Needs Addressed: This recommendation directly addresses the need for better Tributary Management. This recommendation will be important in addressing needs for Water Quality, Sediment, and Floodplains and may provide opportunities to meet the need for more Bicycle Trails.

Cost: This study would be expected to cost between $5,000,000 and $7,000,000.

Value: The Arkansas River is the largest tributary of the Lower Mississippi River. Five states: Arkansas, Oklahoma, Texas, Kansas, and Missouri are dependent on the McClellan-Kerr Arkansas River Navigation System (MKARNS). Arkansas is a Top Ten State for producing sorghum, soybeans, cotton, and livestock; and the number one producer of rice. These foodstuffs are transported on the MKARNS. The watershed contains two National Forests, multiple National Wildlife Refuges, and thousands of acres of wetlands and pristine bottomland hardwood forests. It provides habitat for several federally listed endangered species including interior least tern, pink mucket mussel, and fat pocketbook mussel, and wood stork. This study would address Arkansas Game and Fish Commission concerns about fish passage, specifically for American eel, on the Arkansas River.

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Arkansas River

River Name: Ouachita River

River Location: The Ouachita River originates in Polk County, Arkansas, and flows 510 miles in a southerly direction to Jonesville, Louisiana, where it converges with the Tensas and Little Rivers to form the Black River. The Black River meets the Red River 41 miles south of Jonesville. About 28 miles below the mouth of Black River, the Red River comes to a junction with the head of the Atchafalaya River and the western end of the 7-mile-long Old River, which historically linked these rivers to the Mississippi River.

Specific Proposal: Ouachita River basin is one the most environmentally, economically and culturally diverse watersheds in the entire Mississippi River Watershed. It covers 19,000 square miles across south-central Arkansas and north-central Louisiana. Fifty-nine percent of the watershed is forested and twenty-nine percent is agricultural land. It contains one National Forest, three National Wildlife Refuges, twelve Arkansas Wildlife Management Areas and four Louisiana Wildlife Management Areas. Major cities include Hot Springs and Camden, Arkansas and Monroe, Louisiana. The Ouachita River basin contains a wide range of water resources infrastructure and provides a unique opportunity to demonstrate a watershed-based Integrated Water Resources Management (IWRM) budgeting approach consistent with the National Watershed Vision.

Lead Organization and Partners*:* USACE would lead the study with the Ouachita River Valley Association.

Needs Addressed: This recommendation directly addresses the need for better Tributary Management. This recommendation will be important in addressing needs for Water Quality, Sediment, and Floodplains and may provide opportunities to meet the need for more Bicycle Trails.

Cost: $3,000,000

Value: The study would develop a strategic plan for the Ouachita River Watershed to prioritize activities within the basin. Water resources problems include flooding of urban and rural properties. Bank caving along the river is endangering levees that provide urban and rural flood protection. During October 2009, high flows were threatening levees in several locations. Future bank caving could cause levee failures or significant damage to public infrastructures adjacent to or located on the banks. These damages could lead to significant flooding of area development and/or potential loss of life. Significant problems with navigation on the Ouachita River have been experienced in recent years because authorized cutoffs were never constructed and the existing radius of bendways above Monroe, Louisiana, is too small for tows to make the turns without "light loading" of barges. This study would address Arkansas Game and Fish Commission concerns about fish passage, specifically for American eel, on the Ouachita River.

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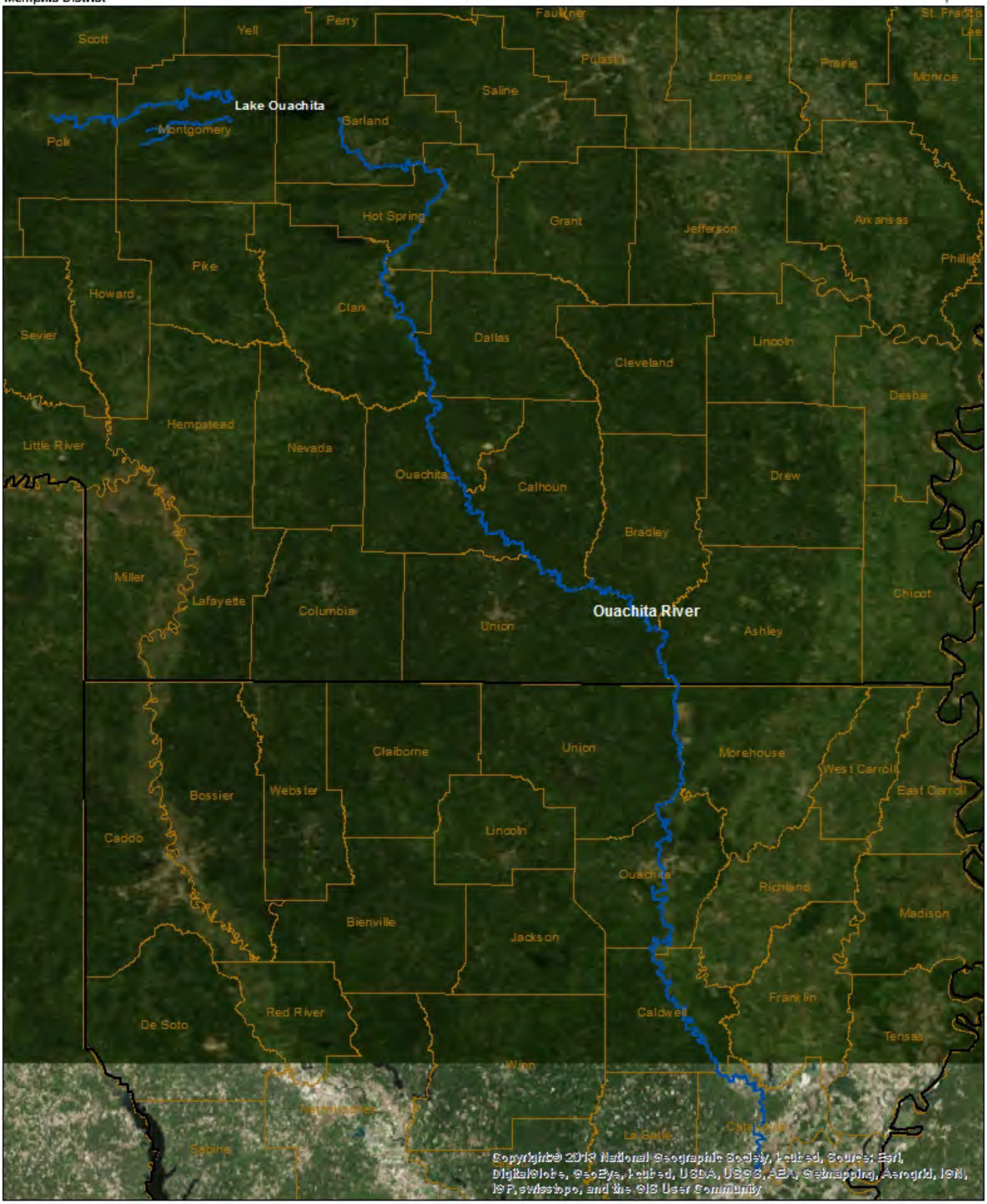
Ouachita River

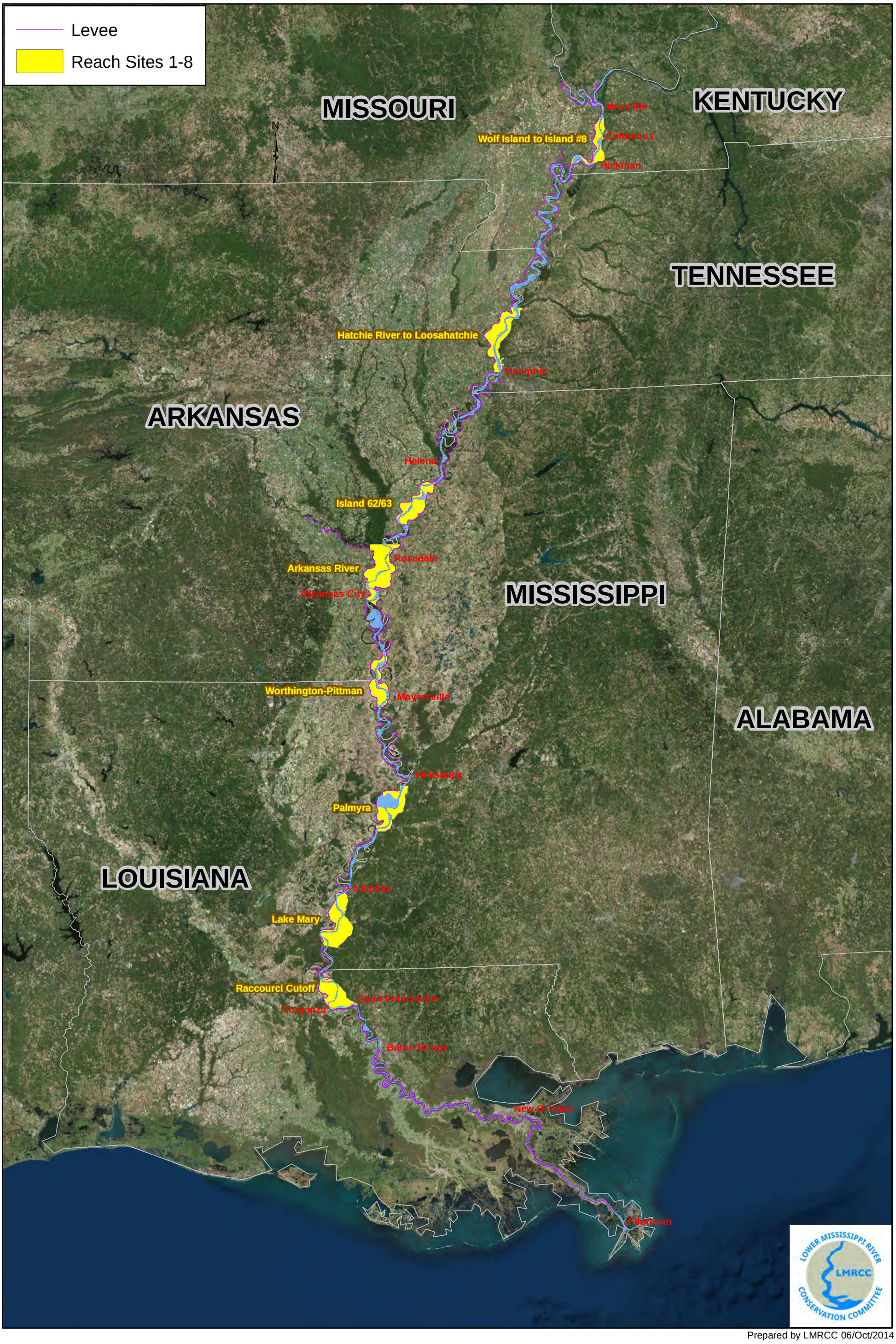


APPENDIX B

Conservation Reaches

Recommendation HRMP 1

LMRRA Conservation Reach Study
Restoration Site Reaches 1-8



Prepared by LMRCC 06/Oct/2014

Reach #1: Wolf Island to Island #8

River Miles: RM 946 – 910 (36 miles)

Description: The upstream end of the reach is located eight miles below the confluence with the Ohio River and extends 36 miles to below the Bend of Island #8. Two large side channels (i.e., Wolf Island Chute and Bend of Island #8) highlight this reach, plus one tributary (i.e., Obion Creek in KY), several crossovers and one large river bend; numerous smaller secondary and tertiary channels, sloughs, and other backwaters, seven dikes fields (16 notched dikes), and 12 revetments. The distance between the levee on the west side and the bluff on the east varies 2-8 miles. Island #8 is about two miles wide.

T&E Species: Wolf Island Chute supports one of the highest concentrations of shovelnose sturgeon in the upper part of the Lower Mississippi River. Pallid sturgeon are frequently captured in this area as well. Island #8 also supports both shovelnose and pallid sturgeon, as does this entire reach. Six active interior least tern colonies have been observed in this reach. This reach is potential habitat for Indiana bat. Bald eagles frequently nest in and near this reach.

Public Access: Six boat ramps provide access to this reach, plus an additional boat ramp located about 5.5 miles upstream from the reach.

LMRCC Projects: 12 projects have been identified in this reach:

- Create, rehabilitate, and diversify secondary channels (6 projects)
- Enhance main channel habitat diversity (5 projects)
- Restore and diversify floodplain water bodies (1 project)

Project specifics noted on map:

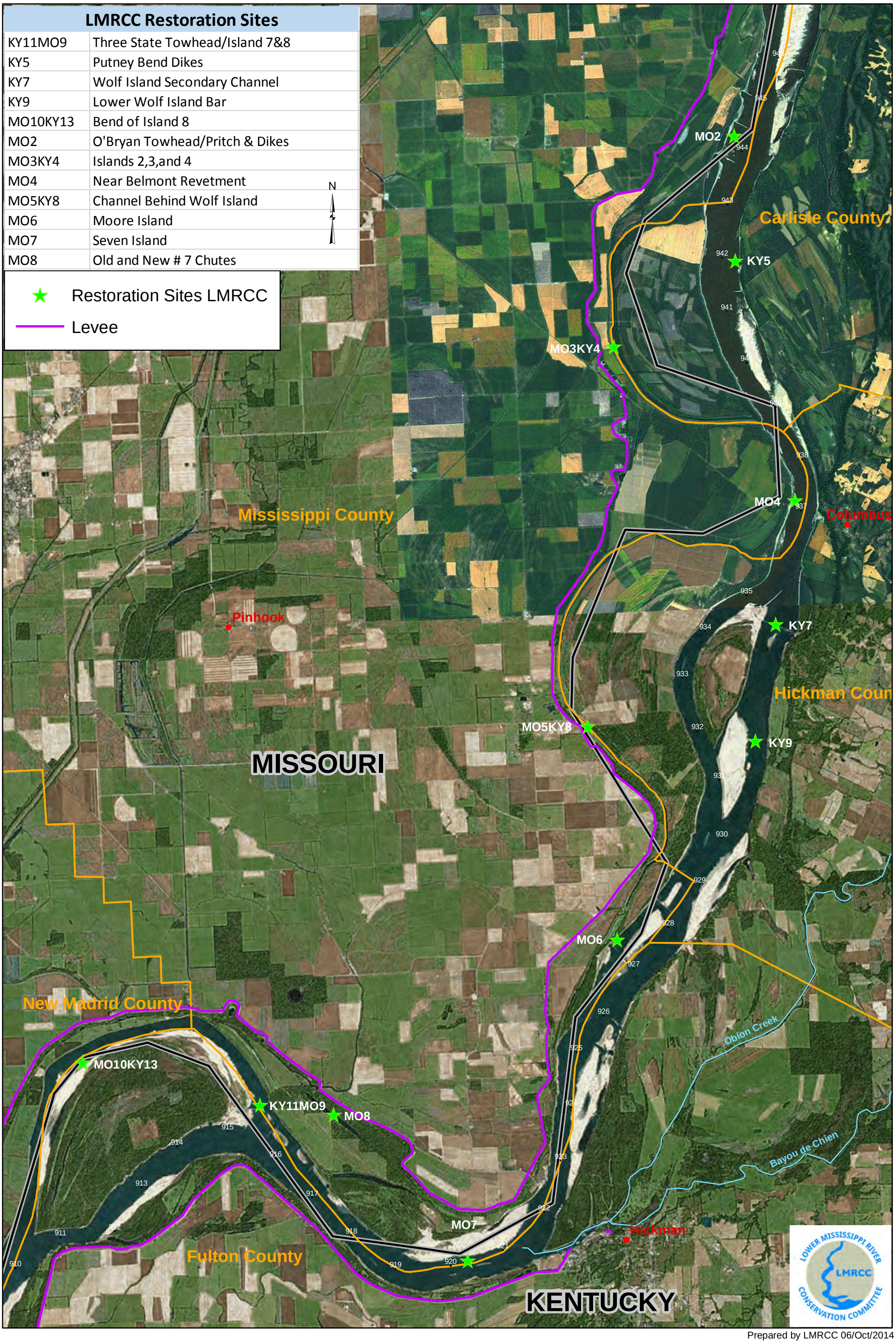
- KY5: Putney Bend Dikes - Enhance main channel habitat diversity
- MO10KY13: Bend of Island 8 - Create, rehabilitate, and diversify secondary channels
- MO3KY4: Islands 2,3,and 4 - Create, rehabilitate, and diversify secondary channels
- MO4: Near Belmont Revetment - Enhance main channel habitat diversity
- MO5KY8: Channel Behind Wolf Island - Create, rehabilitate, and diversify secondary channels
- MO7: Seven Island - Enhance main channel habitat diversity
- MO8: Old and New # 7 Chutes - Restore and diversify floodplain water bodies

Completed or Underway Projects:

- KY11MO9: Three State Towhead/Island 7&8 - Create, rehabilitate, and diversify secondary channels (completed)
- KY9: Lower Wolf Island Bar - Create, rehabilitate, and diversify secondary channels (completed)
- KY7: Wolf Island Secondary Channel - Create, rehabilitate, and diversify secondary channels (underway)
- MO2: O'Bryan Towhead/Pritch & Dikes - Enhance main channel habitat diversity (underway)
- MO6: Moore Island - Enhance main channel habitat diversity (completed)

LMRRA Conservation Reach Study
Wolf Island to Island #8 - River Mile 946 to 910

LMRCC Restoration Sites	
KY11MO9	Three State Towhead/Island 7&8
KY5	Putney Bend Dikes
KY7	Wolf Island Secondary Channel
KY9	Lower Wolf Island Bar
MO10KY13	Bend of Island 8
MO2	O'Bryan Towhead/Pritch & Dikes
MO3KY4	Islands 2,3,and 4
MO4	Near Belmont Revetment
MO5KY8	Channel Behind Wolf Island
MO6	Moore Island
MO7	Seven Island
MO8	Old and New # 7 Chutes



Prepared by LMRCC 06/Oct/2014

Reach #2: Hatchie River to Loosahatchie

River Miles: RM 775 – 736 (39 miles)

Description: This reach extends from just above the Hatchie Towhead dike field downstream to include Hopefield Dikes. Over 10 dike fields, numerous crossings and pools, side channels, old bendways, and wide overbank areas between west levee and east bluff (2-9 miles). In addition, there are three tributaries/river mouths in the reach (i.e., Hatchie, Loosahatchie, and Wolf Rivers). Habitat restoration efforts have been conducted on the Loosahatchie Bar (e.g., dike and closure notching), across the river from Memphis, with pre- and post-project surveys and biological assessments. Meeman Shelby State Park and Fort Pillow State Park both border this reach, and the Lower Hatchie National Wildlife Refuge and JM Tulley Wildlife Management area are adjacent to it.

T&E Species: Eight active interior least tern colonies and fat pocketbook mussel shells have been observed. The reach has good potential for pallid sturgeon and Indiana bat.

Public Access: There are boat ramps at Richardson Landing, Memphis Riverfront, and Meeman-Shelby State Park.

LMRCC Projects: 17 projects already identified in this reach and includes dike notching, tributary/mouth restoration, wetland complex restoration, and lake level stabilization.

- Create, rehabilitate, and diversify secondary channels (8 projects)
- Restore and diversify floodplain water bodies (2 projects)
- Augment aquatic connectivity with the floodplain (4 projects)
- Tributary enhancement (3 projects)

Project specifics noted on map:

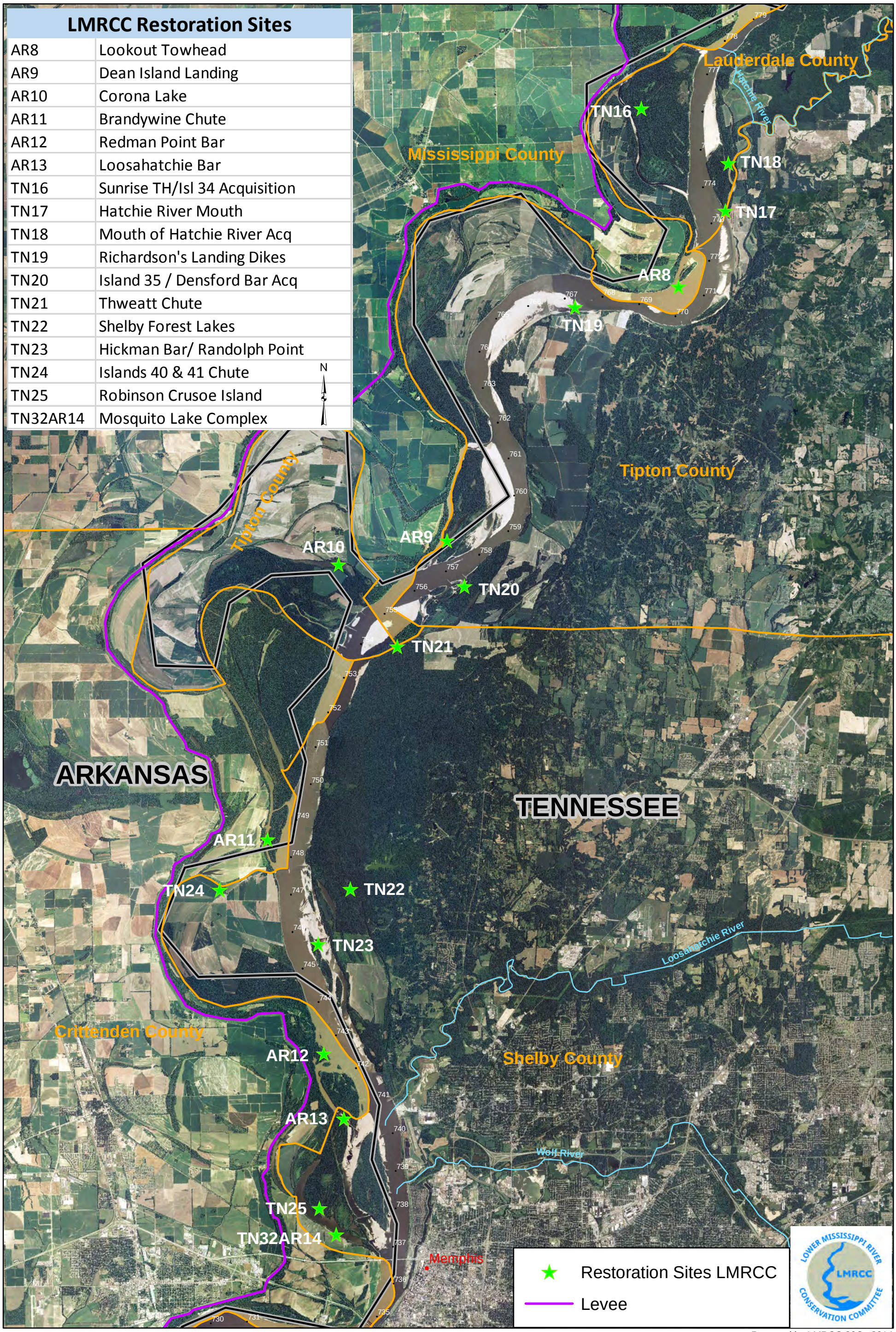
- AR11: Brandywine Chute - Create, rehabilitate, and diversify secondary channels
- AR9: Dean Island Landing - Restore and diversify floodplain water bodies
- TN16: Sunrise TH/Isl 34 Acquisition - Augment aquatic connectivity with the floodplain
- TN18: Mouth of Hatchie River Acquisition - Tributary enhancement
- TN20: Island 35 / Densford Bar Acquisition - Augment aquatic connectivity with the floodplain
- TN21: Thweatt Chute - Create, rehabilitate, and diversify secondary channels
- TN22: Shelby Forest Lakes - Augment aquatic connectivity with the floodplain
- TN24: Islands 40 & 41 Chute - Create, rehabilitate, and diversify secondary channels
- TN32AR14: Mosquito Lake Complex - Tributary enhancement

Completed or Underway Projects:

- AR10: Corona Lake - Restore and diversify floodplain water bodies (underway)
- AR12: Redman Point Bar - Create, rehabilitate, and diversify secondary channels (completed)
- AR13: Loosahatchie Bar - Create, rehabilitate, and diversify secondary channels (completed)
- AR8: Lookout Towhead - Create, rehabilitate, and diversify secondary channels (completed)
- TN17: Hatchie River Mouth - Tributary enhancement (underway)
- TN19: Richardson's Landing Dikes - Create, rehabilitate, and diversify secondary channels (underway)
- TN23: Hickman Bar/ Randolph Point - Create, rehabilitate, and diversify secondary channels (completed)
- TN25: Robinson Crusoe Island - Augment aquatic connectivity with the floodplain (completed)

LMRRA Conservation Reach Study
Hatchie River to Loosahatchie - River Mile 775 to 736

LMRCC Restoration Sites	
AR8	Lookout Towhead
AR9	Dean Island Landing
AR10	Corona Lake
AR11	Brandywine Chute
AR12	Redman Point Bar
AR13	Loosahatchie Bar
TN16	Sunrise TH/Isl 34 Acquisition
TN17	Hatchie River Mouth
TN18	Mouth of Hatchie River Acq
TN19	Richardson's Landing Dikes
TN20	Island 35 / Densford Bar Acq
TN21	Thweatt Chute
TN22	Shelby Forest Lakes
TN23	Hickman Bar/ Randolph Point
TN24	Islands 40 & 41 Chute
TN25	Robinson Crusoe Island
TN32AR14	Mosquito Lake Complex



Prepared by LMRCC 06Oct2014

Reach #3: Island 62/63 Reach

River Miles: RM 650 – 618 (32 miles)

Description: From just above Kangaroo Pt. Dikes to the crossing below Island 67 Dikes lays a diverse ecosystem. Two prominent features include the Jackson and Sunflower cut-offs that formed DeSoto and Mellwood Lakes (e.g., oxbow lakes). Also included are large tracts of bottomland hardwood forests within the batture, and several secondary channels, river crossings and pools, old bendways, and wide overbank areas which extend 2-12 miles between the levees. Dikes have been notched at Island 63, Kangaroo Pt., and Below Ludlow, along with pre- and post-construction surveys.

T&E Species: Ten active interior least tern colonies and fat pocketbook mussel shells have been observed. The reach has good potential for pallid sturgeon.

Public Access: Access from the boat ramp at Island 63 Chute.

LMRCC Projects: 15 projects have been identified in this reach, including dike notching, lake restoration, and secondary channel restoration/habitat enhancement)

- Create, rehabilitate, and diversify secondary channels (9 projects)
- Restore and diversify floodplain water bodies (5 projects)
- Improve recreational access (1 Project)

Project specifics noted on map:

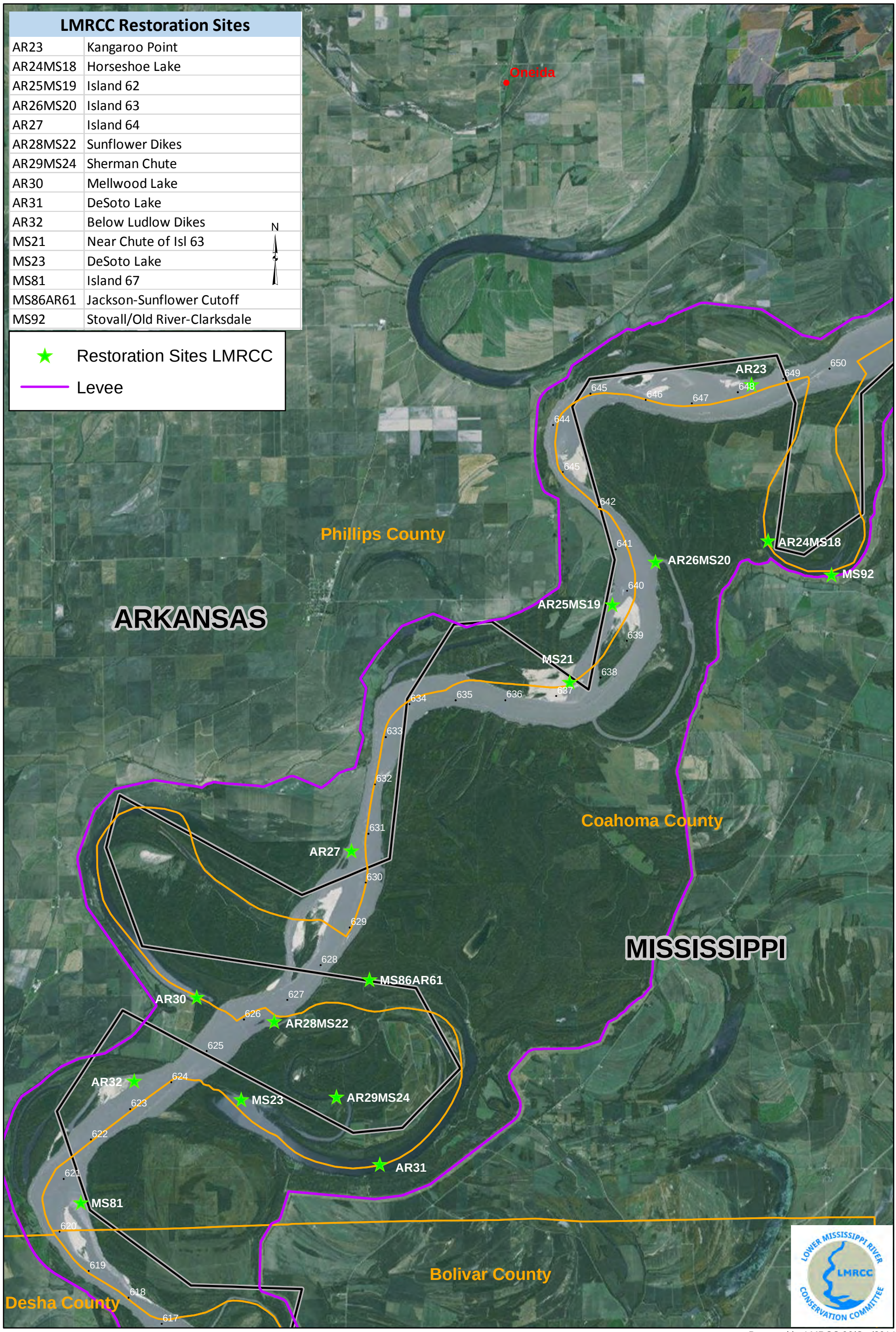
- AR24MS18: Horseshoe Lake - Restore and diversify floodplain water bodies
- AR27: Island 64 - Create, rehabilitate, and diversify secondary channels
- AR28MS22: Sunflower Dikes - Create, rehabilitate, and diversify secondary channels
- AR29MS24: Sherman Chute - Create, rehabilitate, and diversify secondary channels
- AR30: Mellwood Lake - Restore and diversify floodplain water bodies
- AR31: DeSoto Lake - Restore and diversify floodplain water bodies
- MS23: DeSoto Lake - Restore and diversify floodplain water bodies
- MS81 Island 67 - Create, rehabilitate, and diversify secondary channels
- MS86AR61: Jackson-Sunflower Cutoff - Restore and diversify floodplain water bodies
- MS92: Stovall/Old River-Clarksdale - Improve recreational access

Completed or Underway Projects:

- AR23: Kangaroo Point - Create, rehabilitate, and diversify secondary channels (underway)
- AR25MS19: Island 62 - Create, rehabilitate, and diversify secondary channels (underway)
- AR26MS20: Island 63 - Create, rehabilitate, and diversify secondary channels (complete)
- AR32: Below Ludlow Dikes - Create, rehabilitate, and diversify secondary channels (underway)
- MS21 Near Chute of Island 63 - Create, rehabilitate, and diversify secondary channels (complete)

LMRRA Conservation Reach Study
Island 62/63 - River Mile 650 to 618

LMRCC Restoration Sites	
AR23	Kangaroo Point
AR24MS18	Horseshoe Lake
AR25MS19	Island 62
AR26MS20	Island 63
AR27	Island 64
AR28MS22	Sunflower Dikes
AR29MS24	Sherman Chute
AR30	Mellwood Lake
AR31	DeSoto Lake
AR32	Below Ludlow Dikes
MS21	Near Chute of Isl 63
MS23	DeSoto Lake
MS81	Island 67
MS86AR61	Jackson-Sunflower Cutoff
MS92	Stovall/Old River-Clarksdale



Prepared by LMRCC 06/Oct/2014

Reach #4: Arkansas River

River Miles: RM 599 – 556 (43 miles)

Description: Beginning at the mouth of the White River, this reach extends 43 miles to Choctaw Bar Chute. This complex reach is rich in diverse ecosystems, which encompasses the Caulk cut-off that formed Lake Whittington, one of the larger batture lakes in the lower Mississippi River. Also included are several secondary channels, river crossings and pools, and old bendways. A large expanse of floodplain is contained within this reach, ranging from 4-13 miles between the levees. Dike notching along with pre- and post-project surveys have been conducted at Below Prentiss and Catfish Point. Great River Road State Park is located in this reach.

T&E Species: Nine active interior least tern colonies have been observed. The reach has good potential for pallid sturgeon.

Public Access: Access from Terrene Lodge, Rosedale Harbor, and Easton Lodge.

LMRCC Projects: 14 projects already identified in this reach, including secondary channel restoration, dike notching, lake restoration and gravel bar conservation

- Create, rehabilitate, and diversify secondary channels (6 Projects)
- Enhance main channel habitat diversity (3 Projects)
- Restore and diversify floodplain water bodies (4 Projects)
- Improve recreational access (1 Project)

Project specifics noted on map:

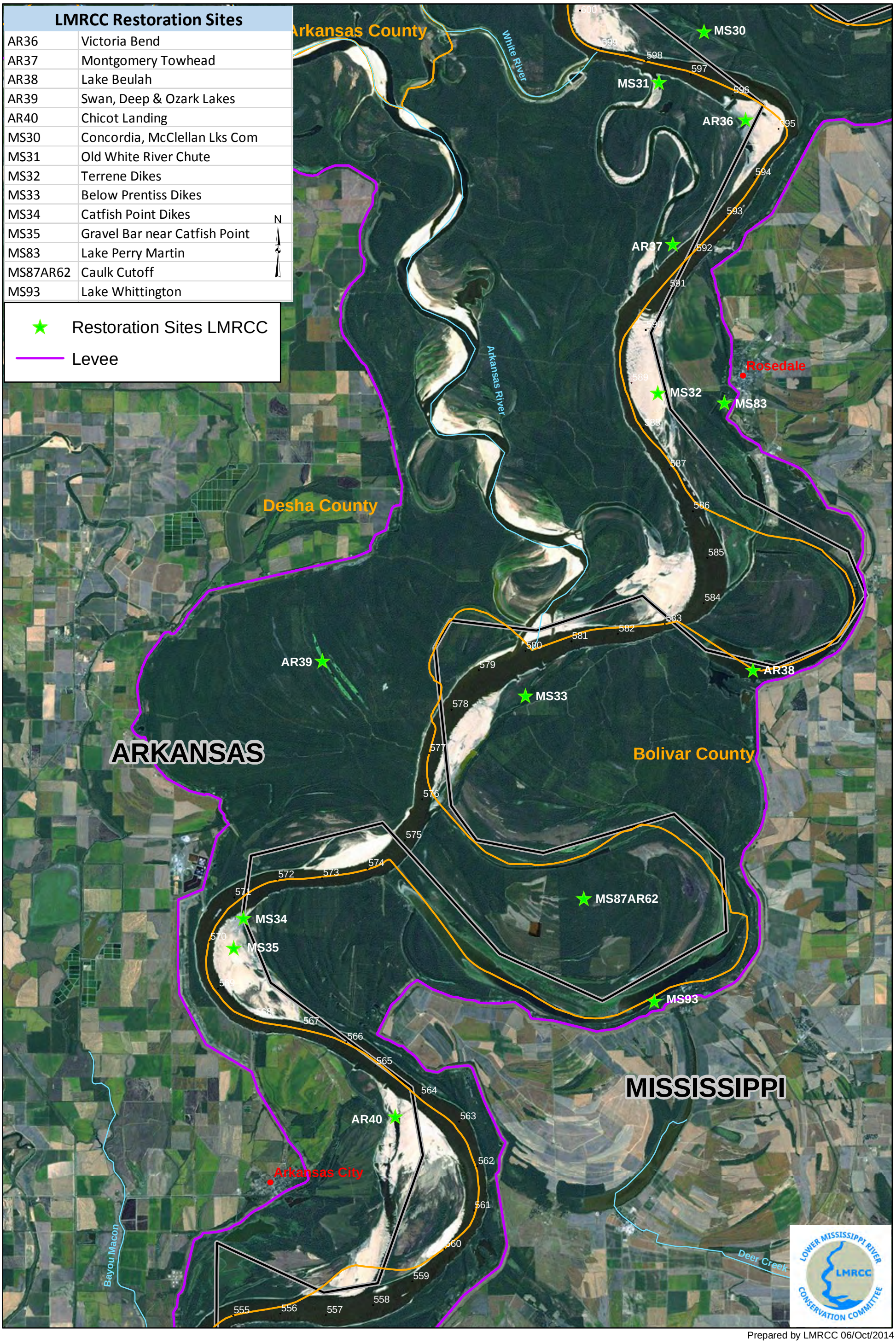
- AR37: Montgomery Towhead - Enhance main channel habitat diversity
- AR38: Lake Beulah - Enhance main channel habitat diversity
- AR39: Swan, Deep & Ozark Lakes - Restore and diversify floodplain water bodies
- MS30: Concordia Island - Restore and diversify floodplain water bodies
- MS31: Old White River Chute - Create, rehabilitate, and diversify secondary channels
- MS35: Gravel Bar near Catfish Point - Enhance main channel habitat diversity
- MS87AR62: Caulk Cutoff - Restore and diversify floodplain water bodies
- MS93: Lake Whittington - Improve recreational access

Completed or Underway Projects:

- AR36: Victoria Bend - Create, rehabilitate, and diversify secondary channels (underway)
- AR40: Chicot Landing - Create, rehabilitate, and diversify secondary channels (complete)
- MS32: Terrene Dikes - Create, rehabilitate, and diversify secondary channels (underway)
- MS33: Below Prentiss Dikes - Create, rehabilitate, and diversify secondary channels (complete)
- MS34: Catfish Point Dikes - Create, rehabilitate, and diversify secondary channels (complete)
- MS83: Lake Perry Martin - Restore and diversify floodplain water bodies (complete)

LMRRA Conservation Reach Study
Arkansas River - River Mile 599 to 556

LMRCC Restoration Sites	
AR36	Victoria Bend
AR37	Montgomery Towhead
AR38	Lake Beulah
AR39	Swan, Deep & Ozark Lakes
AR40	Chicot Landing
MS30	Concordia, McClellan Lks Com
MS31	Old White River Chute
MS32	Terrene Dikes
MS33	Below Prentiss Dikes
MS34	Catfish Point Dikes
MS35	Gravel Bar near Catfish Point
MS83	Lake Perry Martin
MS87AR62	Caulk Cutoff
MS93	Lake Whittington



Prepared by LMRCC 06/Oct/2014

Reach #5: Worthington-Pittman

River Miles: RM 524 – 490 (34 miles)

Description: This reach begins above Kentucky Bend and extends to a short distance above Lake Providence, LA. These 34 miles of the LMR encompass a diverse and complex mix of habitats including chutes/side channels (e.g., Cornfield Chute, Moon Chute, Matthews Bend, Caroline Chute, Bunches Cutoff, Old River Chute), floodplain lakes (e.g., Snag Lake, Gassoway Lake, Doe Lake, plus many borrow pits), Old River oxbow, islands, wide expanses of batture (e.g., Island 88, Worthington Towhead, Sara Island, Cracraft Towhead, Pittman Island, Duncansby Towhead, and Wilson Point), numerous wetlands, and extensive forested areas and agricultural fields. The reach also includes dike fields, crossovers, and river bends. It encompasses two cut-offs (Worthington and Sarah) with levees set back creating a diverse floodplain with bottomland hardwood forest, large lakes, and other water bodies. In this reach, there are 2-9 miles between the levees.

T&E Species: Six active interior least tern colonies have been observed in this reach and it has good potential for pallid sturgeon.

Public Access: Boat ramps provide access to this reach.

LMRCC Projects: 18 projects already identified in this reach .

- Create, rehabilitate, and diversify secondary channels (10 Projects)
- Enhance main channel habitat diversity (1 Project)
- Restore and diversify floodplain water bodies (1 Project)
- Augment aquatic connectivity with the floodplain (5 Projects)
- Improve recreational access (1 Project)

Project specifics noted on map:

- AR53: Oakes - Create, rehabilitate, and diversify secondary channels
- AR54: Matthews Bend - Augment aquatic connectivity with the floodplain
- AR56: Leota Dikes / Carolina Chute - Create, rehabilitate, and diversify secondary channels
- AR57: Island 88 - Augment aquatic connectivity with the floodplain
- AR58: Lower Cracraft - Create, rehabilitate, and diversify secondary channels
- AR59: Island 89 & Gassoway Lake - Create, rehabilitate, and diversify secondary channels
- AR60: Cornfield and Moon Chutes - Create, rehabilitate, and diversify secondary channels
- LA1: Bunch's Cutoff Boat Ramp - Improve recreational access
- LA3: Old River - Augment aquatic connectivity with the floodplain
- LA4: Wilson Point Dikes - Create, rehabilitate, and diversify secondary channels
- LA47: Sara Cutoff - Restore and diversify floodplain water bodies
- MS41: Longwood Chute - Augment aquatic connectivity with the floodplain
- MS42: Gravel Bar near Carolina Chute - Enhance main channel habitat diversity
- MS43: Corregidor Dikes - Create, rehabilitate, and diversify secondary channels
- MS44LA2: Brunch’s Cutoff and Old River- Create, rehabilitate, and diversify secondary channels
- MS45: Skipwith Crevasse - Augment aquatic connectivity with the floodplain

Completed or Underway Projects:

- AR55: Kentucky Bend / Island 86 - Create, rehabilitate, and diversify secondary channels (underway)
- MS46LA5: Baleshed Landing Dikes - Create, rehabilitate, and diversify secondary channels (underway)

LMRRA Conservation Reach Study
Worthington-Pittman - River Mile 524 to 490

LMRCC Restoration Sites	
AR53	Oakes
AR54	Matthews Bend
AR55	Kentucky Bend / Island 86
AR56	Leota Dikes / Carolina Chute
AR57	Island 88
AR58	Lower Cracraft
AR59	Island 89 & Gassoway Lake
AR60	Cornfield and Moon Chutes
LA1	Bunch's Cutoff Boat Ramp
LA3	Old River
LA4	Wilson Point Dikes
LA47	Sara Cutoff
MS41	Longwood Chute
MS42	Gravel Bar near Carolina Chute
MS43	Corregidor Dikes
MS44LA2	Brunch Cutoff and Old River L
MS45	Skipwith Crevasse
MS46LA5	Baleshed Landing Dikes

Restoration Sites LMRCC

Levee

N

AR53 524 523 Chicot County 522 MS41 521 AR60 AR54 520 AR55 519 518 517 516 515 Washington County AR56 514 MS42 AR57 513 512 511 MISSISSIPPI ARKANSAS 510 AR58 509 Bayou Macon AR59 508 507 West Carroll Parish 506 LA47 505 MS43 Millikin 504 503 502 501 MS44LA2 LA1 LA3 500 MS45 499 498 LA4 497 Mayersville 496 LOUISIANA East Carroll Parish 495 494 493 Issaquena County 492 491 MS46LA5 490 Tensas Bayou

Prepared by LMRCC 06/Oct/2014

Reach #6: Palmyra

River Miles: RM 431 – 398 (33 miles)

Description: Just below Vicksburg, MS the reach begins just upstream of Below Racetrack dikes and extends through Below Grand Gulf Dikes. Two prominent features include Yucatan Lake (an oxbow lake) and an extremely complex, wide batture (e.g., 1.5-13 miles between the levees). Palmyra, a ten-mile long secondary channel, was created from the Diamond cut-off and connects to numerous floodplain lakes. The reach also encompasses diverse ecosystems containing several secondary channels, river crossings and pools and old bendways.

T&E Species: Six active interior least tern colonies have been observed in this reach and its has good potential for pallid sturgeon.

Public Access: Access from the boat ramp at Grand Gulf and La Tourneau.

LMRCC Projects: 12 projects already identified in this reach (e.g., chute restoration, lake assessment/restoration, dike notching, gravel bar conservation and recreational access)

- Create, rehabilitate, and diversify secondary channels (1 Project)
- Enhance main channel habitat diversity (3 Projects)
- Restore and diversify floodplain water bodies (3 Projects)
- Augment aquatic connectivity with the floodplain (2 Projects)
- Improve recreational access (3 Projects)

Project specifics noted on map:

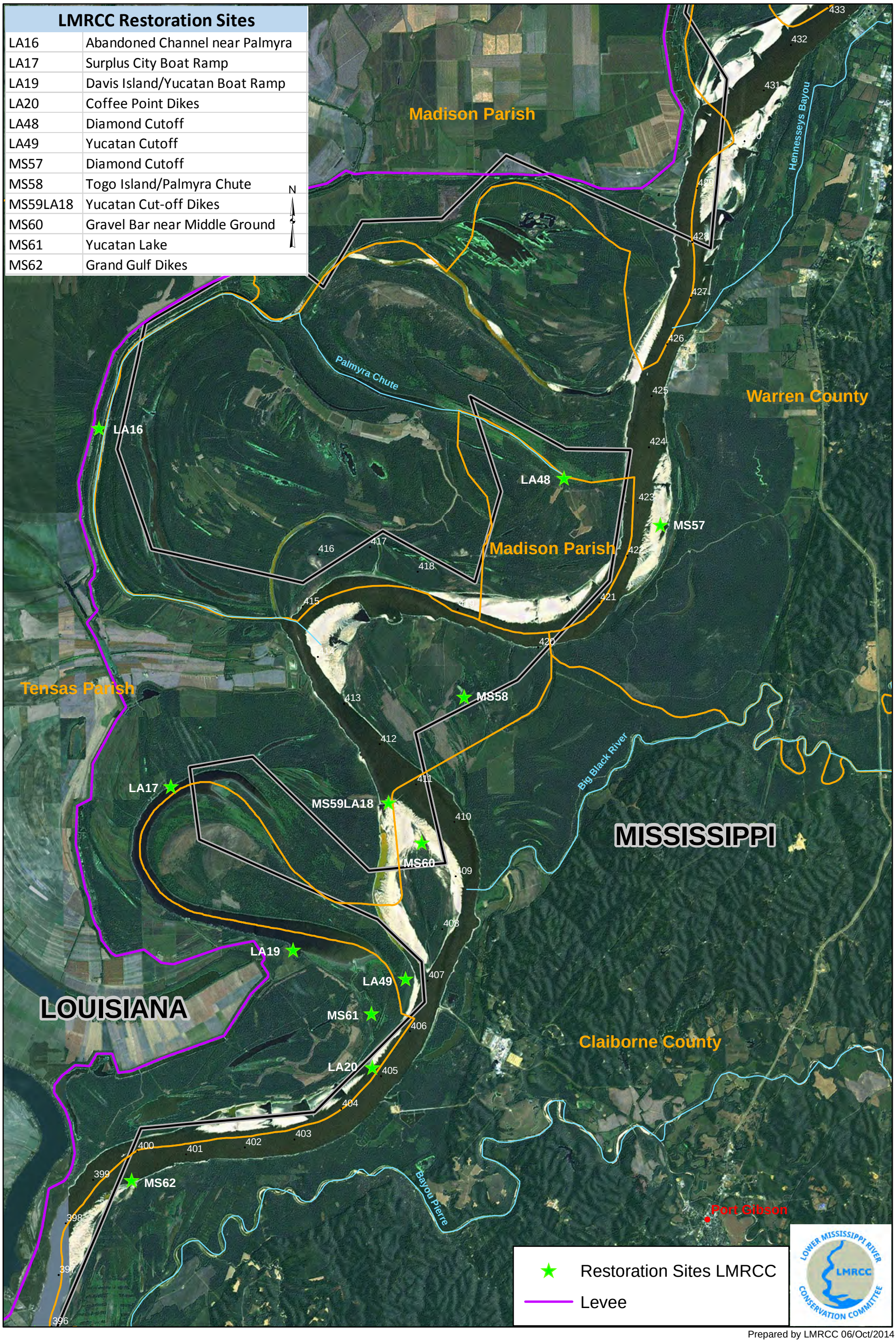
- LA16: Abandoned Channel near Palmyra - Improve recreational access
- LA17: Surplus City Boat Ramp - Improve recreational access
- LA19: Davis Island/Yucatan Boat Ramp - Improve recreational access
- LA48: Diamond Cutoff -Restore and diversify floodplain water bodies
- MS58: Togo Island/Palmyra Chute - Restore and diversify floodplain water bodies
- MS59LA18: Yucatan Cut-off Dikes - Create, rehabilitate, and diversify secondary channels
- MS60: Gravel Bar near Middle Ground - Enhance main channel habitat diversity
- MS61: Yucatan Lake - Augment aquatic connectivity with the floodplain
- MS62: Grand Gulf Dikes - Enhance main channel habitat diversity

Completed or Underway Projects:

- LA20: Coffee Point Dikes - Augment aquatic connectivity with the floodplain (underway)
- MS57: Diamond Cutoff - Enhance main channel habitat diversity (underway)
- LA49: Yucatan Cutoff - Restore and diversify floodplain water bodies (underway)

LMRRA Conservation Reach Study
Palmyra - River Mile 431 to 398

LMRCC Restoration Sites	
LA16	Abandoned Channel near Palmyra
LA17	Surplus City Boat Ramp
LA19	Davis Island/Yucatan Boat Ramp
LA20	Coffee Point Dikes
LA48	Diamond Cutoff
LA49	Yucatan Cutoff
MS57	Diamond Cutoff
MS58	Togo Island/Palmyra Chute
MS59LA18	Yucatan Cut-off Dikes
MS60	Gravel Bar near Middle Ground
MS61	Yucatan Lake
MS62	Grand Gulf Dikes



Prepared by LMRCC 06/Oct/2014

Reach #7: Lake Mary

River Miles: RM 360 – 322 (38 miles)

Description: The reach begins just above Natchez Island Dikes (just below Natchez, MS) and extends to below the Lake Mary outlet and proposed Union Point dikes. Lake Mary and Glasscock Cutoff are the major habitat features in this reach. Also included are secondary channels, river crossings and pools, channels, old bendways and a wide batture that ranges 2.5-14 miles between the west levee and the high ground on the east. Three Rivers Wildlife Management Area is also located in this reach. While there are several notched dikes in the reach, there are no known surveyed reaches.

T&E Species: Four active interior least tern colonies have been observed in this reach and there is good potential for pallid sturgeon. Critical Habitat for the Louisiana black bear has been designated in the Tensas River Basin near this reach.

Public Access: Access from the boat ramp at Natchez Front and Lake Mary Road boat ramp.

LMRCC Projects: 13 projects have been identified in this reach – dike notching, improve aquatic habitat, recreational access, chute restoration, lake restoration.

- Create, rehabilitate, and diversify secondary channels (4 Projects)
- Enhance main channel habitat diversity (4 Projects)
- Restore and diversify floodplain water bodies (2 Projects)
- Augment aquatic connectivity with the floodplain (1 Project)
- Improve recreational access (2 Projects)

Project specifics noted on map:

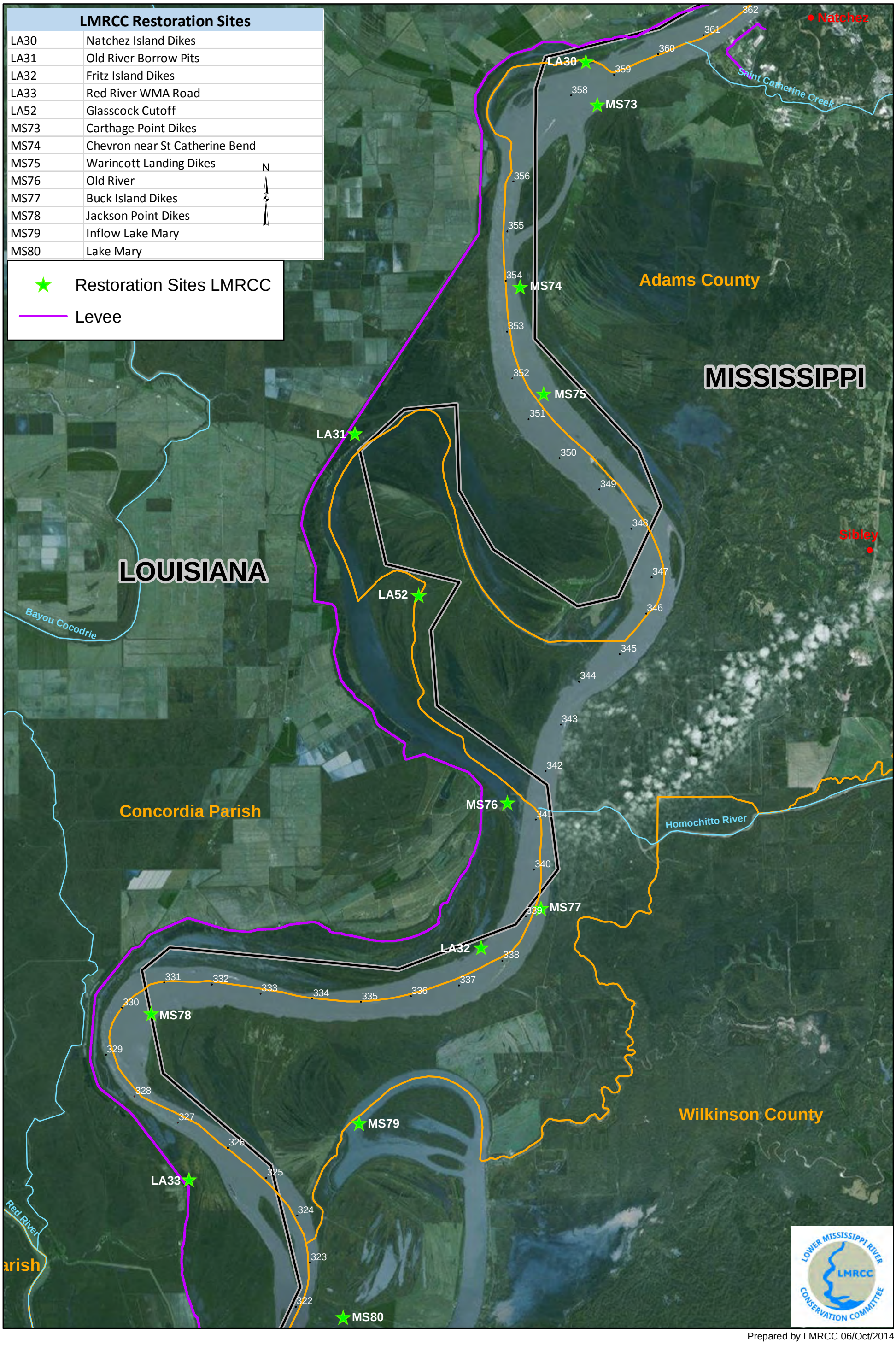
- LA30: Natchez Island Dikes - Enhance main channel habitat diversity
- LA31: Old River Borrow Pits - Improve recreational access
- LA33: Red River WMA Road - Improve recreational access
- LA52: Glasscock Cutoff - Restore and diversify floodplain water bodies
- MS73: Carthage Point Dikes - Create, rehabilitate, and diversify secondary channels
- MS74: Chevron near St Catherine Bend - Enhance main channel habitat diversity
- MS76: Old River - Create, rehabilitate, and diversify secondary channels
- MS78: Jackson Point Dikes - Enhance main channel habitat diversity
- MS79: Inflow Lake Mary - Restore and diversify floodplain water bodies
- MS80: Lake Mary - Augment aquatic connectivity with the floodplain

Completed or Underway Projects:

- LA32: Fritz Island Dikes - Create, rehabilitate, and diversify secondary channels (underway)
- MS75: Warincott Landing Dikes - Create, rehabilitate, and diversify secondary channels (underway)
- MS77: Buck Island Dikes - Enhance main channel habitat diversity (underway)

LMRRA Conservation Reach Study
Lake Mary - River Mile 360 to 322

LMRCC Restoration Sites	
LA30	Natchez Island Dikes
LA31	Old River Borrow Pits
LA32	Fritz Island Dikes
LA33	Red River WMA Road
LA52	Glasscock Cutoff
MS73	Carthage Point Dikes
MS74	Chevron near St Catherine Bend
MS75	Warincott Landing Dikes
MS76	Old River
MS77	Buck Island Dikes
MS78	Jackson Point Dikes
MS79	Inflow Lake Mary
MS80	Lake Mary



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Reach #8: Raccourci Cutoff

River Miles: RM 300 – 265 (35 miles)

Description: The reach begins at the upper end of Raccourci Cutoff to St. Francisville, LA. First major component of this reach is the Raccourci Cutoff and its associated batture. The cutoff extends nearly 14 miles and is connected to Monday Lake. Other lakes within the batture include Green, Sugar House, Limeless, and Shaw Lakes. Sloughs, borrow pits, wetlands, extensive forested area, islands and side channels also add complexity to this area. Second major component includes the Morganza Floodway and Control Structure that can be operated to mitigate flooding in Baton Rouge, LA. Third major component is the large expanse of batture along the east bank above St. Francisville, LA. A few small tributaries (i.e., Bayou Sara) empty into the river in this area. Wetlands, small lakes, and sloughs add habitat diversity throughout this mostly forested batture. In this reach, there are 1-10 miles between the levees.

T&E Species: One active interior least tern colony has been observed in this reach. This reach overlies part of the Upper Atchafalaya River Basin section of Critical Habitat for the Louisiana black bear.

Public Access: There is a boat ramp located about 5.5 miles upstream from the reach.

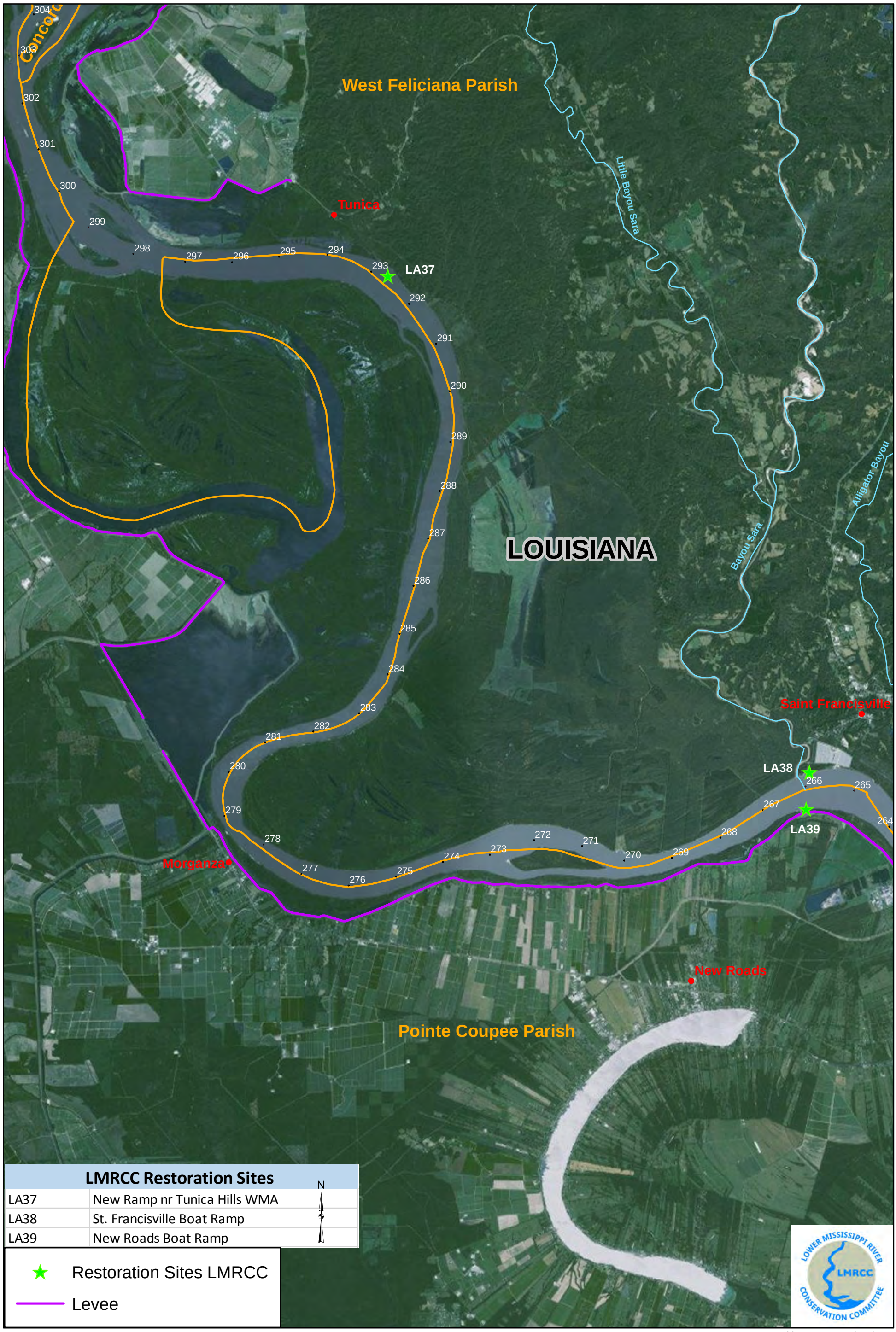
LMRCC Projects: Only three projects to improve recreational access were identified.

- Improve recreational access (3 Projects)

Project specifics noted on map:

- LA37: New Ramp near Tunica Hills WMA - Improve recreational access
- LA38: St. Francisville Boat Ramp - Improve recreational access
- LA39: New Roads Boat Ramp - Improve recreational access

LMRRA Conservation Reach Study
Raccourci Cutoff - River Mile 300 to 265



Prepared by LMRCC 06/Oct/2014

APPENDIX C

Aquatic Habitat Restoration Studies

Recommendation HRMP 2

Project ID	Project Name	Primary Project Focus	Project State	Upper RM
AR42	Point Comfort	Augment aquatic connectivity with the floodplain	AR	548
AR43	Lake Paradise	Augment aquatic connectivity with the floodplain	AR	548
AR51	Lake Port Reconnection	Augment aquatic connectivity with the floodplain	AR	527
KY02	Upper Island 1 Dikes (Backwater)	Augment aquatic connectivity with the floodplain	KY	948
MS06	Midway Lake	Augment aquatic connectivity with the floodplain	MS	694
MS52	Chotard Lake	Augment aquatic connectivity with the floodplain	MS	461
MS65	Rodney Lake Assessment	Augment aquatic connectivity with the floodplain	MS	389
MS71	Giles Bend	Augment aquatic connectivity with the floodplain	MS	367
TN01	Tiptonville Chute	Augment aquatic connectivity with the floodplain	TN	879
TN06	Robert E. Everett Lake	Augment aquatic connectivity with the floodplain	TN	838
TN10	Nebraska Point Dikes	Augment aquatic connectivity with the floodplain	TN	815
TN13	Elmot Bar and Kate Aubrey Acq	Augment aquatic connectivity with the floodplain	TN	784
TN15	Cold Creek Chute	Augment aquatic connectivity with the floodplain	TN	783
TN33MS01	Mud & Horn Lake Complex	Augment aquatic connectivity with the floodplain	TN	725
TN34	Open Lake - Lower Forked Deer Acquisition	Augment aquatic connectivity with the floodplain	TN	801
AR01	Tamm Bend	Create, rehabilitate, and diversify secondary channels	AR	821
AR02	Wright's Point	Create, rehabilitate, and diversify secondary channels	AR	820
AR03	Island 25 Bend	Create, rehabilitate, and diversify secondary channels	AR	805
AR04	Island 27	Create, rehabilitate, and diversify secondary channels	AR	800
AR16	Cat Island	Create, rehabilitate, and diversify secondary channels	AR	711
AR19	Commerce Dikes/Rabbit Island	Create, rehabilitate, and diversify secondary channels	AR	694
AR21MS15	Prairie Point	Create, rehabilitate, and diversify secondary channels	AR	669
AR22	Montezuma Towhead	Create, rehabilitate, and diversify secondary channels	AR	655
AR33	Head of Island 69/Below Knowlton	Create, rehabilitate, and diversify secondary channels	AR	616
AR34	Island 69 Dikes	Create, rehabilitate, and diversify secondary channels	AR	614
AR46	Leland Bar	Create, rehabilitate, and diversify secondary channels	AR	536
AR47	Leland and Whiskey Chutes	Create, rehabilitate, and diversify secondary channels	AR	537
AR50	Lake Port Towhead	Create, rehabilitate, and diversify secondary channels	AR	529
KY14	Kentucky Pt. Dikes	Create, rehabilitate, and diversify secondary channels	KY	888
LA09	Cottonwood Bar SC	Create, rehabilitate, and diversify secondary channels	LA	471
LA23	Secondary Channel Opposite Cottage Bend 390	Create, rehabilitate, and diversify secondary channels	LA	390
LA24	Browns Field Dikes	Create, rehabilitate, and diversify secondary channels	LA	388
MO11	Donaldson Point	Create, rehabilitate, and diversify secondary channels	MO	907
MO13	Island #11	Create, rehabilitate, and diversify secondary channels	MO	882
MO15	Beaver Lake	Create, rehabilitate, and diversify secondary channels	MO	872
MO22	Boat Club Chute	Create, rehabilitate, and diversify secondary channels	MO	849
MO24	Island 18	Create, rehabilitate, and diversify secondary channels	MO	836
MO25	Island 20	Create, rehabilitate, and diversify secondary channels	MO	832
MO26	Flow to Ashland Towhead	Create, rehabilitate, and diversify secondary channels	MO	833
MO27	Island 15	Create, rehabilitate, and diversify secondary channels	MO	853
MS10	Bordeaux Point Dikes	Create, rehabilitate, and diversify secondary channels	MS	682
MS11	Below Walnut Bend Dikes	Create, rehabilitate, and diversify secondary channels	MS	676.5
MS25	Cessions Towhead	Create, rehabilitate, and diversify secondary channels	MS	616
MS26	Island 70 Dikes	Create, rehabilitate, and diversify secondary channels	MS	609
MS48	Ajax Bar Dikes	Create, rehabilitate, and diversify secondary channels	MS	485
MS50	Arcadia Point Dikes	Create, rehabilitate, and diversify secondary channels	MS	471
MS53	Paw Paw Bend	Create, rehabilitate, and diversify secondary channels	MS	447
MS54LA13	Tarpley Island Dike (False Point Dikes)	Create, rehabilitate, and diversify secondary channels	MS	439.5
MS64LA22	Bondurant Towhead Dikes	Create, rehabilitate, and diversify secondary channels	MS	395
MS67LA25	Spithead Towhead	Create, rehabilitate, and diversify secondary channels	MS	387
MS69LA27	Waterproof Dikes	Create, rehabilitate, and diversify secondary channels	MS	378
MS70	Chevron below Fairchilds Bend RM371	Create, rehabilitate, and diversify secondary channels	MS	371
MS82	Anconia	Create, rehabilitate, and diversify secondary channels	MS	528
TN02	Lee Towhead	Create, rehabilitate, and diversify secondary channels	TN	859
TN03	Hathaway Dikes	Create, rehabilitate, and diversify secondary channels	TN	855
TN04	Blaker Towhead	Create, rehabilitate, and diversify secondary channels	TN	846
TN07	Island 21, North End	Create, rehabilitate, and diversify secondary channels	TN	829
TN08	Island 21 secondary Channel	Create, rehabilitate, and diversify secondary channels	TN	829
TN11AR05	Ashport Golddust Dikes Bar	Create, rehabilitate, and diversify secondary channels	AR	797
TN12AR06	Kate Aubrey Towhead	Create, rehabilitate, and diversify secondary channels	TN	791
TN26	Ensley Bar/Dismal Point Dikes	Create, rehabilitate, and diversify secondary channels	TN	726
TN27	Armstrong Bar Hydrology	Create, rehabilitate, and diversify secondary channels	TN	720
TN30	Plum Point Dikes	Create, rehabilitate, and diversify secondary channels	TN	786
TN31	Plum Point Acquisition	Create, rehabilitate, and diversify secondary channels	TN	790
MS72	Marengo Bend	Create/rehabilitate wetlands	MS	365
TN28	Armstrong Bar Acquisition	Create/rehabilitate wetlands	TN	720
AR07	Island 30	Enhance main channel habitat diversity	AR	787
AR15	Engineer's Bar	Enhance main channel habitat diversity	AR	734
AR18	Basket Bar	Enhance main channel habitat diversity	AR	699
AR20	St. Francis Dikes	Enhance main channel habitat diversity	AR	671
AR35	Henrico Dikes	Enhance main channel habitat diversity	AR	603
AR44	Tarpley Cutoff	Enhance main channel habitat diversity	AR	538
AR45	Point Chicot and Bachelor Bend	Enhance main channel habitat diversity	AR	540

AR52	Walnut Point	Enhance main channel habitat diversity	AR	525
MO01	Birds Point Sandbar	Enhance main channel habitat diversity	MO	953
MO12	Hotch Kiss Bend	Enhance main channel habitat diversity	MO	897
MO16	Stewart Towhead	Enhance main channel habitat diversity	MO	873
MO19	Across from Lee TH/ Isl 14	Enhance main channel habitat diversity	MO	860
MO20	Robinson Bayou	Enhance main channel habitat diversity	MO	854
MO23	Caruthersville-Linwood	Enhance main channel habitat diversity	MO	846
MS03	Gravel Bar near Cat Island RM710	Enhance main channel habitat diversity	MS	710
MS04	Pickett Dike Field	Enhance main channel habitat diversity	MS	705
MS07	Gravel Bar near Midway Lake RM693	Enhance main channel habitat diversity	MS	693
MS09	Gravel Bar near Bordeaux Pt RM682	Enhance main channel habitat diversity	MS	682
MS13	Flower Lake Bar	Enhance main channel habitat diversity	MS	668
MS14	Gravel Bar near Prairie Point RM 667	Enhance main channel habitat diversity	MS	667
MS16	Montezuma Bar	Enhance main channel habitat diversity	MS	658
MS17	Friars Point	Enhance main channel habitat diversity	MS	652
MS27	Gravel Bar near Island 70 rm608	Enhance main channel habitat diversity	MS	608
MS29	Smith Point Dikes	Enhance main channel habitat diversity	MS	
MS37	Ashbrook Cutoff	Enhance main channel habitat diversity	MS	548
MS38	Ashbrook-Miller Bend Dikes	Enhance main channel habitat diversity	MS	548
MS40	Gravel Bar near Anconia RM528	Enhance main channel habitat diversity	MS	528
MS47LA6	Ben Lomond Dikes	Enhance main channel habitat diversity	MS	488.5
MS51	Tennessee Bar Dikes	Enhance main channel habitat diversity	MS	467
MS55	Gravel Bar near Tarpley Island RM439 (near False Point)	Enhance main channel habitat diversity	MS	439
MS68	Chevron near Coles Island RM382	Enhance main channel habitat diversity	MS	382
TN14	Keyes Point Dikes	Enhance main channel habitat diversity	TN	792
TN09	Moss Island Acquisition	Enhance terrestrial habitat	TN	824
TN29	Open Lake - Obion River	Enhance terrestrial habitat	TN	817
AR17	Porter Lake Dikes	Restore and diversify floodplain water bodies	AR	703
AR41	Old River	Restore and diversify floodplain water bodies	AR	549.5
AR48	Beaver Lake	Restore and diversify floodplain water bodies	AR	534
AR49	Lake Lee	Restore and diversify floodplain water bodies	AR	529
LA08	Borrow Pits near Stump Hole	Restore and diversify floodplain water bodies	LA	484
LA34	Red River WMA Borrow Pits	Restore and diversify floodplain water bodies	LA	327
LA36	Borrow Pits near Shreves Bar	Restore and diversify floodplain water bodies	LA	302.5
LA40	Devil's Swamp	Restore and diversify floodplain water bodies	LA	235
LA50MS89	Rodney Cutoff	Restore and diversify floodplain water bodies	LA - MS	390
LA51	Giles Cutoff	Restore and diversify floodplain water bodies	LA	370
MO14	Pt. Pleasant Chute	Restore and diversify floodplain water bodies	MO	878
MO18	Near Little Crypress Bend	Restore and diversify floodplain water bodies	MO	867
MS05	Old River Lake, Island 53	Restore and diversify floodplain water bodies	MS	702
MS08	Old River Lake, Rabbit Island	Restore and diversify floodplain water bodies	MS	690
MS12	Duck, Mud, North, and Flower Lakes	Restore and diversify floodplain water bodies	MS	670
MS28	Old River Lake, Island 71	Restore and diversify floodplain water bodies	MS	604
MS39	Lake Ferguson	Restore and diversify floodplain water bodies	MS	544
MS56	Lake Centennial	Restore and diversify floodplain water bodies	MS	438
MS66	Rodney Lake Weir	Restore and diversify floodplain water bodies	MS	387
MS84	Tunica Lake	Restore and diversify floodplain water bodies	MS	678
MS85	Hardin Point Cutoff	Restore and diversify floodplain water bodies	MS	678
MS88AR63	Ashbrook - Tarpley Cutoff	Restore and diversify floodplain water bodies	MS-AR	550
TN05	Island 18 Towhead	Restore and diversity secondary channels	TN	838
KY01	Mayfield Creek	Tributary enhancement	KY	950
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Support and Comment Letters

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United States Department of the Interior

U. S. GEOLOGICAL SURVEY
Lower Mississippi-Gulf Water Science Center
640 Grassmere Park Drive, Suite 100
Nashville, TN 37211

Date: May 12, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report to Congress

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses.

The U.S. Geological Survey (USGS), Lower Mississippi-Gulf Water Science Center supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River partners in this thorough examination of the needs and opportunities for the Lower Mississippi River.

Section 1: ***Assessment of Information Needed*** *for River-Related Management*

The Assessment of Information Needed for River-Related Management includes current information and research which allows for a thorough documentation of what information is currently available for Lower Mississippi River management and where information knowledge gaps exist. Recommendations include the need to continue sediment analysis already underway to aid in river and delta management, to establish a water quality monitoring program and to establish a river information center to house the complicated and extensive data in a central location for river managers. Additionally, ten tributaries were identified as targets for watershed studies to better understand the influence these waters have on the main stem Lower Mississippi River.

The USGS Lower Mississippi-Gulf Water Science Center which covers the states of Tennessee, Alabama, Mississippi, Louisiana, and Arkansas has a wealth of information, experience, and resources available to apply towards the assessment of information needed for river-related management.

In response to **recommendation DISC1:** create a Lower Mississippi River Information Center (LMRIC) to collect and store information about the LMR including: historical information, scientific data, management, and use – USGS would like to partner with the USACE to contribute to and lead this effort along with the U.S. Environmental Protection Agency (EPA), our sister agencies in the Department of Interior – National Park Service and U.S. Fish and Wildlife Service, state agencies, and nongovernmental organizations (NGOs). This center will promote interagency cooperation, encourage research and foster public interest in the river and is needed to leverage the science, engineering, technology, and public policy to meet the Nation's needs.

In response to **recommendation DISC 2:** continue with sediment analysis of the middle and lower Mississippi River that was initiated in 2014 in a Mississippi River Geomorphic and Potamology Study – USGS would like to partner with USACE and continue to participate in the collection and analysis of sediment data in the middle and lower Mississippi River and its major tributaries. Understanding sediment dynamics is important for river management and no more so than in the Mississippi River.

In response to **recommendation DISC 3:** create a dedicated water quality monitoring program for the entire LMR – USGS would like to partner with EPA, contribute to, and share the lead in the water quality monitoring program. Standardized water quality collection techniques, timing, and methodologies are needed to develop both point-in-time water quality assessments and long term trends to insure that the Mississippi River provides good water for drinking, recreating, and industry, for the river itself, coastal wetlands, fish and wildlife, water supply, groundwater, and Gulf of Mexico hypoxia.

In response to **recommendation DISC 4a:** Conduct Comprehensive Watershed Studies of the major tributary rivers of the LMR as authorized in Section 729 of the Water Resources Development Act of 1986 (Bayou de Chien – Mayfield Creek, KY; Obion River, TN; Forked Deer River, TN; Hatchie, River, TN; Bayou Pierre, MS; and Big Black, MS) – USGS would be available to support USACE, USFWS, U.S. Department of Agriculture, state agencies, and NGOs in addressing the needs for better tributary management as they provide opportunities for fish and wildlife habitat, and recreation opportunities. Each of these watersheds is geographically located within the boundaries of the USGS Lower Mississippi-Gulf Water Science Center.

In response to **recommendation DISC 4b.1-3:** Conduct studies on larger tributary systems (St. Francis Basin, Arkansas River, and Ouachita River) – USGS would available to support USACE USFWS, and others in assessing existing water resources infrastructure critical to the needs of the Mississippi River. Each large tributary is unique in its needs and contributions to the Mississippi River.

In response to **recommendation DISC 5a:** Island inventory – USGS would be available to support USACE, USFWS, and others in conducting ecological surveys of the islands on the Mississippi River to determine their uniqueness, ecological resources, and opportunities for restoration.

In response to **recommendation DISC 5b:** Potential natural vegetation study – USGS would be available to support USACE and USFWS in conducting research on the current hydrology, soils, and historic vegetation in developing potential vegetation maps to aid in vegetative restoration.

Sincerely,

W. Scott Gain, Director
U.S. Geological Survey
Lower Mississippi-Gulf Water Science Center

Mike Knoedl
Director

Jeff Crow
Chief of Staff and
Deputy Director

A Century of Conservation

Arkansas Game and Fish Commission

Andrew Bass
Assistant Deputy Director

Ricky Chastain
Assistant Deputy Director

June 1, 2015
Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Lower Mississippi River Resource Assessment Final Report to Congress

Colonel Anderson:

The Lower Mississippi River Resource Assessment (LMRRA) is authorized by Section 402 of the Water Resources Development Act of 2000, Public Law 106-541. It states that the Secretaries of the Army and the Interior, in cooperation with the states of Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee shall develop 1) an assessment of information needed for river-related management, 2) an assessment of natural resource habitat needs and, 3) an assessment of the need for river-related recreation and access. The goal of the LMRRA is to summarize the needs for information, habitat, and recreation identified in the three previous assessments and develop a strategy to meet those needs.

The Arkansas Game & Fish Commission (AGFC) was an active partner in the development of the LMRRA through submission of AGFC data layers, meeting attendance, and our membership in the U.S. Fish & Wildlife Service's Lower Mississippi River Conservation Committee (LMRCC). The AGFC supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River partners in this examination of the needs and opportunities for the Lower Mississippi River.

Assessment of Information Needed for River-related Management

The Assessment of Information Needed for River-Related Management includes current information and research which allows for a thorough documentation of what information is currently available for Lower Mississippi River management and where information knowledge gaps exist. Recommendations include the need to continue sediment analysis already underway to aid in river and delta management, to establish a water quality monitoring program and to establish a river information center to house the complicated and extensive data in a central location for river managers. Additionally, ten tributaries were identified as targets for watershed studies to better understand the influence these waters have on the main stem Lower Mississippi River (LMR).

AGFC supports the following LMRRA recommendations:

5

Recommendation - Data, Information, Science and Communication (DISC) 2: Continue with sediment analysis of the Middle and Lower Mississippi River that was initiated in 2014 in a Mississippi River Geomorphic and Potamology Study.
Recommendation DISC 3: Create a dedicated water quality monitoring program for the entire LMR.
Recommendation DISC 4a: Conduct Comprehensive Watershed Studies of the major tributary rivers of the LMR as authorized in Section 729 of the Water Resources Development Act of 1986.
Recommendation DISC 4b: Conduct studies on larger tributary systems. These studies would focus on the active floodplain and existing water resources infrastructure and not on the entire watershed. USACE would need specific authorization to conduct these studies.
Recommendation DISC 5a: Island Inventory - Conduct an ecological survey of the islands on the Mississippi River to determine their uniqueness, ecological resources, and opportunities for restoration.
Recommendation DISC 5b: Potential Natural Vegetation Study – Conduct research on the current hydrology, soils, and historic vegetation within the batture and develop a potential vegetation map to inform vegetative restoration.

The above recommendations complement the AGFC Strategic Plan goals of:

- Managing Fish and Wildlife
- Working Together for Fish and Wildlife
- Preparing for the Future

Assessment of Natural Resource Habitat Needs

The Assessment of Natural Resource Habitat Needs recommendations focus on eight conservation priority areas to determine federal interest in specific restoration project opportunities, planning and design, and implementation approaches. Each reach has opportunities to enhance a broad spectrum of features including side channels, backwaters, oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars. These eight reaches total 275 miles or nearly 30% of the LMR. Recreational enhancement will be considered alongside natural resource habitat improvements to provide opportunities for people to benefit from completed restoration actions.

AGFC supports the following LMRRA recommendations:

Recommendation – Habitat, Restoration, and Management Program (HRMP) 1. Conduct eight conservation reach habitat restoration studies on the LMR. The Mississippi River ecosystem is a dynamic system with interactions between the terrestrial and aquatic systems, main channel and side channel areas, mudflats, backwaters, tributaries, and islands. These feasibility studies would examine the Mississippi River and batture to determine if there is Federal interest sufficient to justify construction of ecosystem restoration features. Eight reaches have been identified as priorities.

1. Wolf Island to Island 8 Reach RM 946 – 910 (36 mi.)
2. Hatchie/Loosahatchie Reach RM 775 – 736 (39 mi)

3. Islands 62/63 Reach RM 650 - 618 (32 mi.)
4. Arkansas River Reach RM 599 – 556 (43 mi.)
5. Possum (Worthington-Pittman) Reach RM 524 – 490 (34 mi.)
6. Palmyra River Reach RM 431 – 398 (33 mi.)
7. Lake Mary Reach RM 360 -322 (38 mi.)
8. Raccourci Cutoff Reach RM 300 -265 (35 mi.)

Recommendation HRMP 2a. Conduct Aquatic Habitat Ecosystem Restoration studies using the existing USACE authority under Section 1135 of the Water Resources Development Act (WRDA) of 1986 or Section 206 of WRDA 1996.

Recommendation HRMP 3: Terrestrial Habitat Program – Continue to implement programs that restore native vegetation to the batture. Most of the land within the batture is in private ownership, but some landowners are interested in reforesting their land. There are programs to assist these landowners.

Recommendation HRMP 4: Invasive Species - There are several plans in place to address invasive species on the river that would include substantial benefit to native species if implemented. They include privet abatement, kudzu control, the Aquatic Nuisance Species Task Force (ANSTF) and Mississippi Interstate Cooperative Resource Association (MICRA) have developed plans to manage and control carp and other aquatic nuisance species.

The above recommendations complement the AGFC Strategic Plan goals of:

- Managing Fish and Wildlife
- Working Together for Fish and Wildlife
- Preparing for the Future

In addition to the recommendations provided in the LMRRA, AGFC would like to make the following recommendations:

- Include opportunities for fish passage and eel ladders on the Ouachita River, White River, and Arkansas River dams to the LMR.
- Develop a study to estimate the number and species of fish that are killed by the Huxtable Plant on the St. Francis River.

Assessment of the Need for River-related Recreation and Access

Assessment of River Related Recreation and Access: The LMR passes seven states and many municipalities and cities. Currently many opportunities exist for outdoor recreation and tourism on and near the LMR, but there is no single entity marketing the river for tourism. Therefore, many of the recreation recommendations included in this assessment are important for numerous government agencies, municipalities, and private organizations. Multiple state organizations like the Mississippi River Parkway Commission, Mississippi River Trail, local communities and non-governmental organizations can help provide continuity to provide better service and access to the Mississippi River. These recommendations are river-related recreation items but are often not directly within the batture or on the LMR. They include boat ramps for all sizes of watercraft, bike and pedestrian trails, riverfront parks, large riverboat docks, lodging and dining, guide service and marketing of the river as a destination.

AGFC supports the following LMRRA recommendations:

> **Recommendation – Recreation Program (RP) 1.** Boat Ramps – Increase the number of boat ramps on the LMR. A boat ramp every 10 to 20 miles on the river would provide more opportunities for paddlers, fishermen and hunters and would increase safety to allow those in distress more options for getting off the water or easier access for search and rescue operations to get to those in distress. More ramps should be available to directly access backwaters and side channels. Ramps also provide locations for interpretive signs about the Mississippi River, environmental education and safety. **Recommendation RP 7.** Outfitter and Guide - Establish more outfitter & guide services on the LMR. Increased guide services of fishing, canoeing/kayaking, and hunting will help safely get river adventurers on the water to explore and enjoy.

The above recommendations complement the AGFC Strategic Plan goals of:

- Serving the Public
- Connecting People with Fish and Wildlife

The LMRRA combines the three assessments into a comprehensive plan that contains recommendations that will guide future management of the LMR. This report will illustrate many needs and opportunities to restore natural resources, develop recreation options for access and experiences, and improve our knowledge of the river. As this work moves forward there will be interest in public and private collaboration to restore habitat, enhance recreation access, and promote information sharing. AGFC is encouraged by this work and will continue to work with our state and federal partners to develop and implement projects that protect and enhance the LMR's natural resources while increasing opportunities for public use.

The opportunity to comment is appreciated.

Sincerely,

Ricky Chastain
Assistant Deputy Director, Arkansas Game & Fish Commission

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May 28, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report to Congress

Dear Colonel Anderson:

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses.

The Kentucky Division of Water (DOW) supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River partners in this thorough examination of the needs and opportunities for the Lower Mississippi River.

Section 1: *Assessment of Information Needed for River-Related Management*

The *Assessment of Information Needed for River-Related Management* includes current information and research which allows for a thorough documentation of what information is currently available for Lower Mississippi River management and where information knowledge gaps exist. Recommendations include the need to continue sediment analysis already underway to aid in river and delta management, to establish a water quality monitoring program and to establish a river information center to house the complicated and extensive data in a central location for river managers. Additionally, ten tributaries were identified as targets for watershed studies to better understand the influence these waters have on the main stem Lower Mississippi River. Recommendations identified in the *Assessment of Information Needed for River-Related Management* are listed below:

- **Recommendation 1:** Create a Lower Mississippi River Information Center (LMRIC) to collect and store information about the LMR including: historical information, scientific data, management, and use.
- **Recommendation 2:** Continue with sediment analysis of the Middle and Lower Mississippi River that was initiated in 2014 in a Mississippi River Geomorphic and Potamology Study.
- **Recommendation 3:** Create a dedicated water quality monitoring program for the entire LMR.
- **Recommendation 4a:** Conduct Comprehensive Watershed Studies of the major tributary rivers of the LMR as authorized in Section 729 of the Water Resources Development Act of 1986.

    - Bayou de Chien/Obion Creek – Mayfield Creek, KY
    - Obion River, TN
    - Forked Deer River, TN
    - Hatchie, River, TN
    - Bayou Pierre, MS
    - Big Black, MS

- **Recommendation 4b:** Conduct studies on larger tributary systems. These studies would focus on the active floodplain and existing water resources infrastructure and not on the entire watershed. USACE would need specific authorization to conduct these studies.

    - St Francis Basin
    - Arkansas
    - Ouachita

- **Recommendation 5a:** Island Inventory - Conduct an ecological survey of the islands on the Mississippi River to determine their uniqueness, ecological resources, and opportunities for restoration.
- **Recommendation 5b:** Potential Natural Vegetation Study – Conduct research on the current hydrology, soils, and historic vegetation within the batture and develop a potential vegetation map to inform vegetative restoration.

The DOW agrees to participate with the implementation of Recommendations 1 and 3 above and in a watershed study on Bayou de Chien/Obion Creek. Regarding Recommendation 1, the DOW is interested in contributing LMR and major tributary data to the Lower Mississippi River Information Center. The DOW will submit historical data once the LMRIC is available. As the LMRIC is available, DOW will upload recently collected data on a quarterly basis. In regards to Recommendation 3, DOW agrees to provide guidance to the LMRCC on a monitoring approach and the development of a monitoring network. DOW will provide guidance to USACE, United States Geological Survey, or other agencies on where monitoring stations could be located on the Mississippi River in Kentucky. Data generated from the monitoring network could provide essential information to organizations such as the Gulf Hypoxia Task Force to make water quality recommendations for the Mississippi River and the Gulf of Mexico. DOW will also assist USACE in organizing and conducting a watershed study of Bayou de Chien/Obion Creek. DOW currently utilizes a basin rotation approach for monitoring and anticipates its monitoring to focus in the Mississippi River basin in 2020. In addition, DOW supports the sediment analysis efforts currently being conducted by the USACE (Recommendation 2). Furthermore, DOW encourages the USFWS with other partners to conduct the natural vegetation inventories of river islands natural vegetation and the batture as noted in Recommendation 5.

Section 2: *Assessment of Natural Resource Habitat Needs*

The *Assessment of Natural Resource Habitat Needs* recommendations focus on eight conservation priority areas to determine federal interest in specific restoration project opportunities, planning and design, and implementation approaches. Each reach has opportunities to enhance a broad spectrum of features including side channels, backwaters, oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars. These eight reaches total 275 miles or nearly 30% of the LMR. Recreational enhancement will be considered alongside natural resource habitat improvements to provide opportunities for people to benefit from completed restoration actions. Recommendations identified in the *Assessment of Natural Resource Habitat Needs* are listed below:

- **Recommendation 1:** Conduct eight conservation reach habitat restoration studies on the LMR. The Mississippi River ecosystem is a dynamic system with interactions between the terrestrial and aquatic systems, main channel and side channel areas, mudflats, backwaters, tributaries, and islands. These feasibility studies would examine the Mississippi River and batture to determine if there is Federal interest sufficient to justify construction of ecosystem restoration features. Eight reaches have been identified as priorities.

    1. Wolf Island to Island 8 Reach RM 946 – 910 (36 mi.)
    2. Hatchie/Loosahatchie Reach RM 775 – 736 (39 mi)
    3. Islands 62/63 Reach RM 650 - 618 (32 mi.)
    4. Arkansas River Reach RM 599 – 556 (43 mi.)
    5. Possum (Worthington-Pittman) Reach RM 524 – 490 (34 mi.)
    6. Palmyra River Reach RM 431 – 398 (33 mi.)
    7. Lake Mary Reach RM 360 -322 (38 mi.)
    8. Raccourci Cutoff Reach RM 300 -265 (35 mi.)

- **Recommendation 2a:** Conduct Aquatic Habitat Ecosystem Restoration studies using the existing USACE authority under Section 1135 of the Water Resources Development Act (WRDA) of 1986 or Section 206 of WRDA 1996.
- **Recommendation 2b:** Use the existing USFWS National Fish Passage Program to restore side channels and other aquatic habitat on the Mississippi. This program has already been used to restore 56 miles of habitat on the LMR
- **Recommendation 3:** Terrestrial Habitat Program – Continue to implement programs that restore native vegetation to the batture. Most of the land within the batture is in private ownership, but some landowners are interested in reforesting their land. There are programs to assist these landowners.
- **Recommendation 4:** Invasive Species **-** There are several plans in place to address invasive species on the river that would include substantial benefit to native species if implemented. They include privet abatement, kudzu control, the Aquatic Nuisance Species Task Force (ANSTF) and Mississippi Interstate Cooperative Resource Association (MICRA) have developed plans to manage and control carp and other aquatic nuisance species.

The Kentucky Division of Water supports USACE and other partners in conducting conservation reach habitat restoration studies in Recommendation 1, especially the Wolf Island to Island 8 reach, as indicated above. DOW also supports USACE in conducting Aquatic Habitat Restoration studies within the Wolf Island to Island 8 reach and the USFWS in conducting side-channel restoration projects as identified in Recommendations 2A and 2B. Although DOW is not directly involved in Recommendations 3 and 4 above, these efforts support reforestation of the batture and invasive species management.

Section 3: *Assessment of River-Related Recreation and Access*

The Lower Mississippi River passes seven states and many municipalities and cities. Currently many opportunities exist for outdoor recreation and tourism on and near the LMR, but there is no single entity marketing the river for tourism. Therefore, many of the recreation recommendations included in this assessment are important for numerous government agencies, municipalities, and private organizations. Multiple state organizations like the Mississippi River Parkway Commission, Mississippi River Trail, local communities and non-governmental organizations can help provide continuity to provide better service and access to the Mississippi River. These recommendations are river-related recreation items but are often not directly within the batture or on the LMR. They include boat ramps for all sizes of watercraft, bike and pedestrian trails, riverfront parks, large riverboat docks, lodging and dining, guide service and marketing of the river as a destination. Recommendations identified in the *Assessment of River-Related Recreation and Access* are listed below:

- **Recommendation 1:** Boat Ramps – Increase the number of boat ramps on the LMR. A boat ramp every 10 to 20 miles on the river would provide more opportunities for paddlers, fishermen and hunters and would increase safety to allow those in distress more options for getting off the water or easier access for search and rescue operations to get to those in distress. More ramps should be available to directly access backwaters and side channels. Ramps also provide locations for interpretive signs about the Mississippi River, environmental education and safety.

- **Recommendation 2:** Bicycle trails – Increase the total mileage of bicycle trails and especially trails where vehicles are not allowed (except as necessary for farming, etc.) The existing Mississippi River Trail extends the full length of the river, but lies mostly on public roads. The Big River Parkway is a planned trail extending from New Orleans, LA to St. Louis, MO on the levees. The Harahan Bridge over the Mississippi River will link Memphis, TN to this trail. Provide opportunity for both long distant rides between cities and towns and shorter rides in and around towns.

- **Recommendation 3:** Riverfront Parks – Develop riverfront parks for the use of local communities and visitors.

- **Recommendation 4:** Riverboat Landings – Develop more and better riverboat landings along the Lower River to provide reliable and accessible opportunities for riverboat passengers to visit and enjoy cities and towns all along the river.

- **Recommendation 5:** Marketing :

    - **Recommendation 5a:** National Geographic Geotourism Destination – Continue developing the Mississippi River as a Geotourism Destination which will include gathering and publicizing information on lodging, restaurants, amenities, museums, festivals, events, tours, culture, ecology and other features.
    - **Recommendation 5b:** Great River Road – Pursue a National Parkway grant to develop a GPS feature for National Scenic Byways.

- **Recommendation 6:** Lodging & Dining **-** Develop more lodging and dining options on the LMR. Most lodging would need to be developed outside of the batture, but there is some demand for camping along the river which could be met on State lands.

- **Recommendation 7:** Outfitter and Guide **-** Establish more outfitter & guide services on the LMR. Increased guide services of fishing, canoeing/kayaking, and hunting will help safely get river adventurers on the water to explore and enjoy.

Although the Kentucky Division of Water is not directly involved in these types of river-related activities, information generated by the monitoring network and provided to the public through the Lower Mississippi River Information Center, which is supported by DOW, should have positive impacts on such river-related activities by forming the public's image of LMR water quality. DOW supports efforts by communities, organizations and agencies to improve river-related activities and access.

Lower Mississippi River Resource Assessment Final Report

The *Lower Mississippi River Resource Assessment Final Report* will likely be released in the fall of 2015, which will combine the three assessments into a comprehensive plan and contain recommendations that will guide future management of the LMR. This report will illustrate many needs and opportunities to restore natural resources, develop recreation options for access and experiences, and improve our knowledge of this iconic river. DOW has been involved in the LMRAA development process through the Lower Mississippi River Conservation Committee. As this work moves forward there will be interest in public and private collaboration to restore habitat, enhance recreation access and promote information sharing. The Kentucky Division of Water is encouraged by this work and appreciates the opportunity to participate in the next stage of development.

Sincerely,

Peter Goodmann, Director
Division of Water

BOBBY JINDAL
GOVERNOR

PEGGY M. HATCH
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF THE SECRETARY

MAY 2 7 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report to Congress

Dear Colonel Anderson:

The Louisiana Department of Environmental Quality (LDEQ) supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River partners in the thorough examination of the needs and opportunities for the Lower Mississippi River as summarized in the *Lower Mississippi River Resource Assessment Final Report to Congress.* The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River. Historically, the Lower Mississippi River has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses. The LMRRA Assessments are summarized below along with an outline of the specific recommendations LDEQ supports, including potential forms of future participation in this commendable effort.

Assessment of Information Needed for River-Related Management

The *Assessment of Information Needed for River-Related Management* includes current information and research which allows for a thorough documentation of what information is currently available for Lower Mississippi River management and where information knowledge gaps exist. Recommendations include the need to: continue sediment analysis already underway to aid in river and delta management; establish a water quality monitoring program; and establish a river information center to house the extensive and complex data in a central location for river managers. Additionally, ten tributaries were identified as targets for watershed studies to better understand the influence these waters have on the main stem Lower Mississippi River.

Data Information Science and Communications (DISC) Program

The LDEQ supports all DISC recommendations and as resources allow, could be involved in recommendations 1, 3 and 4b as outlined below. In particular, LDEQ currently maintains routine surface water quality monitoring stations on the main stem of

the Mississippi River and a number of tributary systems, including the Ouachita River. Additionally, LDEQ makes its routine monitoring data available via public website and electronic document management system.

- **Recommendation DISC 1:** Create a Lower Mississippi River Information Center (LMRIC) to collect and store information about the Lower Mississippi River including scientific data and historical, management, and river use information.
- **Recommendation DISC 3:** Create a dedicated water quality monitoring program for the entire Lower Mississippi River.
- **Recommendation DISC 4b:** Conduct studies on larger tributary systems. These studies would focus on the active floodplain and existing water resources infrastructure and not on the entire watershed. USACE would need specific authorization to conduct these studies.
    - St Francis Basin
    - Arkansas
    - Ouachita

Assessment of Natural Resource Habitat Needs

The *Assessment of Natural Resource Habitat Needs* recommendations focus on eight conservation priority areas (reaches) to determine federal interest in specific restoration project opportunities, planning and design, and implementation approaches. Each reach has opportunities to enhance a broad spectrum of features including side channels, backwaters, oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars. These eight reaches total 275 miles or nearly 30% of the Lower Mississippi River. Recreational enhancement will be considered alongside natural resource habitat improvements to provide opportunities for people to benefit from completed restoration actions.

Habitat Restoration and Management Program (HRMP)

The LDEQ supports all HRMP recommendations, in particular those that directly support maintenance of the fish and wildlife propagation designated use of the river, such as the fish passage programs and other ecosystem restoration and management programs. LDEQ's involvement in habitat management occurs primarily through setting standards to protect the fish and wildlife propagation use and monitoring support of the use on the river and its tributary systems. LDEQ's involvement in habitat restoration occurs primarily through several programs including Remediation, Natural Resource Damage Assessment and Restoration, Wetlands Assimilation projects, and other Nutrient Management Strategy efforts. As resources allow, LDEQ could assist in leveraging resources in areas where LDEQ programs are actively involved in restoration efforts.

Assessment of River Related Recreation and Access

The Lower Mississippi River passes seven states and many municipalities and cities. Currently many opportunities exist for outdoor recreation and tourism on and near the Lower Mississippi River, but there is no single entity marketing the river for tourism. Therefore, many of the recreation recommendations included in the *Assessment of River Related Recreation and Access* are important for numerous government agencies, municipalities, and private organizations. Multiple state organizations like the Mississippi River Parkway Commission, Mississippi River

Trail, local communities and non-governmental organizations can help provide continuity to provide better service and access to the Mississippi River. The recommendations are river-related recreation items but are often not directly within the batture or on the Lower Mississippi River. The recommendations include boat ramps for all sizes of watercraft, bike and pedestrian trails, riverfront parks, large riverboat docks, lodging and dining, guide service and marketing of the river as a destination.

Recreation Program (RP)
The LDEQ supports all RP recommendations. LDEQ's involvement in recreational uses of the Lower Mississippi River occurs primarily through setting standards to protect recreational uses and monitoring support of recreational uses on the river and its tributary systems. Additional access points along the river, such as boat ramps, could improve LDEQ's access to the river for monitoring purposes. Additionally, development of riverfront parks could provide educational-outreach venues for LDEQ pollution prevention programs.

In summary, the *Lower Mississippi River Resource Assessment Final Report* illustrates many needs and opportunities to restore natural resources, develop recreational opportunities, and improve our knowledge of the river. The LDEQ is encouraged by the work that has been achieved and the work proposed under the LMRRA program. LDEQ plans to be engaged in the LMRAA program, supports the recommendations outlined in the Report and as resources allow, could participate in select efforts to achieve the program's goals.

Sincerely,

Peggy M. Hatch
Secretary

ec: Tegan B. Treadaway, Assistant Secretary, Office of Environmental Services (OES)
Scott Guilliams, Administrator, Water Permits Division, OES
Stephanie Braden, Environmental Scientist Sr., Water Permits Division, OES

STATE OF MISSISSIPPI
PHIL BRYANT
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
GARY C. RIKARD, EXECUTIVE DIRECTOR

May 18, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report to Congress

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses.

The Mississippi Department of Environmental Quality supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River partners in this examination of the needs and opportunities for the Lower Mississippi River.

The *Assessment of Information Needed for River-Related Management* includes current information and research which allows for a thorough documentation of what information is currently available for Lower Mississippi River management and where information knowledge gaps exist. Recommendations include the need to continue sediment analysis already underway to aid in river and delta management, to establish a water quality monitoring program and to establish a river information center to house the complicated and extensive data in a centralized location for river managers. Additionally, ten tributaries were identified as targets for watershed studies to better understand the influence these waters have on the main stem Lower Mississippi River. The Mississippi Department of Environmental quality supports the recommendations and is very interested in the proposed water quality studies on the Hatchie River, Big Black River, and Bayou Pierre watersheds.

The *Assessment of Natural Resource Habitat Needs* recommendations focus on eight conservation priority areas to determine federal interest in specific restoration project opportunities, planning and design, and implementation approaches. Each reach has

oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars. These eight reaches total 275 miles or nearly 30% of the LMR. Recreational enhancement will be considered alongside natural resource habitat improvements to provide opportunities for people to benefit from completed restoration actions. The Mississippi Department of Environmental Quality supports the recommendations issued as part of this assessment and is very interested in the proposed conservation reach habitat restoration studies on the following reaches in MS: Islands 62/63 Reach RM 650 - 618 (32 mi.), Arkansas River Reach RM 599 – 556 (43 mi.), Possum (Worthington-Pittman) Reach RM 524 – 490 (34 mi.), Palmyra River Reach RM 431 – 398 (33 mi.), and Lake Mary Reach RM 360 -322 (38 mi.). Additionally, MDEQ would like to request that snakeheads (*Channa* sp) be considered for inclusion in the management of invasive species under recommendation HRMP 4.

Assessment of River Related Recreation and Access: The Lower Mississippi River passes seven states and many municipalities and cities. Currently many opportunities exist for outdoor recreation and tourism on and near the LMR, but there is no single entity marketing the river for tourism. Therefore, many of the recreation recommendations included in this assessment are important for numerous government agencies, municipalities, and private organizations. Multiple state organizations like the Mississippi River Parkway Commission, Mississippi River Trail, local communities and non-governmental organizations can help provide continuity for better service and access to the Mississippi River. These recommendations are river-related recreation items but are often not directly within the batture or on the LMR. They include boat ramps for all sizes of watercraft, bike and pedestrian trails, riverfront parks, large riverboat docks, lodging and dining, guide service and marketing of the river as a destination. The Mississippi Department of Environmental Quality supports the recommendations issued as part of this assessment.

The Lower Mississippi River Resource Assessment Final Report will likely be released in the fall of 2015, which will combine the three assessments into a comprehensive plan and contain recommendations that will guide future management of the LMR. This report will illustrate many needs and opportunities to restore natural resources, develop recreation options for access and experiences, and improve our knowledge of this iconic river. As this work moves forward there will be interest in public and private collaboration to restore habitat, enhance recreation access and promote information sharing. The Mississippi Department of Environmental Quality is encouraged by this work and would like to be included as this work moves forward.

Sincerely,

Richard Harrell, P.E., BCEE
Director, Office of Pollution Control
Mississippi Department of Environmental Quality

MISSOURI DEPARTMENT OF CONSERVATION

Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180

Telephone: 573-751-4115 ▲ www.MissouriConservation.org

ROBERT L. ZIEHMER, Director

June 1, 2015

Colonel Jeffery Anderson
U.S. Army Corps of Engineers, Memphis District
167 North Main Street B-202
Memphis, TN 38103-1894

Dear Colonel Anderson:

The Missouri Department of Conservation (Department) is pleased that the Draft Final Assessment of the Lower Mississippi River Resource Assessment (LMRRA) has been completed and shared for public comment. As the Missouri state agency responsible for managing and conserving Missouri's forest, fish and wildlife resources, the LMRRA has been a long-term interest of the Department. Recognizing that information needed to help manage the natural resources and recreation opportunities on the Lower Mississippi River (LMR) was lacking, the Department was among the organizations that supported authorization of the LMRRA almost 15 years ago. We were pleased when planning efforts by the U.S. Army Corps of Engineers (USACE) and the group of cost-share partners began a few years ago and we believe the LMRRA will be invaluable in helping improve forest, fish and wildlife conditions within the project area.

The information and recommendations within the draft final report will be very helpful with managing the natural resources and improving river-related recreation opportunities of the LMR. The LMRRA will aid in helping develop a new strategic and comprehensive approach to including these goals in river management. The programs that might result from the LMRRA will also aid in creating a better balance between all uses of the river, while not jeopardizing those uses for which the river has historically been managed.

The Department participated in the assessment's development primarily through the Lower Mississippi River Conservation Committee (LMRCC) and provided information on potential habitat restoration opportunities, information needs, and river access opportunities. Department staff have reviewed the draft final report and we support the recommendation that three programs are to be developed that will address 1) Data Science and Communications; 2) Habitat Restoration and Management; and 3) Recreation. While the Department may not participate in all of the recommendations described under each program, all have important outcomes to meet the goals of the LMRRA. Our participation will primarily focus on those recommendations that align with the Department's mission and address forest, fish and wildlife needs.

However, at this stage in the planning process, it is difficult to identify specific recommendations and projects and to what level the Department might participate. More information is needed for most of the recommendations to fully identify our role. In general, we anticipate our level of

participation will range from data sharing to work-in-kind in conducting new studies, data analysis or planning expertise. The recommendations in which future participation is most likely, based on our current understanding of possible projects, are noted below.

Section 1 – Assessment of Information Needed; Data Science and Communications Program (DISC)

- Recommendation DISC 4b: watershed study of the St. Francis Basin
- Recommendation DISC 5a: island inventory
- Recommendation DISC 5b: potential natural vegetation study

Section 2 – Assessment of Natural Resource Habitat Needs; Habitat Restoration and Management Program (HRMP)

- Recommendation HRMP 1: conservation reach habitat restoration of the Wolf Island to Island 8 Reach
- Recommendation HRMP 2b: continued use of U.S. Fish and Wildlife Service National Fish Passage Program Funds to restore side channels
- Recommendation HRMP 3: terrestrial habitat program
- Recommendation HRMP 4: invasive species

Section 3 – Assessment of River Related Recreation and Access

- Recommendation RP 1: boat ramps

The Department's participation in any of these recommendations, or others in the LMRRA, is contingent upon future staffing levels, schedules and funding. Until detailed discussions begin on individual tasks, actual participation is unknown.

I congratulate you and your staff, and the planning team, for completing the LMRRA and the draft final report. This was an arduous task, but one we know is critical to ensuring that the Lower Mississippi River and its resources provide for the widest range of uses and remains a national treasure. We look forward to working with our federal, state and non-governmental organizational partners to improve fish and wildlife resources and river related recreational opportunities on the Lower Mississippi River in the next stage of development.

For additional questions, please contact Janet Sternburg, Policy Coordinator at janet.sternburg@mdc.mo.gov or at 573-522-4115, extenstion 3372.

Sincerely,

David H Thorne

DAVID H. THORNE, Ph.D.
POLICY SUPERVISOR

c: Marsha Raus, USACE
Angeline Rodgers, USFWS, LMRCC Coordinator

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

May 28, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

Dear Colonel Anderson:

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses.

The Tennessee Wildlife Resources Agency (TWRA) supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River partners in this thorough examination of the needs and opportunities for the Lower Mississippi River. TWRA through its membership in the LMRCC has been a partner in the development of the LMRRA and supports the recommendations put forth in this assessment. The LMRRA will provide much needed guiding document for better management of the resources of the Lower Mississippi River.

The partnership between the USACE and the LMRCC has accomplished many things, but they made great strides in habitat restoration. Utilizing funding from the National Fish Passage Program of the U.S. Fish and Wildlife Service, they have restored water to 53.75 miles of side channel habitat since 2006. The LMRRA along with a new strategic and comprehensive approach of management should show yield very impressive results as we work to conserve these resources.

The Lower Mississippi River Resource Assessment Final Report will likely be released in the fall of 2015, which will combine the three assessments into a comprehensive plan and contain recommendations that will guide future management of the LMR. This report will illustrate

the many needs and opportunities to restore natural resources, develop recreation options for access and experiences, and improve our knowledge of this iconic river. As this work moves forward there will be interest in public and private collaboration to restore habitat, enhance recreation access and promote information sharing. The Tennessee Wildlife Resources Agency is encouraged by this work and looks forward to our continued partnership with the USACE and the LMRCC in the future efforts to restore America's greatest river.

Sincerely,

Ed Carter

Ed Carter
Executive Director
Tennessee Wildlife Resources Agency

EC:jh

Arkansas Kentucky Louisiana Mississippi Missouri Tennessee

Lower Mississippi River Conservation Committee
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213
Telephone 601-321-1139

June 1, 2015

Colonel Jeffrey A. Anderson
Memphis District Corps of Engineers
167 North Main Street B-202
Memphis, TN 38103-1894

Dear Colonel Anderson:

The Lower Mississippi River Conservation Committee (LMRCC) is pleased to be a part of the partner team, led by The Nature Conservancy, for the Lower Mississippi River Resource Assessment. The LMRCC is a coalition of 12 state natural resource conservation and environmental quality agencies in Arkansas, Kentucky, Louisiana, Mississippi, Missouri and Tennessee. We are dedicated to conserving the natural resources of the Lower Mississippi River's floodplain and our focus is on habitat restoration, long-term conservation planning and nature-based economic development. We have been involved in the Lower Mississippi River Resource Assessment for several years, including the Reconnaissance Phase. We offer our fullest support for the Draft Final Assessment and the recommendations therein.

The Corps of Engineers' 200-Year Vision calls for a balanced approach to river management and use, which is the intent of the Lower Mississippi River Resource Assessment. The recommendations in the Draft Final Assessment were designed to meet identified needs in the three component resource assessments: Assessment of Information Needed for River-Related Management, Assessment of River-related Recreation and Access and Assessment of Natural Resource Habitat Needs. While the LMRCC is supportive of the entire Draft Final Assessment, there are several recommendations that resonate with the LMRCC member agencies.

Recommendation DISC 1. Science Technology Information Center. Because the LMRCC is comprised of the six states (12 agencies) along the Lower Mississippi River, we have an inherent interest in research and management of the entire lower river. Each of the LMRCC states is involved at various levels in research and monitoring efforts of biological or water quality resources and we would be pleased to see a central repository for data collection in addition to a lead research science center. It is likely that LMRCC member states may have available data that could be contributed to such an Information Center.

Recommendation DISC 3. Water Quality Monitoring Program. There are six state water quality agencies on the LMRCC Executive Committee. In September 2014, the LMRCC completed a Summary of Available Water Quality Assessments of the Lower Mississippi River. In this summary, the LMRCC recommended "additional resources be dedicated to the collection of data sets used for water quality assessments of the Mississippi River". Therefore, we believe a comprehensive water quality monitoring program on the lower river is a need and the LMRCC states would likely be involved as future resources allow.

Recommendation DISC 4. Tributary Watershed Studies. The LMRCC is generally supportive of these tributary studies, although specific involvement of LMRCC member agencies would be dependent upon that state's leadership and support.

Recommendation HRMP 1. Conservation Reach Studies. Since 2006, the LMRCC has been working in partnership with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service through the National Fish Passage Program to conduct restoration in secondary channels on the Lower Mississippi River. To date, we have worked on 13 projects to improve over 55 miles of habitat. The LMRCC has identified specific projects that fall within the proposed reach studies and therefore we are supportive of their completion. The proposed studies provide an excellent opportunity for a more comprehensive and in-depth analysis of these river reaches to determine the full suite of rehabilitation opportunities.

Recommendation HRMP 2. Aquatic Habitat Restoration Studies. As previously mentioned, the LMRCC has been working through the National Fish Passage Program to implement projects on the Lower Mississippi River and we are fully supportive of the continuation and expansion of this work. We have an excellent working relationship with the U.S. Army Corps of Engineers and other partners that help execute these projects.

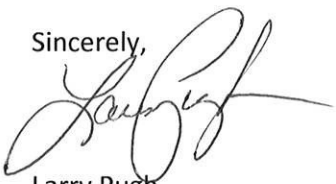
Recommendation HRMP 4. Invasive Species Program. Aquatic nuisance species, particularly Asian Carp, are of concern to the LMRCC and we support efforts to implement existing aquatic nuisance species plans, as developed by the Aquatic Nuisance Species Task Force and the Mississippi Interstate Cooperative Resource Association.

Recommendation RP 1. Boat Ramps. The LMRCC has identified several boat ramp needs in the Restoring America's Greatest River Plan. We are supportive of providing additional access to recreationalists on the river.

This Draft Final Assessment provides a comprehensive list of recommendations to meet needs identified within the component assessments of the Lower Mississippi River Resource Assessment. The LMRCC has been committed to working in partnerships to improve the Lower Mississippi River for the past 20 years. We are fully supportive of this effort to provide a holistic view of river management and needed improvements. We look forward to continuing our partnership with the U.S. Army Corps of Engineers, in addition to The Nature Conservancy, Mississippi River Corridor-Tennessee, Wildlife Mississippi, National Audubon Society, Delta Wildlife and Quapaw Canoe Company, with whom the responsibilities of this assessment have been shared.

Please feel free to contact me or Angie Rodgers (angeline_rodgers@fws.gov or 601-321-1139) if you need additional information or would like to further discuss these opportunities. We appreciate the opportunity to be involved in this project and look forward to future efforts.

Sincerely,



Larry Pugh
Chair
Lower Mississippi River Conservation Committee

June 1, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report to Congress

The Lower Mississippi River Resource Assessment, as authorized by Section 402 of the Water Resources Development Act (WRDA) of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses.

The Mississippi Interstate Cooperative Resource Association (MICRA) is an organization formed in 1991 that consists of 28 state fish and game management agencies in the Mississippi River Basin. Our partnership focuses on improved management of interjurisdictional fish and other aquatic resources. MICRA supports the work of the U.S. Army Corps of Engineers and the Lower Mississippi River partners in this thorough examination of the needs and opportunities for the Lower Mississippi River.

There are numerous components of the Final Assessment that align with our organization's mission and goals, but there are several that merit specific attention. The *Assessment of Information Needed for River-Related Management* includes current information and research which allows for a thorough documentation of what information is currently available for Lower Mississippi River management and where information knowledge gaps exist. We have particular interest in **Recommendation DISC 1:** Create a Lower Mississippi River Information Center to collect and store information about the LMR including: historical information, scientific data, management, and use. Many of our member agencies are involved in monitoring and data collection on the Upper Mississippi River and we support building data repositories for the Lower Mississippi River as a complementary system.

The *Assessment of Natural Resource Habitat Needs* recommendations focus on eight conservation priority areas to determine federal interest in specific restoration project

opportunities, planning and design, and implementation approaches. Each reach has opportunities to enhance a broad spectrum of features including side channels, backwaters, oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars. These eight reaches total 275 miles or nearly 30% of the LMR. Recreational enhancement will be considered alongside natural resource habitat improvements to provide opportunities for people to benefit from completed restoration actions. MICRA is supportive of habitat restoration efforts and is developing an Aquatic Habitat Action Plan for the entire Mississippi River Basin. Specifically we are interested in the following recommendations:

> **Recommendation HRMP 1.** Conduct eight conservation reach habitat restoration studies on the LMR.
>
> **Recommendation HRMP 2a.** Conduct Aquatic Habitat Ecosystem Restoration studies using the existing U.S. Army Corps of Engineers authority under Section 1135 of the WRDA of 1986 or Section 206 of WRDA 1996.
>
> **Recommendation HRMP 2b.** Use the existing USFWS National Fish Passage Program to restore side channels and other aquatic habitat on the Mississippi.
>
> **Recommendation HRMP 4:** Invasive Species: There are several plans in place to address invasive species on the river that would include substantial benefit to native species if implemented. In 2003 MICRA began hosting the Mississippi River Basin Panel on Aquatic Nuisance Species as organized under authority of the National Aquatic Nuisance Species Task Force. Both the Task Force and MICRA have developed plans to manage and control Asian Carp and other aquatic nuisance species. We encourage support of these existing management plans.

The Lower Mississippi River Resource Assessment Final Report is a comprehensive plan containing recommendations to guide the future management of the Lower Mississippi River. There are many needs and opportunities identified and MICRA is encouraged by this work. We look forward to seeing these recommendations move into actions and appreciate the work of the U.S. Army Corps of Engineers and its partners on this effort.

Sincerely,

Bobby Wilson
MICRA Chairman

Mississippi River Corridor
Tennessee

291 Kenilworth Place
Memphis, TN 38112
Phone: 901.278.8459

diana@msrivertn.org
www.msrivertn.org

May 11, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support for the Lower Mississippi River Resource Assessment - Final Report to Congress

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses.

As *Chairman Emeritus* of the Mississippi River Corridor – Tennessee Inc. (MRCT), we have been longtime supporters of the work being accomplished by the U.S. Army Corps of Engineers, and our organization is one of the proud nonprofit partners that have helped to create this thorough examination of the needs and future opportunities for the Lower Mississippi River. Although our corporate jurisdiction only includes the river counties of Shelby, Tipton, Lauderdale, Dyer, Lake and Obion in Tennessee, we encourage and support all positive activities that involve the Mississippi River. With that in mind, we especially support the three sections as proposed and outlined by the LMRRA, and highly recommend they be implemented.

If I had one priority to realign, it would be to immediately focus on Section 3 (Recreation) since in many areas of the Lower Mississippi, the development of visitors, tourism and increased usage of the River are already high priorities. We desperately need more LMR access as well as additional tributary access. In Tennessee, we have many plans that involve multiple states (Arkansas, Mississippi, Missouri and Kentucky) that cannot be implemented until this additional access is created. With the immediate development of access points along the Lower Mississippi, I believe the other recommendations will fall into place.

As this work moves forward there will be a continued interest in public and private collaboration to increase new visitors to the LMR as well as restoring habitat and the water quality of the iconic Mississippi River and its tributaries. The Mississippi River Corridor – Tennessee, Inc will always be ready to help in these endeavors.

Sincerely,

John P. Sheahan
Chairman Emeritus - MRCT

Mississippi River Corridor
Tennessee

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May 30, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 North Main Street – Room B-202
Memphis, Tennessee 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report

Dear Colonel Anderson,

The Mississippi River Corridor – Tennessee (MRCT) has served as a proud nonprofit partner in the significant team of diverse organizations that have helped to create the *Lower Mississippi River Resource Assessment* (LMRRA) for the past three years. The leadership exhibited by The Nature Conservancy and the Corps of Engineers staff, provided the perfect framework to accomplish this landmark Draft Final Assessment on behalf of the Lower Mississippi River. The MRCT is in full support of the recommendations contained within this important document.

The mission of the MRCT is *to identify, conserve and enhance the region's natural, cultural and recreational resources to improve the quality of life and prosperity in West Tennessee.*

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River. Historically, the river in our southern sections has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides an added focus that our natural resources and river-related recreational activities deserve. Creating a better balance between all uses of the river is extremely important and the MRCT believes this new Assessment demonstrates that balance can be obtained without jeopardizing other uses.

We look forward to our continuing partnership with the Corps of Engineers and LMRRA partners: The Nature Conservancy, Wildlife Mississippi, National Audubon Society, Delta Wildlife and Quapaw Canoe Company. It has been an honor and privilege to work with these organizations to further advance the informational resources, wildlife habitat needs and outdoor recreational opportunities for our greatest natural resource – the magnificent Lower Mississippi River and the outstanding southern communities that benefit from its bounty.

Most Sincerely Yours,

Diana Threadgill
President and Executive Director

MISSISSIPPI RIVER NETWORK

Protecting the Land, Water and People of America's Greatest River

| 14 N. Peoria St. | Suite 4F | Chicago, IL 60607 | 312.754.0402 | www.1mississippi.org |

May 29, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

Dear Col. Anderson:

We are writing in response to the release of the LMRRA Final Assessment Public Review Draft, which brings much needed and long delayed attention to the natural resource needs of the Lower Mississippi River. The report is the first broad assessment of the river's natural resource and river-related recreational needs in more than 40 years. We are pleased to see the Corps and partners looked beyond the historic focus on navigation and flood control issues on this stretch of the Mississippi River.

As members of the Mississippi River Network, a coalition of 50 organizations and over 13,000 River Citizens working for a healthier Mississippi River, we recognize that we truly are *1 Mississippi* and ecological restoration and other environmental improvements are needed along the entire length of the River, from the headwaters to the Gulf. **The Network's policy goals emphasize improving water quality, wildlife habitat and public recreation access along the Mississippi River by reducing agricultural and urban run-off and restoring ecosystem and floodplain form and function.**

The draft final Lower Mississippi River Resource Assessment, released for public comment on April 22, contains recommendations that, if implemented, could enhance the river's aquatic habitat and habitat in the active floodplain to make strides towards improving the health of the Lower Mississippi River. Our comments today focus on strengthening the conclusions and recommendations in the draft Assessment for a healthier Lower Mississippi River ecosystem.

Detailed Comments:

A **We generally support improving public access on and along the LMR for outdoor recreation.** We encourage efforts to help communities to value the River as a tourism, recreation and public health asset. These outdoor recreation access projects should be designed, constructed and operated in a way that protects and enhances the River's natural resources

B **We specifically endorse Recommendation DISC 1** to create a Lower Mississippi River Information Center to collect and store information about the LMR, including: historical information, scientific data, management and use. We also support the establishment of long-term science and monitoring programs on the LMR within agencies like the US Geological Survey and academic institutions to better understand the LMR and guide management decisions.

C **We recommend the USACE revisit its conclusion that water quality is "good and improving."** A more accurate conclusion might be that while the Clean Water Act has greatly diminished the level of many pollutants, there are many water quality challenges and emerging threats on the Lower Mississippi River that require monitoring and action to eliminate.

D **We recommend the Habitat Restoration and Management Program conduct a study that looks holistically at the flood risk and ecosystem impacts of the navigation and flood control infrastructure.** Any comprehensive program for the Lower Mississippi River needs to include an evaluation of the cumulative impacts of navigation and flood risk reduction strategies on the health ecosystem and community flood risk to better understand the ecosystem's potential.

E **We recommend the report include a request for a programmatic restoration program authority similar to the Upper Mississippi River Restoration Program.** The draft LMRRA recommends eight conservation studies and projects – all of which need to be authorized separately – and additional aquatic studies to be conducted under already existing national authorities. We do not feel this goes far enough to ensure ecosystem restoration projects continue beyond the scope of the LMRRA.

We appreciate the Assessment's intent to enhance a broad spectrum of features including side channels, backwaters, oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars along the entire LMR. **However, we recommend the report specifically call for protection of**
F **existing ecosystem features** and provide additional tools to protect important habitat**.** Such tools will help halt misguided projects such as the St. Johns New Madrid Floodway levee that would destroy over 50,000 acres of backwater wetlands, an area larger than the District of Columbia, which provide vital breeding areas for fish and habitat for ducks.

By adopting these comments, the Corps will provide the foundations for a stronger Lower Mississippi River ecological restoration program, improve public access so people can enjoy the restored river, and increase knowledge of the river through data collection and analysis that will lead to better management of this valuable resource. We appreciate the opportunity to comment on the public review draft. If you have questions, please contact Andrew Kimmel, Mississippi River Network Policy Manager, at 847-754-0408 or by email at akimmel@bluestemcommunications.org.

Respectfully,

Olivia Dorothy
Associate Director, Mississippi River Management
American Rivers

Anna Weeks
Environmental Policy Associate
Arkansas Public Policy Panel

Andrew Kimmel
Policy Manager
Bluestem Communications

Virginia McLean
President
Friends for Our Riverfront

Trevor Russell
Water Program Director
Friends of the Mississippi River

Matt Rota, MEERM
Senior Policy Director
Gulf Restoration Network

Ralph Rosenberg
Executive Director
Iowa Environmental Council

Steve Barg
Executive Director
Jo Daviess Conservation Foundation

Judith Petersen
Executive Director
Kentucky Waterways Alliance

Dean Klinkenberg
The Mississippi Valley Traveler

Jerry Enzler
President & CEO
National Mississippi River Museum & Aquarium

Dana Wright
Water Policy Director
Tennessee Clean Water Network

Paul Botts
Executive Director
The Wetlands Initiative

Diana Threadgill
President
Mississippi River Corridor – Tennessee

Heather Navarro
Executive Director
Missouri Coalition for the Environment

Carol Hays
Executive Director
Prairie Rivers Network

Kathleen Williams
President and Executive Director
Tennessee Parks and Greenways Foundation (TennGreen)

Response to Comments received from
Mississippi River Network Comments
Dated May 29, 2015

A. Any new public access would be designed, constructed and operated in accordance with the applicable policies of the implementing organizations and all required permits.

B. No response necessary.

C. The previously approved assessments discuss water quality in more detail than this Final Assessment and provides examples of the improving water quality. Although no evidence was found that indicated water quality was limiting the ecosystem, the Assessment includes a recommendation to establish a comprehensive water quality monitoring program.

D. LMRRA examined the information, habitat, and recreation needs on the Lower River. The previous assessments provide detailed discussions of these needs. The recommendations contained in the final assessment are compatible with the ongoing flood risk management and navigation systems on the river. An in-depth analysis of the flood risk management and navigation systems on the Mississippi River is outside of the scope of LMRRA. These projects are constructed and operated according to their Congressional authorizations and all applicable laws. New features are analyzed under USACE policy and the National Environmental Policy Act, Clean Water Act, Endangered Species Act, et al. The Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel in the Lower Mississippi River (Endangered Species Act, Section 7(a) (1)) also examined the ongoing operations and maintenance of the river. These analyses are appropriate to ensure the sustainability of the river systems.

E. The eight conservation reach studies do not necessarily require separate authorizations. These studies are within the USACE mission and can be pursued under the existing policies for General Investigations (GI) if Congress provides authority. Existing authorities (e.g. CAP 1135) have been used for Lower River projects. State agencies and NGOs can request to sponsor these projects at any time. In either case, studies and construction would be subject to cost sharing according to WRDA 1986 (and amendments). The report describes the funding limits for CAP projects and only recommends using CAP to pursue projects that fit. CAP authorities do have annual program limits, but they are not currently being funded to the maximum. The CAP funding and program limits are not expected to impede execution of the projects recommended for those authorities. All other studies do have Congressional funding limits for the study, but not for total project costs.

F. LMRRA recommends projects that are compatible with flood risk management and navigation. USACE plans and analyzes Congressionally authorized flood risk management projects according to applicable laws and policies. These projects undergo public scoping and

public review. Any concerns about specific projects should be made during those comment periods.

Mississippi River Trust

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May 27, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report to Congress

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important, and this work demonstrates that a balance can be obtained without jeopardizing other uses.

The Mississippi River Trust supports the work of the U.S. Army Corps of Engineers (USACE) and the LMR partners in this thorough examination of the needs and opportunities for the LMR. Our organization is already actively involved in aquatic habitat restoration along the LMR. It has provided private funding to the Lower Mississippi River Conservation Committee (LMRCC) to support side channel dike-notching projects. In addition, the Trust is a primary partner, along with the LMRCC and the Natural Resources Conservation Service, in reforestation of privately owned cleared land in the batture. To date, the Lower Mississippi River Batture Reforestation Project has received applications for the reforestation of nearly 12,500 acres of batture lands, and those lands have been reforested or are being prepared for planting. The batture project's goal is to reforest 40,000 acres of cleared land in the batture to provide significant wildlife habitat enhancements, water quality improvements and outdoor recreation benefits.

Specifically, the Mississippi River Trust supports:

- Section 1, Recommendation DISC 5b, a Potential Natural Vegetation Study of the LMR batture.
- Section 2, Recommendation HRMP 1, Conservation Reach Habitat Restoration Studies on the LMR.

- Section 2, Recommendation HRMP 2b, use of the existing National Fish Passage Program to restore side channels and other aquatic habitat along the LMR. These funds have been used for restoration projects that provide significant fish and wildlife benefits and are cost-effective.

- Section 2, Recommendation HRMP 3, Terrestrial Habitat Program – continue to implement programs that restore native vegetation to the batture. The draft LMRRA Final Assessment recommends spending $18 million on this program. To date, the Natural Resources Conservation Service, us and our partners have invested more than $30 million in the Lower Mississippi River Batture Reforestation Project, and more than $95 million in additional funds are needed to reach the project's initial reforestation goal of 40,000 acres.

The Lower Mississippi River Resource Assessment Final Report will likely be released in the fall of 2015, which will combine the three assessments into a comprehensive plan and contain recommendations that will guide future management of the LMR. This report will illustrate many needs and opportunities to restore natural resources, develop recreation options for access and experiences, and improve our knowledge of this iconic river. As this work moves forward there will be interest in public and private collaboration to restore habitat, enhance recreation access and promote information sharing. The Mississippi River Trust is encouraged by this work and would like to get involved in the next stage of development.

Sincerely,

James L. Cummins
President

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June 1, 2015

Via email: Marsha.L.Raus@usace.army.mil
Col. Jeffery A. Anderson
Commander
Memphis District, U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

Re: Lower Mississippi River Resource Assessment, Public Review Draft April 2015

Dear Col. Anderson:

The National Wildlife Federation appreciates the opportunity to comment on the Lower Mississippi River Resource Assessment, Final Assessment in Response to Section 402 of WRDA 2000, Public Review Draft April 2015 (Draft Final Assessment).

The National Wildlife Federation (NWF) is the Nation's largest conservation education and advocacy organization. NWF has more than 5.8 million members and supporters and conservation affiliate organizations in forty-nine states and territories. NWF has a long history of interest and involvement in the programs of the U.S. Army Corps of Engineers (Corps) and the management, protection, and restoration of the Mississippi River. NWF is a strong supporter of ecologically sound efforts to restore the Mississippi River and the nation's many other damaged rivers, coasts, and wetlands.

General Comments

NWF strongly supports scientifically-driven efforts to restore the health of the lower Mississippi River ecosystem to support vibrant populations of fish and wildlife, and safe and healthy river and coastal communities.

Restoring the health of the lower Mississippi River and its floodplain would provide enormous benefits to fish and wildlife. The Mississippi River is home to 260 species of fish (25% of all fish species in North America), 145 species of amphibians and reptiles, 98 species of mussels, and 50 species of mammals. Sixty percent of all North American birds and 40 percent of its waterfowl spend at least part of their lives in the Mississippi River Flyway. This abundance of wildlife drives vibrant recreation-based economies. Restoring the health of the Mississippi River and its floodplain would also improve water quality and provide critical flood damage reduction benefits to river communities.

The historic focus on navigation and flood risk management on the lower Mississippi River has led to significant unintended adverse environmental and public safety consequences that will require substantial efforts to address. Effective and sustainable restoration of the river will require: (1) a robust

understanding of the river system that recognizes the important interplay between navigation activities, flood damage reduction efforts, and ecosystem health; (2) a clear understanding of the historical geomorphic, hydrologic, and ecological changes and altered processes of the lower river; and (3) a planning process that will ensure that restoration – and its significant benefits to the public – will not remain subservient to other river management activities.

NWF stresses the importance of continuing, and expanding, the ongoing sediment transport studies identified in the Draft Final Assessment. Understanding sediment dynamics is an essential component of sound river management for the Mississippi River. We recommend reaching out to the academic community in developing these studies to ensure that they are as robust and accurate as possible.

NWF endorses Recommendation DISC 1 to create a Lower Mississippi River Information Center to collect and store information about the lower Mississippi River including historical information, scientific data, and information on river management and use. We also support the establishment of long-term science and monitoring programs on the lower Mississippi River within agencies like the US Geological Survey and academic institutions to better understand the lower Mississippi River and guide management decisions.

Detailed Comments

NWF recommends that the Draft Final Assessment be revised to include the following recommendations to improve the effectiveness and sustainability of restoration efforts on the lower Mississippi River.

1. Establish a Guiding Framework for Habitat Restoration

NWF strongly supports restoration of the lower Mississippi River and recognizes the importance of addressing localized problems and demonstrating on-the-ground progress through restoration efforts. However, we believe that restoration efforts would be far more effective over the long run if they are developed with a clear understanding of the historical geomorphic, hydrologic, and ecological changes and altered processes of the lower river.

A geomorphic assessment of the lower river would provide an understanding of the river system in light of historical geomorphic, hydrologic, and ecological changes and altered processes; and provide a scientifically-sound basis for developing and prioritizing specific restoration projects. Such an assessment would examine the hydrologic and geomorphologic changes, determine the historical condition of the lower river, identify the role of specific human interventions to the river's processes, and establish trajectories of the impacts of past changes. Such an assessment would form the foundation for a scientifically based framework for sustainable restoration focused on process-based restoration and management actions that will target the river's underlying problems.

To help ensure the sustainability and effectiveness of restoration efforts and to comply with the National Water Resources Planning Policy, the Final Assessment should recommend prioritizing restoration efforts that restore river processes. The National Water Resources Planning Policy requires that "all water resources projects" shall "protect[] and restor[e] the functions of natural systems and

mitigat[e] any unavoidable damage to natural systems."[1] The Final Assessment should also recommend the establishment of clear ecological goals and success criteria for each restoration project. This would help ensure ecological success, and ensure that restoration success can be monitored and adaptive management efforts implemented if restoration efforts are not working as planned.

A

- **Recommendation**: The Final Assessment should call for a geomorphic assessment of the river to identify effective, sustainable management and restoration solutions that address the underlying drivers of geomorphological change and the existing constraints on the fluvial processes of the river. The geomorphic assessment should act as a guiding framework for the Habitat Restoration and Management Program.

B

- **Recommendation:** The Final Assessment should call for establishing a restoration framework based on the results of the geomorphic assessment that prioritizes restoration efforts that restore river processes and that requires establishment of clear ecological goals and success criteria to help ensure restoration success.

2. Modernize Ongoing Management Activities to Improve River Health

Ongoing operation and maintenance of the navigation system, and ongoing construction and maintenance of flood management reduction efforts have had, and will continue to have, significant implications for river health and recreational opportunities. Reassessing and modernizing ongoing river management activities could lead to crucial improvements in river health and a truly integrated approach to river management.

The adverse environmental impacts of many ongoing management activities are significant. For example, robust science shows that use of river training structures to help maintain a deeper navigation channel have led to significant losses of backwater, side channel, and braided habitats. Robust science also shows that river training structures have increased flood levels by 10 to 15 feet and more in some locations of the Mississippi River during large floods. Independent scientists have also determined that the more than 40,000 feet of "wing dikes" and "bendway weirs" constructed by the Corps in the Mississippi during the 3 years prior to the great flood of 1993 contributed to record crests in 1993, 1995, 2008, and again in 2011. In the Upper Mississippi River, flood stages increase by more than 4 inches for each 3,281 feet of wing dike built within 20 river miles downstream.

Flood damage reduction activities have also caused significant losses of vital floodplain wetlands. For example, the Corps routinely digs up floodplain wetlands to use the wetland soil as construction material for raising and enlarging levees. Significant losses of vital floodplain wetlands could be completely avoided by abandoning the practice of locating borrow pits in wetlands.

C

- **Recommendation:** The Final Assessment should call for: (1) a comprehensive evaluation of the ways in which navigation and flood damage reduction activities are affecting the health of the river ecosystem; and (2) identification and implementation of alternatives to the existing navigation and flood damage reduction activities that would reduce adverse

[1] 33 U.S.C 1962-3 (established by § 2031(a) of the Water Resources Development Act of 2007, and immediately applicable to all water resources projects).

environmental impacts and/or achieve systemic improvements to the health of the lower Mississippi River.

D
- **Recommendation:** The Final Assessment should more accurately reflect the implications of ongoing navigation and flood damage reduction activities on river health. As noted below, the Final Assessment should also call for the protection of existing ecosystem features, including floodplain wetlands.

3. Ensure Protection of Existing Resources

NWF supports the broad intent articulated in the Draft Final Assessment to restore a spectrum of ecosystem features, including side channels, backwaters, oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars along the entire lower Mississippi River. However, we recommend that the report also specifically call for protecting existing ecosystem features and provide tools and guidance to ensure protection of such habitat. Such tools will help halt misguided projects such as the St. Johns Bayou and New Madrid Floodway project that would destroy more than 50,000 acres of Mississippi River backwater wetlands – and area of wetlands larger than the District of Columbia – that provide vital habitat to a host of fish and wildlife species.

E
- **Recommendation:** The Final Assessment should call for the protection of existing ecosystem features, including floodplain wetlands, and provide tools and guidance to ensure the protection of such habitat.

4. Call for a Programmatic Restoration Authorization

The Final Assessment should call for establishment of a programmatic restoration authority for the lower Mississippi River. This programmatic authority should be broad in scope and should authorize restoration planning, restoration project implementation, and scientific assessments to guide restoration efforts. This could be similar to the Upper Mississippi River Restoration Program or other large scale restoration authorizations.

The Draft Final Assessment currently recommends eight separate conservation reach studies – each of which would need to be authorized separately, and receive appropriations separately. In addition, each of these studies would need to overcome the current general prohibition (recognizing a few limited exceptions) against new study starts. Once a study is completed, each recommended restoration project would then need to go through its own authorization and appropriations process and overcome any prohibition against new project starts. This approach is highly unlikely to result in meaningful restoration planning and projects being carried out on the lower Mississippi River. Such an approach is also likely to produce only "piecemeal" restoration efforts that would undermine the likelihood of sustainable, ecological success.

F
- **Recommendation:** The Final Assessment should call for establishment of a programmatic restoration authority for the lower Mississippi River that is broad in scope and that authorizes restoration planning, restoration project implementation, and scientific assessments to guide restoration efforts.

5. Actively Engage the Academic Community and the Public

NWF appreciates the recognition in the Draft Final Assessment of the importance of carrying out restoration and other activities on the river through meaningful partnerships with other federal and state agencies, the academic community and the public. NWF recommends that the Final Assessment call for actively engaging with academic institutions and centers to: assist in carrying out the many needed scientific investigations; review and provide input into plan and study development; and integrate restoration planning with overlapping efforts being carried out by the academic community. NWF further recommends that the Final Assessment call for extensive and ongoing actions to engage the public in restoration and other planning activities on the river.

G

- **Recommendation:** The Final Assessment should call for actively engaging with academic institutions and centers on needed scientific investigations, and for extensive and ongoing actions to engage the public in restoration and other planning activities on the river.

6. Accurately Assess the Current Conditions and Impacts of Ongoing Activities

The Draft Final Assessment should be revised to accurately assess the current conditions of the lower Mississippi River, the full extent of impacts from existing management activities, and the need for comprehensive restoration planning to address those problems. A clear understanding of the true level of restoration needs will be critical for effective restoration planning and for obtaining future restoration authorizations and appropriations.

For example, the Final Assessment should more accurately describe: (1) the dire state of Louisiana's coastal wetlands[2] and the profound losses of the river's floodplain wetlands; (2) the role of river training structures on increasing flood heights and the adverse impacts of river training structures on habitat diversity; (3) the role of flood damage reduction activities on floodplain wetland losses and the opportunities for avoiding such losses in the future; (4) the significant losses of side channel, braided channel, and backwater habitat diversity; and (5) the many water quality challenges facing the lower Mississippi River and emerging water quality threats.

H

- **Recommendation:** The Final Assessment should accurately assess the current conditions of the lower Mississippi River, the full extent of impacts from existing management activities, and the need for comprehensive restoration planning to address those problems.

[2] For example, at page 5 the Draft Final Assessment currently states that "Coastal wetlands are declining." This is a gross understatement of the dire problem facing coastal Louisiana, and fails to provide meaningful context for promoting restoration planning.

Conclusion

NWF looks forward to working with the Corps to adopt and implement these recommendations to establish a foundation for comprehensive and sustainable restoration of the Lower Mississippi River that will best serve fish and wildlife, river communities, and the public.

Sincerely,

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Senior Water Resources Counsel

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Response to Comments received from
National Wildlife Federation
Re: Lower Mississippi River Resource Assessment, Public review Draft April 2015
Dated June 1, 2015

A. The previously approved Assessment of Information Needed for River-Related Management examined the ongoing studies and existing geomorphic information for the Lower River and found it to be sufficient. That assessment lists 55 articles on geomorphology on the Lower River including Saucier 1994, Fisk 1944, and Biedenharn et al. 2000. The report did identify a need for more sediment studies and those generally include geomorphology. These sediment studies are already underway as part of the Mississippi River Geomorphology and Potamology Program.

B. USACE policy for ecosystem restoration planning and budgeting has clear guidelines that include geomorphic condition, hydrologic character, sustainability, connectivity, et al. This provides sufficient guidance for restoration.

C. LMRRA examined the information, habitat, and recreation needs on the Lower River. The previous assessments provide detailed discussions of these needs. The recommendations contained in the final assessment are compatible with the ongoing flood risk management and navigation systems on the river. An in-depth analysis of the flood risk management and navigation systems on the Mississippi River is outside of the scope of LMRRA. These projects are constructed and operated according to their Congressional authorizations and all applicable laws. New features are analyzed under USACE policy and the National Environmental Policy Act, Clean Water Act, Endangered Species Act, et al. The Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel in the Lower Mississippi River (Endangered Species Act, Section 7(a) (1)) also examined the ongoing operations and maintenance of the river. These analyses are appropriate to ensure the sustainability of the river systems.

D. See response C. above.

E. LMRRA recommends projects that are compatible with flood risk management and navigation. USACE plans and analyzes Congressionally authorized flood risk management projects according to applicable laws and policies. These projects undergo public scoping and public review. Any concerns about specific projects should be made during those comment periods.

F. The eight conservation reach studies do not necessarily require separate authorizations. These studies are within the USACE mission and can be pursued under the existing policies for General Investigations (GI) if Congress provides authority. Existing authorities (e.g. CAP 1135) have been used for Lower River projects. State agencies and NGOs can request to sponsor these projects at any time. In either case, studies and construction would be subject to cost sharing

according to WRDA 1986 (and amendments). The report describes the funding limits for CAP projects and only recommends using CAP to pursue projects that fit. CAP authorities do have annual program limits, but they are not currently being funded to the maximum. The CAP funding and program limits are not expected to impede execution of the projects recommended for those authorities. All other studies do have Congressional funding limits for the study, but not for total project costs.

G. The Assessment recommends a Lower Mississippi River Information Center to catalog and store available information. This center would promote academic investigations and public awareness of the river and its resources. All projects planned on the Lower River receive appropriate technical and public review.

H. The current conditions and needs on the Lower River were assessed in the three previous assessments on information, habitat, and recreation. This Final Assessment does not revisit those conclusions. Other studies have also examined river operations, e.g., 2013 Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel in the Lower Mississippi River (Endangered Species Act, Section 7(a) (1)), Mississippi River and Tributaries 2011 Post Flood Report, and 20th Century Stage Trends Along the Mississippi River (Wasklewicz et al. 2004). On the Lower River, dikes have not been found to increase flood heights (Wasklewicz et al. 2004). USACE reexamines the Mississippi River flowline after every major flood; the post - 2011 analysis is underway. Coastal wetlands are outside the study area, but were discussed in the previous assessments.

G. The Assessment recommends a Lower Mississippi River Information Center to catalog and store available information. This center would promote academic investigations and public awareness of the river and its resources. All projects planned on the Lower River receive appropriate technical and public review.

H. The current conditions and needs on the Lower River were assessed in the three previous assessments on information, habitat, and recreation. This Final Assessment does not revisit those conclusions. Other studies have also examined river operations, e.g., 2013 Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel in the Lower Mississippi River (Endangered Species Act, Section 7(a) (1)), Mississippi River and Tributaries 2011 Post Flood Report, and 20th Century Stage Trends Along the Mississippi River (Wasklewicz et al. 2004). On the Lower River, dikes have not been found to increase flood heights. Coastal wetlands are outside the study area, but were discussed in the previous assessments.

Marsha L. Raus
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June 1, 2015

Re: Comments on the Lower Mississippi River Assessment for 2015

The partners on this project, Nature Conservancy, The Audubon Society, the U.S. Army Corps of Engineers and a few others, have done an excellent job of identifying resources and opportunities which need to be better understood, identified, protected and developed in the lower Mississippi River area. The Delta Chapter of the Sierra Club concurs with most of their observations.

While the project area is well defined, there are resources both within and just outside of the designated area which might be identified and connected with the project area. An example would be the Indian mound complex at Poverty Point which was recognized last year as a major World Heritage Area. Another would be the two 5,000 year old Indian mounds on the LSU campus in Baton Rouge. Both of these pre-historical sites are located outside of the project area on the loess bluffs which are next to the project area.
Some assets that might be good to mention in the assessment are a couple of models of the Mississippi River. Mud Island in Memphis, Tennessee and at the Corps of Engineers District complex in Vicksburg, Mississippi would definitely be places that the interested public should know about and visit.

Other sites of antiquity like Poverty Point and the Indian mounds in and near the project area which, if identified, would greatly increase both the interest in the Lower Mississippi River Project area and the river basin.

The Lower Mississippi River project is important because it brings together three districts of the Corps of Engineers. These three districts are New Orleans, Vicksburg and Memphis. We believe that there needs to be a project which brings together all of the districts of the Corps of Engineers in the entire Mississippi River Basin.

Each of the rivers in the basin are closely connected together because they share a common water resource and they have interactive and interconnected resources like fish, wildlife, insects, farmland, forest, prairies, wetlands, cities, businesses, history, archeology, governmental officials, agencies, non governmental organizations, flood and transportation issues and challenges like pollution.

Removal of Habitat for Aquatic Species

Two, of many, aquatic species which need increased attention so they can recover in the Lower Mississippi River Project area are the pallid sturgeon and the Ohio River fresh water shrimp. The construction of dams in the Ohio River has all but eliminated the shrimp from the Ohio but they are still found in the Mississippi River. The pallid sturgeon is found in the Yellowstone River and parts of the Missouri River Basin but dams have eliminated a significant part of their habitats.

The fresh water shrimp in the Atchafalaya and Red Rivers have recovered significantly from the pollution from Velsicol at Memphis, but the river shrimp in the Mississippi River have not done so well.

Waters and Wetlands in the Atchafalaya Floodway

According to the Introduction…

"This is the third report completed for the Lower Mississippi River Resource Assessment authority. This assessment focuses on the natural resource habitat needs for the Lower Mississippi River (LMR)." And

"This Habitat Assessment does not reexamine the habitat issues in the Atchafalaya Basin because state and Federal agencies are already giving the Basin and its issues appropriate attention. "

We totally disagree with this conclusion. Members of the Delta Chapter of the Sierra Club are members of Friends of the Atchafalaya, a non profit organization which has developed extensive recommendations on the future of the Atchafalaya Floodway, the Atchafalaya Basin and Atchafalaya Bay. Nothing is happening to the millions of acres of habitat for fish and wildlife in this seriously challenged area as indicated in the above paragraph lifted from the report on the Lower Mississippi River.

Toxic and Hazardous Pollution in the Project Area

According to the Executive Summary… "The Mississippi River receives water from 31 states. The water contains many contaminants and nutrients. Water quality is not a major limiting factor in the river ecosystem, but there is very little information about localized water quality effects, especially in backwaters, and side channels. There is a need to better understand water quality in secondary and tertiary habitats that are important for some life stages of fish and mussels."

According to the organization, Environment America, the Ohio River is one of the most polluted rivers in North America. There are many pollution sources in the Ohio River Basin like strip mining for coal, petro chemical facilities, waste impoundments, nuclear processing and research facilities and others. The Ohio River is less polluted than it was fifty years ago, but when it enters the Mississippi River it is often seriously polluted.

The closure last year of Doe Run , the last lead smelter in the United States, which operated in Herculaneum, Missouri for more than 100 years, will greatly reduce lead pollution in the project area because this smelter, which is next to the Mississippi River was releasing more than 30 tons of toxic and hazardous heavy metals every year. The trucks which transported rocks to the smelter also dropped many tons of pollution throughout this part of southeast Missouri. We have not seen any reports about how many tons of pollution from this facility made its way to the nearby Mississippi River and the states of Illinois, Kentucky, Tennessee, Arkansas and other parts of Missouri, which are all downwind and downstream of this old smelter.

On the way down to the Gulf of Mexico there have been many sources of pollution such as the Velsicol pesticide production facility on the east side of Memphis, the Petro Processors and Rollins hazardous waste disposal facilities next to Devils Swamp near Baton Rouge, the EXXON oil refinery and chemical plants in Baton Rouge, Dow Chemical at Plaquemine, Good Hope Oil Refinery and the Shell Oil Refinery at Norco and Marine Shale Processors near Morgan City.

All of these facilities and hundreds of others in or near the project area have caused serious problems like the massive fish kills caused by discharges of Endrin at Velsicol which killed millions of fish, other aquatic species in the Atchafalaya and Mississippi Rivers and eliminated the Brown Pelicans from coastal Louisiana in the 1960's.

Appendix A of the LMRRA mentions Public Scoping Meetings which were held in three cities along the river on Recreation and Habitat Assessments. The first meeting was held on July 2013 in Dyersburg, TN. There were approximately 25 attendees.

On the first line of the 5th page in Appendix A we are given the 5th question which was presented to the attendees. "What improvements could be made along the Mississippi River to enhance your experience?"

The lead response was… "1 -Water quality. I live in the Memphis suburbs near Collierville and used to paddle quite a bit downtown. There have always been signs posted at the boat ramp at the mouth of the Wolf River and under the Auction Street Bridge which caution people not to eat the fish that swim in the Mississippi and Wolf. I get terrible headaches after I paddle in the river, so I no longer go downtown to paddle."

The Wolf River was contaminated by the Velsicol Chemical facility on the north east side of Memphis. This facility produced Endrin, chlorodane and a number of other extremely toxic and hazardous pesticides which are banned today. While there were some warning signs on the Wolf River there were none on the Mississippi River in the states of Arkansas and Mississippi, even though fish and wildlife in these areas were contaminated with the serious pollutants.

Coastal Land Losses

As you know, one of the biggest problems in coastal Louisiana is the loss of more than a million acres of coastal land and wetlands in the last 80 years. This land loss is the most serious coastal land loss of all other coastal states in the United States put together.

Four of the most serious causes of this land loss have been

1. the thousands of miles of canals and pipelines in coastal Louisiana connected with oil and natural gas exploration, drilling, production and transportation;
2. thousands of miles of navigation canals like the Intracoastal Waterway, the Mississippi River Gulf Outlet and the Chene, Boeuf Black and Atchafalaya Waterway;
3. the more than 43,000 major dams which have been built in the 31 states in the Mississippi River Basin, all of which have held back billions of tons of sediment from reaching Louisiana;
4. the failure of the Corps of Engineers to also manage sediment at the mouth of the Mississippi River to rebuild and maintain coastal wetlands.

While these four issues are outside of the area, they are very important to the project area and have a very direct link and connection with the Lower Mississippi River project area.

There are two major dams in the project area which separate the Atchafalaya River from the Mississippi River but no one seems to be looking at how these and the other more than 43,000 major dams in the Mississippi River Basin have altered the habitat for fish and wildlife in the basin and all but stopped the movement of sediment downriver to Louisiana. This is, we believe, one of the most important untold stories in the project area and the Mississippi River Basin.

One of the most important geographical features in the states of Louisiana, Mississippi, Arkansas, Tennessee, Missouri, Kentucky, and Illinois on both sides of the Mississippi River Basin are the loess deposits which the Corps of Engineers has totally failed to describe even though the Corp's facilities at Vicksburg are located on these elevated wind blown deposits.

The Lower Mississippi River Resource Assessment must include information about the more than 400 mile wide and more than 2,000 mile long deposits of loess, wind blown dust from the latter part of the last glacial period, which was deposited about 55,000 to about 14,000 years ago;

These dust deposits stretch out about 150 miles west of the Mississippi River and 300 miles on the east side of the River Basin in much of Louisiana, Mississippi and all other states along this river. The loess deposits are the high ground along much of the river.

There are no flood protection levees along the east side of the Mississippi River Basin from the State Capitol in Baton Rouge to Vicksburg, Mississippi except for the area

where the Angola State Prison was built on 18,000 acres of former river depositional deposits between the loess deposits and the river.

These loess deposits should be included in the assessment because they have had an enormous impact on Louisiana. If these loess deposits did not exist, the area in south Louisiana below I-10 and I-12 would be part of the Gulf of Mexico. Development in the state, past and future would be altered. These high grounds along the Mississippi River are not subject to flooding from the river.

Last Glacial loess in the conterminous USA, E. Arthus Bettis III, Daniel R. Muhs, Helen M. Roberts, Ann G. Wintle, USGS – Published Report, University of Nebraska, Lincoln, 1-1-2003.

Loess map ofLouisiana Chacko J. John, Director , Louisiana Geologic Survey, Louisiana State University, Baton Rouge, Louisiana, Summer 2008.

The Building of Coastal Louisiana

Starting about 6,000 years ago, as the glaciers had stopped melting and the waters of the Gulf of Mexico rose to their present levels, Bayou Manchac, which is just south of Baton Rouge on the east side of the Mississippi River Basin and the Vermillion River which flows through Lafayette on the west side of the basin, were the delta distribution channels for the ancestral Mississippi River. These delta systems transported the sediment which became the southern part of Louisiana in what is the land below Interstate 10, west of Baton Rouge and below Interstate 12, east of Baton Rouge.

Since then, the historic Mississippi River has moved into new delta river distribution systems like the Bayou Teche, Bayou Lafourche, the Atchafalaya River and today's Mississippi River which passes through New Orleans. All of these rivers have deposited many millions of tons of sediment which have turned millions of acres of water in the Gulf of Mexico into the coastal wetlands which stretch from the Chandeleur Islands south of the Mississippi coast to all of the coastal wetlands in Louisiana and much of Texas.

The Columbia Lock and Dam, the G-P Paper Mill on the Ouachita River and the Ouachita Tree Removal Plans by the Corps of Engineers

While the Columbia Lock and Dam on the Ouachita River in Caldwell Parish, Louisiana is not in the Lower Mississippi River project area it is part of the Atchafalaya – Mississippi River Navigation System. The environmental problems associated with this navigation project help to illustrate some of the complexities and problems associated with similar projects in the Lower Mississippi River Basin.

The dam, barge lock and impoundment for this project caused some extensive damages to the forest in the Upper Ouachita National Wildlife Refuge which had been created as a buffer area and as mitigation for the Columbia dam and reservoir which formed after the dam was built. Standing water for extra months each year from the reservoir drowned thousands of trees in the bottomland hardwoods and overflow swamp mitigation area of the refuge.

The refuge was also contaminated with mercury from the thousands of natural gas wells in the refuge which used the mercury flow meters or monometers. Each of these meters contains about a liter of mercury and there was elemental mercury on the ground below hundreds of these natural gas flow meters. Unfortunately there are still hundreds, and possibly thousands of this mercury filled flow meters in use in the Monroe Gas Field north of Monroe and the rest of the Lower Mississippi River Valley in Louisiana. We have to wonder how many thousands of mercury filled meters were in the Lower Mississippi River Resource Area and how many liters of mercury are still on the ground and in the waters and wetlands of the river basin.

Another source of pollution in the upper Ouachita River is the Georgia Pacific paper mill near Camden, Arkansas which discharges into the river about a mile north of the Louisiana Arkansas state line. Significant quantities of mercury compounds were used to prevent fungus growth in the vats where the logs were turned into paper.

Thus, the fish and wildlife in the Ouachita River and the Refuge are contaminated with serious levels of mercury from natural gas flow meters, a variety of pesticides from farming in Arkansas and Louisiana and Dioxin and mercury contamination from the Georgia Pacific paper mill near Camden.

Creating an Enemy

After the extensive failures of the hurricane flood protection levees in the New Orleans metropolitan area following Hurricane Katrina in 2005, officials in the Corps of Engineers were desperately looking for something they could do to create a positive public relations campaign around the country. What they decided on was to clear trees growing near the more than 100,000 miles of levees along rivers and canals which they were suppose to maintain.

There was no documentation that trees have ever damaged flood protection levees but that was the argument advanced by the Corps of Engineers officials.

There was strong local opposition to these tree clearing projects from California to Maine and one of the most successful opposition efforts was along the Ouachita River in north Louisiana. The landowner opposition to tree clearing was successful and this saved thousands of trees near levees around the country.

"Army Corps of Engineers orders thousands of trees near levees chopped down"
Published: Tuesday, June 09, 2009, 9:13 PM ***By Felipe Nieves***

Wetlands in New Orleans
Improving Wildlife Habitat

In the parishes of Orleans, Jefferson and St. Bernard there has been development of tens of thousands of acres of Mississippi River overflow wetlands into residential and

business structures. The exception is the 23,000 acre Bayou Sauvage National Wildlife Refuge in New Orleans East. This is the largest wildlife refuge in an urban area in the United States. It is also very important as part of the habitat for wildlife and aquatic species in Lake Pontchartrain and the Gulf of Mexico. We hope the Corps of Engineers reconnects this wildlife Refuge with Lake Pontchartrain and Lake Borgne.

Wetlands in St. Charles Parish
Small Changes Can Make Large Improvements

In St. Charles Parish between the New Orleans Louis Armstrong Airport and the Bonnet Carre Spillway, just west of New Orleans, are about 30,000 acres of Mississippi River overflow swamp and marsh which are also coastal wetlands and still partially connected with Lake Pontchartrain. More than 20,000 acres of these wetlands are confined by a levee system and a weir on Bayou la Branche about three miles from the lake and the Mississippi River.

This weir and dam were constructed by landowners and hunters to keep out salt water from these fresh water wetlands. The salt water in Lake Pontchartrain was mostly from the Mississippi River Gulf Outlet, which was built by the Corps of Engineers, and has been stressing the wetlands around Lake Pontchartrain. Unfortunately, this weir, which keeps out salt water, also keeps out aquatic species, like shrimp, crabs and menhaden which historically have used these Mississippi River wetlands as an integral part of their habitat.

There are hundreds, and possibly thousands, of structures throughout the Lower Mississippi River Basin and the rest of coastal Louisiana like this weir on Bayou La Branche, which keep aquatic species out of the wetlands. The wetlands are critical habitat for these species. The design of this weir is the problem. If the opening in the weir was a vertical opening with some of the opening below the water level in Bayou la Branche rather than a horizontal opening a couple of feet above the bayou then it could accommodate the passage of aquatic species which are currently blocked from the wetlands. If salt levels were too high for these wetlands the weir could then be closed temporarily to keep out the salt water.

Most structures like this weir in the LaBranche Wetlands received permits from the Corps of Engineers, the Louisiana Department of Wildlife and Fisheries, the Department of Environmental Quality or the Department of Natural Resources for dredging and filling, or altering, of waters and wetlands under Sections 401 and 404 of the Clean Water Act. Apparently, when these permits were considered no attention was given to how this and similar structures would impede the movement of aquatic species.

Officials with the Corps of Engineers, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the Louisiana Department of Wildlife and Fisheries, the Louisiana Coastal Protection and Restoration Authority and several other federal and state agencies need to look at all of the thousands of structures which have been built in

the river basins and coastal waters and wetlands to make sure that they are not adversely and inadvertently impacting our natural resources like fish and wildlife.

Toxic and Hazardous Waste in the LaBranche Wetlands

Several major canals were dug through the LaBranche wetlands including what today are called Bayou Trepagnier and Bayou LaBranche. These two waterways were used as discharge canals for waste water from the Pan American Oil Refinery, the Good Hope Oil Refinery, and now the Valero Oil Refinery and the Shell Oil Refinery. Shell discharged about five million gallons of waste water each day for more than seventy years into Bayou Trepagnier and then into Bayou LaBranche and Lake Pontchartrain..

The bottom of Bayou Trepagnier contains somewhere between 200,000 and 300,000 cubic yards of toxic and hazardous waste like lead and chromium from the Shell Oil Refinery at Norco. Back in 1985 we helped local residents report this contamination to the Louisiana Department of Environmental Quality. As of this date, Shell has cleaned up about a mile of the contaminated sediment nearest the refinery and put some cover over the more than two miles of sediment closer to Lake Pontchartrain. This is better than in 1985 but all of the contamination should have been removed.

There are thousands of other seriously contaminated waters and wetlands like Bayou Trepagnier in, or next to, the Lower Mississippi River project area. The officials in the various federal and state agencies and corporate officials who could clean up these serious messes have not.

If the U.S. Army Corps of Engineers and the U.S. Congress hope to develop plans to Restore the Mississippi River waters and wetlands, then they will have to work with the appropriate federal and state agencies and identify all of the seriously contaminated areas in and near the Lower Mississippi River, like Bayou Trepagnier, and work with other agencies, like the Environmental Protection Agency and the U.S. Fish and Wildlife Service to develop real cleanup and restoration plans.

In the 1970’s and 1980’s I served as a member of the citizen’s advisory committee to the U.S. Army Corps of Engineers on the New Orleans to Baton Rouge River Assessment Project which was a Corps effort to study the water resources in this reach of the Mississippi River Basin. The atlas which the Corps developed identified sewerage treatment facilities and industries along the river and gave information on what these facilities were discharging.

The Corps of Engineers could easily develop a comprehensive electronic atlas for all of the pollution sources in and along the Lower Mississippi River basin and identify those sites which need to be restored to their pre industrial state. The U.S. Army Corps of Engineers has an excellent library at their facility in Vicksburg, Mississippi on hazardous and toxic chemicals and how to clean them up successfully.

The Corps of Engineers also needs to establish an advisory committee of federal and state agencies, interested and involved groups and others who could be following this restoration project over the next thirty to fifty years to make sure all of this contamination is effectively cleaned up and the environment in and along the Lower Mississippi River project area is restored.

Cumulative Adverse Impacts Not Considered or Connected Together

Public participation on two spoil disposal areas for the same navigation channel in Atchafalaya Bay south of Morgan City, Louisiana are examples of how the Environmental Protection Agency and the Corps of Engineers could have handled projects more efficiently and effectively.

Two separate public notices for two dredging projects came out the same month in 2011 with no mention of the other public notice, or project, even though these two public notices were dealing with different parts of the same navigation project in the same part of Atchafalaya Bay where the U.S. Army Corps of Engineers would be conducting maintenance dredging for the Atchafalaya Bay Navigation Channel. The Bird Island West is a 3,270 acre artificial island of dredged material on state water bottoms. The Atchafalaya Navigation Spoil Disposal Area is 18 miles long and three miles wide on federal water bottoms.

A July 21, 2012 public notice was for a proposed Scoping Process where the Environmental Protection Agency and the Corps of Engineers were trying to get public input on what should be considered or included in the Environmental Impact Statement for the continued use of the Atchafalaya Navigation Spoil Disposal Area, which is just south of the spoil disposal area known as Bird Island West, but there was no proposed environmental impact statement for the expansion of Bird Island West.

The Atchafalaya Navigation Spoil Disposal Area, which involves twelve and a half million cubic yards of annual dredging and spoil placement, is locally very important, but is only a small part of the fifty four (54) mile navigation project known as the Bayous Chene, Boeuf, Black and Atchafalaya River Navigation project.

These navigation projects help move drilling rigs out to the Gulf and are parts of several much larger projects including the 150 mile long Atchafalaya River Navigation and Floodway Project and the Intracoastal Waterway Navigation project.

The Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers and many other federal and state government agencies all have failed to adequately notify and educate their staff about all of these projects and how they are connected together. Officials in these agencies have also failed to adequately notify and involve the public about the comprehensive environmental and economic cost of these projects as well as the adverse environmental and economic cost of these and the dozens of other navigation and flood control projects across the coast and in the Lower Mississippi River Basin which are connected to each other.

These projects, and thousands of others which are in the Lower Mississippi River Basin and coastal Louisiana, have dramatically altered and impacted most of the waters, wetlands, people and the fish and wildlife resources and their habitat across the basin and coastal areas of the state. The various federal and state agencies have failed to evaluate how these projects are connected together and what their cumulative impacts have been and will be in future decades.

The Impacts of Coal on the Lower Mississippi River

On December 23 of 2014 Judge Kevin Connor, of Plaquemine Parish, ruled that "the Louisiana Department of Natural Resources failed to fully investigate alternative sites for the proposed RAM Terminals coal transfer facility project and the specific commodities that RAM Terminals intends to transport by rail in connection with the project."

In the ruling, Connor in part referred to the Louisiana Supreme Court's Save Ourselves, Inc. ruling in 1984, which created a so-called "rule of reasonableness" requiring that "a balancing process" that considers the environmental costs and benefits of proposed projects, along with economic and social factors must be considered.

Connor said RAM failed to specifically name an alternative site in its application. The judge also said the record "does not show that DNR exercised any independent evaluation of alternative sites.

"Instead, DNR deferred to RAM's assertion, unsupported by any actual evidence, that alternative sites were not feasible," Connor wrote."

Residents have particularly opposed the facility's proposal to have access to a rail line. Connor's ruling said "the prospect of unknown substances being transported by rail through the most heavily populated portion of Plaquemines Parish is a matter of concern" and that "RAM provided no details regarding what substances it plans to transport by rail."

The Save Our Selves Decision

In 1974 the voters of Louisiana adopted a new State Constitution and Section 1 of Article 9 provided…

> "The natural resources of the state, including air and water, and the healthful, scenic, historic, and esthetic quality of the environment shall be protected, conserved, and replenished insofar as possible and consistent with the health, safety, and welfare of the people. The legislature shall enact laws to implement this policy."

Ten years later in 1984 the Louisiana Supreme Court gave us a 9-0 decision, in the case, Save OurSelves versus the Louisiana Environmental Control Commission, 452 So.2d 1152, SOS v ECC

The Judges wrote that Article 9, Section 1 of the La. Constitution requires all public officials to make sure that if their decisions might adversely impact human health or the environment that the applicant had meaningfully considered alternative sites, alternative projects and alternative processes. The judges also declared that officials cannot act like umpires calling balls and strikes but must go out and make sure that the public interest is being represented.

So here we are forty years after the constitution was adopted and thirty years after the SOS v ECC decision by the Supreme Court. More than 200 other decisions by judges all over Louisiana have made decisions which agree with the SOS v ECC decision.

State Laws and Court Decisions in the Lower Mississippi River

Judge Connor's RAM decision has dealt with the handling of coal in the bottom of the Lower Mississippi River and declares that like all of the decisions before his, the state officials must make sure that applicants must consider avoiding adverse impact on human health and the environment. The Corps of Engineers needs to realize that there is more to consider than just navigation and flood control, just as the public must realize the hazards of the river corridor.

Challenges at the Mouth of the River

The Corps of Engineers and the U.S. Congress have been narrowly focused on navigation and flood control in the Lower Mississippi River and especially at the mouth of the river. The Corps has narrowed the river so that water and sediment is jettisoned out of South Pass into deeper waters of the Gulf of Mexico. Thus sediment cannot reach and help to maintain coastal Louisiana and Texas.

For decades the Corps of Engineers has also been dredging up sediment in the navigation channel and barging it a few miles out into deeper waters of the Gulf of Mexico.

Thus, if the Lower Mississippi River project only looks at navigation needs, the Corps and the Congress can avoid having to consider the negative impacts their maintenance of the mouth of the Mississippi River has on coastal land losses.

While the Lower Mississippi River Assessment document mentions the dead zone in the Gulf of Mexico and that this oxygen depleted area is caused by too much nitrate and phosphate fertilizer applications in the Mississippi River Basin, the project only goes to the mouth of the river and not into the Gulf of Mexico.

This project should include a real discussion of sediment movement at the mouth of the river and what can be done to correct the incorrect uses of these vary valuable natural

resources. The production and uses of chemicals for fertilizer in the Mississippi River Basin has been causing the “Dead Zone” in the Gulf of Mexico and this disaster is not being included in the project because it is happening beyond the mouth of the River.

According to the Executive Summary
The Atchafalaya Floodway is a large part of the Project Area

> “The Mississippi River and the land between the levees are a dynamic ecosystem that changes markedly in response to the river's annual hydrologic regime. The nearly 3 million-acre floodplain is interspersed with abandoned channels, meander scars, and large expanses of forested wetlands. These areas provide a diverse array of aquatic and terrestrial habitat types.”

If this is correct then the area inside of the Atchafalaya Floodway, which is more than a million acres, is a third of the project area from the Ohio River to the Gulf of Mexico. The project area in the Atchafalaya Floodway probably only includes the mile inside the levees along the Atchafalaya River rather than the land and water inside of the levees on each side of the Atchafalaya Floodway.

Inside of the Atchafalaya Floodway the Corps of Engineers has failed to consider how their narrow focus on moving floodwaters has adversely impacted a third of the area within the Lower Mississippi River Project Area. Since the Corps finished building the Whiskey Bay Pilot Channel to move water through the floodway there has been dramatic adverse impact to water quality and natural resources in the Atchafalaya Floodway.

There are groups in Louisiana, like Friends of the Atchafalaya, Louisiana Wildlife Federation, Louisiana Environmental Action Network, the Delta Chapter of the Sierra Club, The Atchafalaya National Heritage Area and many others, who would like to work with Nature Conservancy, The Audubon Society and the Corps of Engineers to restore real life to the Atchafalaya Floodway and the rest of the Lower Mississippi River project area.

We hope these comments will be of some assistance to the efforts to deal with resources in the Lower Mississippi River.

Sincerely yours,

William A. Fontenot
Conservation Chair, Delta Chapter of the Sierra Club
632 Drehr Ave.
Baton Rouge, LA 70806
225-383-5673
wafontenot@gmail.com

Response to Sierra Club letter
Dated June 1, 2015
Re: Comments on the Lower Mississippi River Assessment for 2015

Atchafalaya

The letter writer disagrees that the ongoing and completed studies and plans in the Atchafalaya Basin are sufficient. The decision to not reexamine the Atchafalaya was made in consultation with MVN and MVD. The Atchafalaya Basin Master Plan was circulated for public comment and concerns should have been expressed in that process.

Water Quality

The letter writer cites numerous instances of industrial contamination on the Lower River. Contaminants are regulated under the Clean Water Act and the previous reports discussed water quality and trends in more detail. The letter mentions a fish kill on the Wolf River from an Endrin spill; this occurred in 1963. There are no documented fish kills on the Lower River in the last 20 years. The Final Assessment does recommend a comprehensive water quality monitoring program (DISC 3) which would include testing for contaminants.

Sediment

The letter writer mentions sediment in relation to locks and dams and coastal wetlands. Sedmiment studies are ongoing throughout the Lower River and DISC 2 recommends those studies continue.

Coastal Wetlands

Coastal wetlands are outside of the geographic scope of LMRRA, but they were discussed in the previous assessments as they relate to sediment and water quality. The final assessment makes no specific recommendation for coastal wetlands, but DISC 2 and DISC 3 would both provide valuable information to support wetland restoration.

Loess

The letter writer notes the assessment did not discuss loess. LMRRA focuses on the needs for information, habitat, and recreation. A complete description of all of the features of the project area is outside the scope of the assessment.

Other

The letter writer mentions a number of other issues which are outside of the scope of the assessment including: salt water weirs, coal terminals, trees on levees, the conduct of public

meetings, and the 43,000 major dams throughout the basin. These comments will not be incorporated into the document.

From: Lauren D. Field
To: Raus, Marsha MVN @ MVM
Subject: [EXTERNAL] RE: Lower Mississippi River Resource Assessment Comment deadline extension (UNCLASSIFIED)
Date: Tuesday, May 19, 2015 10:46:35 AM

Marsha, please add the following comment:

In West Feliciana Parish, St. Francisville, LA there is growing demand for access to the Mississippi River both from the community and tourists. We need improved boat ramps for launching boats for recreational fishing, as well as for the local Sheriff's department to respond to emergency situations. We are in desperate need of appropriate parking for the above-mentioned. We are in need of appropriate docking for Riverboat Tourist Traffic and appropriate parking to support tour buses and shuttle services.

Thank you,
Lauren D. Field,
Executive Director,
225-978-9502
executivedirector@stfrancisvilleaf.org
P. O. Box 797
St. Francisville, LA 70775
www.stfrancisvilleaf.org

-----Original Message-----
From: Raus, Marsha MVN @ MVM [mailto:Marsha.L.Raus@usace.army.mil]
Sent: Monday, May 18, 2015 3:19 PM
To: Raus, Marsha MVN @ MVM
Subject: Lower Mississippi River Resource Assessment Comment deadline extension (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

The Memphis District of the U.S. Army Corps of Engineers is extending the comment deadline for the Lower Mississippi River Resource Assessment. All comments must reach the Memphis District U.S. Army Corps of Engineers office by COB 1 June 2015.

The original Notice of Availability and the Final Assessment can be found at the following link.

http://www.mvm.usace.army.mil/Missions/Projects/LMMRA.aspx

The three previously approved assessments are also available for your information.

Please contact Marsha Raus at the address below if you have any questions.

Marsha L Raus
U.S. Army Corps of Engineers
167 North Main B-202
Memphis, TN 38103
901-544-3455
Marsha.L.Raus@usace.army.mil

The Nature Conservancy
Protecting nature. Preserving life.™

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nature.org/louisiana

11 May 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report to Congress

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses.

The Nature Conservancy in Louisiana supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River Resource Assessment partners in this thorough examination of the needs and opportunities for the Lower Mississippi River. Specifically, we support the following items from the report that align with our on the ground conservation priorities in the LMR basin.

In the *Assessment of Information Needed* section we support the creation of a Lower Mississippi River Information Center to collect and store information about the LMR (Recommendation DISC 1). We are working on a comprehensive assessment of the freshwater resources of Louisiana, and we know firsthand how difficult it is to acquire data collected by many different agencies over time. A central repository, like the LMRIC, would simplify data collection efforts. In addition, TNC in Louisiana has been involved in large-scale floodplain restoration projects on the Ouachita River, and as such, we support Recommendation DISC 4b to conduct a study on large tributaries of the LMR, such as the Ouachita River.

In the *Assessment of Natural Resource Habitat Needs* section we support Recommendation HRMP 3 Terrestrial Habitat Program to implement programs that restore native vegetation to the batture. We have been involved with reforestation programs throughout the LMR Valley in Louisiana and would like to further that work in the batture.

The Lower Mississippi River Resource Assessment Final Report will likely be released in the fall of 2015, which will combine the three assessments into a comprehensive plan and contain recommendations that will guide future management of the LMR. This report will illustrate many needs and opportunities to restore natural resources, develop recreation options for access and experiences, and improve our knowledge of this iconic river. As this work moves forward there will be interest in public and private collaboration to restore habitat, enhance recreation

access and promote information sharing. The Nature Conservancy in Louisiana is encouraged by this work and would like to be involved in the next stage of development.

Sincerely,

Keith Ouchley
Louisiana and Mississippi State Director
The Nature Conservancy

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North America Freshwater
2800 S. Brentwood Blvd.
St. Louis, MO 63144
nature.org/h2o

May 31, 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main Street Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report

Dear Colonel Anderson:

As you know The Nature Conservancy has been a strong proponent of this study since initiation. We made the commitment and took the risk to become the cost-share partner lead along with a number of very strong collaborators. We are thankful for our partner's support in the full delivery of our cost share obligation but also very thankful for the support of the Memphis District staff in getting this product to this final stage. Some of the final review, primarily from outside the Memphis District, slowed the process a bit, but we are still anxious to present this product to other state and federal agencies and a diverse group of cooperators that could bring different recommendation elements forward for feasibility studies and actual implementation. We are also most anxious to deliver the final report to Congress for their consideration of the report recommendations.

It took 15 years to go from authorization (WRDA, section 402, 2000) to completion. However the value and the requirement to examine the opportunities and needs associated with the Lower Mississippi River for river information, recreation and natural resource is imperative. Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and these assessments demonstrate that balance can be obtained without jeopardizing other authorized uses.

The Nature Conservancy North America Water program supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River partners in this thorough examination of the needs and opportunities for the Lower Mississippi River.

Section 1: ***Assessment of Information Needed*** *for River-Related Management:*

The Assessment of Information Needed for River-Related Management brought together over 500 publications, reports and data for the Lower Mississippi River. To the knowledge of the preparers this has not been done before and can provide many future benefits for river managers and scientists to understand what is known and where information knowledge gaps exist for the LMR. However, this is only the beginning, and the effort must continue if improvements are going to be attempted for recreational and natural resources enhancements on the river.

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As a result of our commitment to continuing to expand our knowledge base and enhance our understanding of this extensive area, TNC will continue to work on **Recommendation DISC 1:** Create a Lower Mississippi River Information Center (LMRIC) and **Recommendation DISC 3:** Create a dedicated water quality monitoring program for the entire LMR. We expect that our involvement will likely focus on bringing together the right experts from federal agencies and academics to determine the best way to start to make these two recommendations become reality. Initial work is showing great promise to move this pivotal element forward.

We are encouraged with the strong support from the Mississippi Valley Division to conduct sediment analysis work, and support the continuation of this effort until it is complete. The information gathered from this work will help determine what is needed for river restoration and we will support the continued efforts of **Recommendation DISC 2,** which will complete the current sediment analysis of the Middle and Lower Mississippi River through the Mississippi River Geomorphic and Potamology Study.

TNC support for **Recommendation DISC 4a and 4b** comprehensive Watershed Studies using the existing authority of Section 729 or new authorities will most likely come for state chapters that have interest in a particular tributary in their state. The Kentucky and Tennessee TNC Chapters are already implementing conservation actions in four of the six tributaries identified in Recommendation 4a including Bayou de Chien, Obion, Forked Deer, and Hatchie Rivers.

Section 2: ***Assessment of Natural Resource Habitat Needs:***

Although all 954 miles of the Lower Mississippi River are important, we agree with the recommendation to focus on eight conservation priority areas to determine federal interest in specific restoration project opportunities, planning and design, and implementation approaches. Each reach has opportunities to enhance a broad spectrum of features including side channels, backwaters, oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars. These eight reaches total 275 miles or nearly 30% of the LMR. This is our strongest area of interest and our future efforts will likely focus on recommendation **HRMP 1.**

Our past use of authorities like Section 1135 and 206 have been challenging, so rather than pursuing Recommendations HRMP 2b, we will look to find other options to move forward on this work. As we seek other options, we will continue to strongly support the work that is currently underway using the existing USFWS National Fish Passage Program to restore side channels along with the Corps commitment to Section 7 (a) (1) of the Endangered Species Act. This work has already been used to restore 56 miles of habitat on the LMR.

TNC state chapters have focused over the years on reforestation of the Lower Mississippi River Alluvial Valley (within and outside the study boundaries) with donors and other federal partners. This important work continues to be a focus of these offices as they have made great progress.

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Section 3: ***Assessment of River Related Recreation and Access***

At TNC we recognize the importance of connecting people with natural resources in order to create a long-term commitment to nature. The Lower Mississippi River passes through seven states and many municipalities and cities, and yet many people experience fear and anxiety about the river resources and/or have never come in contact with the river. Enhancing recreational assets to provide opportunity for on the water, or near water experiences is essential for moving forward to get people connected to the river in a positive manner. Our work on this report to date shows that there are many local government and non-profits that have an interest in the recreational aspect of this study. Although, TNC will probably not become directly involved in this aspect of the study recommendations, we will work to help find the best matches to collaborate on boat ramps, bike trails, riverfront trails and parks, river guides and marketing.

The approved Lower Mississippi River Resource Assessment Final Report with the recommendations from the three assessments will likely be released in the fall of 2015. We will use this report to inform Congressional members of the many needs and opportunities to restore natural resources, develop recreation options for access and experiences, and improve our knowledge of this portion of the iconic Mississippi River. We also expect there will be interest from a diverse set of government agencies and private entities to work on various recommendations in the report. The TNC North America Water program is encouraged by these opportunities and we will be involved in the next stages of development.

Please feel free to contact Gretchen Benjamin (or, myself) if you would like to discuss our further support, commitment, and involvement in this very important effort. Gretchen's phone number is: 608.397.1140; and, her email address is: gbenjamin@tnc.org.

Sincerely,

Robert Sinkler
The Nature Conservancy
Director Water Infrastructure
North America Water

Date: 28 May 2015

Colonel Jeffery Anderson
Memphis District – U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

RE: Support of the Lower Mississippi River Resource Assessment Final Report to Congress

The Lower Mississippi River Resource Assessment (LMRRA), as authorized by Section 402 of the Water Resources Development Act of 2000, provided the guidance to thoroughly assess the information, recreation and natural resource needs and opportunities for the Lower Mississippi River (LMR). Historically, the LMR has been managed primarily for navigation and flood risk management. This new strategic and comprehensive approach for other river uses provides the added focus that natural resources and river-related recreation deserve. Creating a better balance between all uses of the river is important and this work demonstrates that balance can be obtained without jeopardizing other uses.

The Nature Conservancy, Tennessee Chapter supports the work of the U.S. Army Corps of Engineers (USACE) and the Lower Mississippi River partners in this thorough examination of the needs and opportunities for the Lower Mississippi River.

Section 1: ***Assessment of Information Needed*** *for River-Related Management: Include appropriate information if this section pertains to your agency, organization or community*

The Assessment of Information Needed for River-Related Management includes current information and research which allows for a thorough documentation of what information is currently available for Lower Mississippi River management and where information knowledge gaps exist. Recommendations include the need to continue sediment analysis already underway to aid in river and delta management, to establish a water quality monitoring program and to establish a river information center to house the complicated and extensive data in a central location for river managers. Additionally, ten tributaries were identified as targets for watershed studies to better understand the influence these waters have on the main stem Lower Mississippi River.

- **Recommendation DISC 1:** Create a Lower Mississippi River Information Center (LMRIC) to collect and store information about the LMR including: historical information, scientific data, management, and use.
- **Recommendation DISC 2:** Continue with sediment analysis of the Middle and Lower Mississippi River that was initiated in 2014 in a Mississippi River Geomorphic and Potamology Study.
- **Recommendation DISC 3:** Create a dedicated water quality monitoring program for the entire LMR.
- **Recommendation DISC 4a:** Conduct Comprehensive Watershed Studies of the major tributary rivers of the LMR as authorized in Section 729 of the Water Resources Development Act of 1986.

- Bayou de Chien – Mayfield Creek, KY
- Obion River, TN
- Forked Deer River, TN
- Hatchie, River, TN
- Bayou Pierre, MS
- Big Black, MS

- **Recommendation DISC 4b:** Conduct studies on larger tributary systems. These studies would focus on the active floodplain and existing water resources infrastructure and not on the entire watershed. USACE would need specific authorization to conduct these studies.

    - St Francis Basin
    - Arkansas
    - Ouachita

- **Recommendation DISC 5a:** Island Inventory - Conduct an ecological survey of the islands on the Mississippi River to determine their uniqueness, ecological resources, and opportunities for restoration.
- **Recommendation DISC 5b:** Potential Natural Vegetation Study – Conduct research on the current hydrology, soils, and historic vegetation within the batture and develop a potential vegetation map to inform vegetative restoration.

Section 2: ***Assessment of Natural Resource Habitat Needs***

The *Assessment of Natural Resource Habitat Needs* recommendations focus on eight conservation priority areas to determine federal interest in specific restoration project opportunities, planning and design, and implementation approaches. Each reach has opportunities to enhance a broad spectrum of features including side channels, backwaters, oxbow lakes, tributary and floodplain functions, islands, gravel bars, wetlands and sandbars. These eight reaches total 275 miles or nearly 30% of the LMR. Recreational enhancement will be considered alongside natural resource habitat improvements to provide opportunities for people to benefit from completed restoration actions.

- **Recommendation HRMP 1.** Conduct eight conservation reach habitat restoration studies on the LMR. The Mississippi River ecosystem is a dynamic system with interactions between the terrestrial and aquatic systems, main channel and side channel areas, mudflats, backwaters, tributaries, and islands. These feasibility studies would examine the Mississippi River and batture to determine if there is Federal interest sufficient to justify construction of ecosystem restoration features. Eight reaches have been identified as priorities.

    1. Wolf Island to Island 8 Reach RM 946 – 910 (36 mi.)
    2. Hatchie/Loosahatchie Reach RM 775 – 736 (39 mi)
    3. Islands 62/63 Reach RM 650 - 618 (32 mi.)
    4. Arkansas River Reach RM 599 – 556 (43 mi.)
    5. Possum (Worthington-Pittman) Reach RM 524 – 490 (34 mi.)

6. Palmyra River Reach RM 431 – 398 (33 mi.)
7. Lake Mary Reach RM 360 -322 (38 mi.)
8. Raccourci Cutoff Reach RM 300 -265 (35 mi.)

- **Recommendation HRMP 2a.** Conduct Aquatic Habitat Ecosystem Restoration studies using the existing USACE authority under Section 1135 of the Water Resources Development Act (WRDA) of 1986 or Section 206 of WRDA 1996.
- **Recommendation HRMP 2b.** Use the existing USFWS National Fish Passage Program to restore side channels and other aquatic habitat on the Mississippi. This program has already been used to restore 56 miles of habitat on the LMR
- **Recommendation HRMP 3:** Terrestrial Habitat Program – Continue to implement programs that restore native vegetation to the batture. Most of the land within the batture is in private ownership, but some landowners are interested in reforesting their land. There are programs to assist these landowners.
- **Recommendation HRMP 4:** Invasive Species **-** There are several plans in place to address invasive species on the river that would include substantial benefit to native species if implemented. They include privet abatement, kudzu control, the Aquatic Nuisance Species Task Force (ANSTF) and Mississippi Interstate Cooperative Resource Association (MICRA) have developed plans to manage and control carp and other aquatic nuisance species.

Section 3: ***Assessment of River Related Recreation and Access***

Assessment of River Related Recreation and Access: The Lower Mississippi River passes seven states and many municipalities and cities. Currently many opportunities exist for outdoor recreation and tourism on and near the LMR, but there is no single entity marketing the river for tourism. Therefore, many of the recreation recommendations included in this assessment are important for numerous government agencies, municipalities, and private organizations. Multiple state organizations like the Mississippi River Parkway Commission, Mississippi River Trail, local communities and non-governmental organizations can help provide continuity to provide better service and access to the Mississippi River. These recommendations are river-related recreation items but are often not directly within the batture or on the LMR. They include boat ramps for all sizes of watercraft, bike and pedestrian trails, riverfront parks, large riverboat docks, lodging and dining, guide service and marketing of the river as a destination.

- **Recommendation RP 1.** Boat Ramps – Increase the number of boat ramps on the LMR. A boat ramp every 10 to 20 miles on the river would provide more opportunities for paddlers, fishermen and hunters and would increase safety to allow those in distress more options for getting off the water or easier access for search and rescue operations to get to those in distress. More ramps should be available to directly access backwaters and side channels. Ramps also provide locations for interpretive signs about the Mississippi River, environmental education and safety.

- **Recommendation RP 2.** Bicycle trails – Increase the total mileage of bicycle trails and especially trails where vehicles are not allowed (except as necessary for farming, etc.) The existing Mississippi River Trail extends the full length of the river, but lies mostly on public roads. The

Big River Parkway is a planned trail extending from New Orleans, LA to St. Louis, MO on the levees. The Harahan Bridge over the Mississippi River will link Memphis, TN to this trail. Provide opportunity for both long distant rides between cities and towns and shorter rides in and around towns.

- **Recommendation RP 3.** Riverfront Parks – Develop riverfront parks for the use of local communities and visitors.

- **Recommendation RP 4.** Riverboat Landings – Develop more and better riverboat landings along the Lower River to provide reliable and accessible opportunities for riverboat passengers to visit and enjoy cities and towns all along the river.

- **Recommendation RP 5.** Marketing :

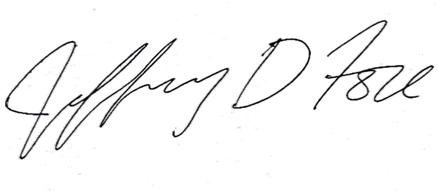
    - **Recommendation RP 5a.** National Geographic Geotourism Destination – Continue developing the Mississippi River as a Geotourism Destination which will include gathering and publicizing information on lodging, restaurants, amenities, museums, festivals, events, tours, culture, ecology and other features.
    - **Recommendation RP 5b.** Great River Road – Pursue a National Parkway grant to develop a GPS feature for National Scenic Byways.

- **Recommendation RP 6.** Lodging & Dining - Develop more lodging and dining options on the LMR. Most lodging would need to be developed outside of the batture, but there is some demand for camping along the river which could be met on State lands.

- **Recommendation RP 7.** Outfitter and Guide - Establish more outfitter & guide services on the LMR. Increased guide services of fishing, canoeing/kayaking, and hunting will help safely get river adventurers on the water to explore and enjoy.

We support the Corps' engagement in managing the Lower Mississippi River for all of its uses and look forward to collaborating where feasible in areas of ecosystem restoration. Additionally, expansion of recreational opportunities on the river stands to bring more public engagement with their natural resources that will further strengthen the work to protect and maintain this iconic river.

Sincerely,



Jeffrey D Fore, PhD
West Tennessee Program Director
The Nature Conservancy

Corps of Engineers and LMRCC

Please include this attached letter to the Lower Mississippi River Resource Assessment. This resource, The Historic Town of Randolph, Tennessee on the Second Chickasaw Bluff can fit under the category of Lodging and Dining, Riverside Parks and Riverboat Landings.

TennGreen / Tennessee Parks and Greenways Foundation purchased this site, the original boat landing and Town of Randolph, in 2009 to protect this Tennessee treasure. The approximate 19 acres with 1,400 feet of river frontage, active spring and hiking trails will make a fine park.

From 1830 to 1840 the Town of Randolph was bigger than Memphis because it had a natural riverboat landing, located just below the Hatchie River.

On top of the bluff, offering an amazing view of the Mississippi River, is an A-frame Chalet. This site we use for an interpretive center, museum and starting in 2014 a Vacation Rental By Owner. **www.vrbo.com/513875.**

A thirty minute drive from the festivities of downtown Memphis, Randolph offers a quiet, safe and spacious get-a-way to give you the best of both worlds.

Graydon Swisher II
901-550-6481
TPGF Cheerleader / Volunteer
Fort Wright Historical Site Inc.
Shelby County Historical Commission
West Tennessee Historical Society

ALL LETTERS SUBMITTED ONLINE MAY 2-29, 2015 VIA www.wildlifemiss.org/river

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Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Thank you for producing the Lower Mississippi River Resource Assessment. Implementation of its recommendations will provide a better future for one the great rivers of the world and the people, wildlife and communities that depend on a healthy and vibrant waterway.

Robert T Joyce

7556 Glastonbury Road
Knoxville TN 37931

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps
Riverfront parks
Aquatic habitat restoration
Aquatic habitat studies
Tributary watershed studies
Bicycle and pedestrian trails

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Always loved the Mississippi River!!!! Followed all parts of the Great River Road, just to enjoy being close to it. Worked with Brennen Company in LaCrosse, WI for a dredging project the QC Power Plant. I was amazed at the habitat restoration project they were doing in the Upper Mississippi River area. We need those types of projects all up and down the Mississippi. It's one of America's finest resources. I'm in full support of your efforts.

Felix A Frye

15 Long Branch LN
Washington Missouri 63090

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Aquatic habitat studies
Habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails
Riverboat landings

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Any recreational enhancements should be sustainable in design in construction, using green building materials. Also, public access points should always include interpretive features to help users understand the Lower MS River ecosystems and our part in protecting and restoring it.

Liz Barber
Barber and Mann, Inc.
453 Northpark Drive
Ridgeland MS 39157

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Boat ramps
Aquatic habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails

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Rebecca Roberts

550 Liberty Road
Fairview MS 38847

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Riverfront parks
Tributary watershed studies

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Kathy Brautigam

715 S. Maple St
Monticello Arkansas 71655

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Riverfront parks
Aquatic habitat restoration
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Sandra West

5535 Marblehead Dr
Jackson MS 39211

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Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
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Riverfront parks
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Aquatic habitat studies
Tributary watershed studies

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Robert Strader

P.O. Box 943
Natchez MISSISSIPPI 39121

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Aquatic habitat restoration
Aquatic habitat studies

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Franklin Chalk

1725 Pineview Circle
Meridian MS 39305

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Riverfront parks

Aquatic habitat restoration
Aquatic habitat studies

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Christine Olsen
birdwatcher
900 Robin Rd
Silver Spring md 20901

Areas of interest:

Terrestrial habitat restoration
Riverfront parks
Tributary watershed studies
Bicycle and pedestrian trails

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James Kilroy
User
721 China St.
Vicksburg MS - Mississippi 39183

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Memphis District - U.S. Army Corps of Engineers
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Memphis, TN 38103-1894

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Jason Hoeksema
Delta Wind Birds
P.O. Box 1536
Oxford MS 38655

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Riverfront parks
Aquatic habitat restoration
Aquatic habitat studies
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David Boxone
Miss birders
169 Peachtree Street
Brandon Me 38042

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Dear Colonel Anderson, The Mississippi River Corridor - Tennessee has been a proud and supporting partner in helping to produce the Lower Mississippi River Resource Assessment for the past three years. It's goals are ambitious but with your help and the multitude of avid River advocates, we can accomplish great work on the Lower Mississippi basin. Thank you for supporting this important Assessment and our efforts to improve the greatest natural resource in our region.

Diana Threadgill
Mississippi River Corridor - Tennessee
291 Kenilworth Place
Memphis TN 38112

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Riverfront parks
Aquatic habitat restoration
Habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails
Riverboat landings

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Thank you for producing the Lower Mississippi River Resource Assessment. Implementation of its recommendations will provide a better future for one the great rivers of the world and the people, wildlife and communities that depend on a healthy and vibrant waterway.

Dear Col. Anderson, I am a Professor of Biology at the University of Mississippi. Most of my research, and much of my teaching, is conducted on the magnificent Lower Mississippi River. I am extremely glad and impressed that the Corps is becoming increasingly involved with habitat assessment and restoration, and ecological studies of the river. The river is a natural treasure and we must protect it for generations to come. Thank you. Clifford Ochs

Clifford Ochs
University of Mississippi
Dept of Biology
University Mississippi 38677

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps
Riverfront parks
Aquatic habitat restoration
Aquatic habitat studies
Habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Layne Logue
609 Lake Forest Drive
Vicksburg MS 39183

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Habitat restoration
Canoe & kayak paddle trails

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Linda DeKock

1673 Walker Ave NW
Grand Rapids MI 49504

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Gary DeKock

1673 Walker Ave NW
Grand Rapids MI 49504

Areas of interest:

Habitat restoration
Riverfront parks
Aquatic habitat restoration

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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David Blomquist

318 6th Ave. NE, Apt. 3
Minneapolis MN 55413

Areas of interest:

Terrestrial habitat restoration
Riverfront parks
Habitat restoration

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Andrew Whitehurst
Gulf Restoration Network
3141 W. Tidewater Ln.
Madison Ms 39110

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Riverfront parks

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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I enjoy the recreation opportunities the river offers - fishing, kayaking, boating. This river has the potential to become as important and well-used as any other recreational natural resource of our country. Thank you for your work on this project.

Scott Peatross

374 Roseland Place
Memphis TN 38111

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Tributary watershed studies
Bicycle and pedestrian trails
canoe / kayak access

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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JOHN H GARY III
MRCT, FfOR, MYC
2245 Madison Ave.
Memphis TN 38104

Areas of interest:

Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Habitat restoration
Bicycle and pedestrian trails

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
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Stephanie Artz

415 Stuart Island Rd
Lake Village AR 71653

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Riverfront parks
Aquatic habitat restoration
Aquatic habitat studies
Tributary watershed studies
Bicycle and pedestrian trails
cleaning up oil spills!

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167 N. Main St. Room B-202
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Living on the great Mississippi I feel strongly about protecting our waterfront land along this wonderful river. We have travelers from around the world visiting Historic Natchez and our bluff top view along with the Historic Under the Hill river level view, compete with larger popular areas. I want to see our Mississippi River Parkway and River Trails succeed in my lifetime!

Gail Guido

27A Silver St.
Natchez MS 39120

Areas of interest:

Riverfront parks
Habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails
Riverboat landings

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Kelly

204 Boxwood Cir
Brandon MS 39047

Areas of interest:

Riverfront parks
Habitat restoration
Bicycle and pedestrian trails

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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As an avid paddler, I've noticed rivers across the country becoming threatened over the years. If we can use resources to assess, prepare, and plan for protecting our waterways, I consider this a good investment in our future. Waterways are crucial to livelihood and important to understanding and respecting our habitat for generations to come. I support efforts to research, evaluate, and educate as we work together to ensure healthy waterways.

Stephanie Herrmann

202 West Jackson
Farmerville Louisiana 71241

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Claire Reid

214 Upham St. Unit 13 D
Mobile AL 36607

Areas of interest:

Habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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J.E. Holmes
user of the Mississippi River for recreation
2541 Broad Ave.
Memphis TN 38112

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Riverfront parks
Aquatic habitat restoration

Tributary watershed studies
Bicycle and pedestrian trails
canoe and kayak trails

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Matt Rota
Gulf Restoration Network
541 Julia St., Suite 300
New Orleans Louisiana 70130

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Riverfront parks
Aquatic habitat restoration
Aquatic habitat studies
Tributary watershed studies
Bicycle and pedestrian trails

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Joel Pyska

po box 310
cobb ca 95426

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Riverfront parks
Aquatic habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails

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Memphis District - U.S. Army Corps of Engineers
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Memphis, TN 38103-1894

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Greg Virden

140 Bayou Rd
Greenville MS 38701

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Habitat restoration

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Karen Thornton
Mississippi River Corridor Tennessee
291 Kenilworth Place
Memphis Tennessee 38112

Areas of interest:

Tributary watershed studies
Bicycle and pedestrian trails

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
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Memphis, TN 38103-1894

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Thank you for producing the Lower Mississippi River Resource Assessment. Implementation of its recommendations will provide a better future for one the great rivers of the world and the people, wildlife and communities that depend on a healthy and vibrant waterway.

The continued development and enhancement to the Lower MS River is vital to economic development in West Tennessee. There are many opportunities that can be translated into job creation and increased tax revenues for our rural communities.

Harriet Cannon
Asst. to State Director
3322 West End Avenue
Nashville TN 37203

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Janet Moreland
LoveYourBigMuddy Expedition
10150 S. Route N
Columbia Missouri 65203

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Riverfront parks
Aquatic habitat restoration
Aquatic habitat studies
Tributary watershed studies
Bicycle and pedestrian trails

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Adam Davis
Paddler
8232 George Brett Dr
Memphis TN 38018

Areas of interest:

Tributary watershed studies

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Richard Barham

847 shenandoah drive
cataula Georgia 31804

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Thank You

Jo Mason

3807 30th St.
Rock Island IL 61201

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Hart Henson

995 CR 188
Greenwood MS 38930

Areas of interest:

Habitat restoration

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Robin Whitfield
Chakchiuma Swamp Natural Area
125 Green St
Grenada Mississippi 38901

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Aquatic habitat restoration
Aquatic habitat studies
Habitat restoration

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Memphis District - U.S. Army Corps of Engineers
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The Mississippi River is a valuable resource for tourism and it will unite all the States along its waterway. I think it will bring in a lot of income into the states that border the Mississippi. If you build it and invite them then they will be part of it and try to protect it. Donovan Garcia

Donovan Garcia
Friends of Bayou Teche national Wildlife Refuge
P.O. Box 249
Jeanerette La 70544

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Riverfront parks
Aquatic habitat studies
Habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails
Paddling Trails

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Riverfront Parks – Develop riverfront parks for the use of local communities and visitors.

Tom Harrison
Mississippi River Corridor TN
355 Riverbluff Place #3
Memphis TN 38103

Areas of interest:

Bicycle and pedestrian trails
Riverboat landings

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
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Carrie Coulter

kidsdogsratsohmy@yahoo.com
Yazoo City MS 39194

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies

Ecological inventory
Boat ramps
Riverfront parks
Aquatic habitat restoration
Aquatic habitat studies
Habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails
Riverboat landings

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Karel Edgar

1613 Kurre
Cape Girardeau MO 63701

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Riverfront parks
Aquatic habitat restoration
Aquatic habitat studies
Tributary watershed studies
Bicycle and pedestrian trails

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Please, promote Environmental Education such as Citizens' Science and Engagement, including underprivileged citizens!

Giusy Pappalardo

Piazza Enrico Toto 1
Gravina di Catania, CT Italy 95030

Areas of interest:

Habitat restoration
Aquatic habitat restoration

Tributary watershed studies
Bicycle and pedestrian trails
Social-Ecological Dynamics

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Notch the dikes and put the riverr back in the marsh. We often kayak side channels by using public access at the Shipland WMA. It is very difficult and the only place we know of that is public. Some access would be great, doesn't even have to be complicated or hard to maintain boat ramps, just a way to get access to the river.

Glen Davis
Magnolia Fly Fishers
143 Grande Oaks Drive
Terry MS 39170

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps
Riverfront parks
Aquatic habitat restoration
Habitat restoration

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Memphis District - U.S. Army Corps of Engineers
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Leslie Walker

PO Box 6004
Brandon MS 39047

Areas of interest:

Habitat restoration
Riverfront parks
Tributary watershed studies

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Alan Huffman

1056 Old Bridgeport Road
Bolton MS 39041

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Jane Strub

12670 Ingersoll Ave N
Hugo MN 55038

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Riverfront parks
Tributary watershed studies
Bicycle and pedestrian trails

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Memphis District - U.S. Army Corps of Engineers
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Christopher B King

625 W CHICKASAW ST
BROOKHAVEN Mississippi 39601

Areas of interest:

Habitat restoration

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Holly Cox

183 Keesler Circle
Biloxi MS 39530

Areas of interest:

Habitat restoration

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Thank you for producing the Lower Mississippi River Resource Assessment. Implementation of its recommendations will provide a better future for one the great rivers of the world and the people, wildlife and communities that depend on a healthy and vibrant waterway.

Karen A. Bowyer
Dyersburg State Community College
1510 Lake Road
Dyersburg TN 38024

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

Dear Col. Anderson:

I support the work of the U.S. Army Corps of Engineers and its partners in completing the Lower Mississippi River Resource Assessment and delivering the report and its recommendations to Congress. The report provides the first comprehensive assessment of the lower river's natural resource and river-related recreation needs in more than 40 years.

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Reid Bishop
Belhaven University
200 Peachtree Street
Jackson MS 39202

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Boat ramps
Riverfront parks

Aquatic habitat restoration
Aquatic habitat studies

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Marlena Bergeron

2545 willow creek ct
evans Georgia 30809

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Riverfront parks
Aquatic habitat restoration

Aquatic habitat studies
Tributary watershed studies

Colonel Jeffery Anderson
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My house is on the bluff overlooking the River south of I-20 in Vicksburg. We see a variety of activities and support these endeavors.

Paul Ingram
None
2 Riverwood Place
Vicksburg MS 39180

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Maureen Donnelly

632 Seneca Ave.
Jackson MS 39216

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167 N. Main St. Room B-202
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Lorie Yates
Harrison County School District
121 Reynolds Circle
Ocean Springs MS 39564

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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I'm from the Mississippi Delta and have seen the USACE's historical efforts under the mission of "flood control" only make flooding worse and cause extensive destruction of wildlife habitat. The LMRRA is long overdue. Thanks for the efforts of partners and the changing attitude of USACE. I certainly hope the LMRRA will be implemented.

Tommy Shropshire
Retired Natural Resource Consulting
1572 Orchard Wood Rd.
TERRY Mississippi 39170

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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I support the recommendations of the LMRRA and in addition, funding to actually conduct habitat restoration, both terrestrial and aquatic, as the two along the lower Mississippi River are inextricably intertwined. In particular, I support the program to restore floodplain habitat. The potential for improved management of the Lower Mississippi River, "America's Amazon" to vastly increase ecotourism, ecological knowledge, ecological health, and support for river-based economies is becoming a reality. This program could be what makes it really take off. Thank you.

Gregg Elliott
K Gregg Consulting

6990 Parkbrook Lane
Cordova TN 38018

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Riverfront parks
Habitat restoration
Tributary watershed studies
Bicycle and pedestrian trails
wildlife

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
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This is one of the most important areas in the US...please act now!! THANK YOU!

Vance G. Martin
The WILD Foundation
717 Poplar Ave
Boulder CO 80304

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Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
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Elizabeth Rooks-Barber

PO box 852
Flora Ms 30971

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Rita Myers

6262 COMANCHE ST
KILN Mississippi 39556

Areas of interest:

Terrestrial habitat studies
Ecological inventory
Boat ramps
Riverfront parks
Aquatic habitat restoration

Aquatic habitat studies
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Tributary watershed studies
Bicycle and pedestrian trails
Riverboat landings

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Barbara Crouse
Ms.
45 beacon
concord New Hampshire 03301

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167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Again Thank You for your efforts to finally address the importance of the Mississippi River to the lives of people in the Lower portion of the river. Long recognized as a unique resource in its northern reaches, the report shows how it can become more significant to those in this region of the river. As someone who has spent considerable time on The River, I can attest to both it's might and its majesty. I strongly support funding and implementation of the recommendations of the report. The Mississippi is truly America's great river and a treasure to be afforded more attention.

Cathy Shropshire

1572 Orchard Wood Rd
Terry MS 39170

Additional LMRRA support letters received online by May 30, 2015

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Nancy Donald
Okatibbee Creek Audubon Society
8125 Rosewood Lane
Meridian MS 39305

Colonel Jeffery Anderson
Memphis District - U.S. Army Corps of Engineers
167 N. Main St. Room B-202
Memphis, TN 38103-1894

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Mary Stripling
Jackson Audubon Society
675 Lakewood Rd
VICKSBURG MS 39180

Areas of interest:

Habitat restoration
Terrestrial habitat restoration
Terrestrial habitat studies
Ecological inventory
Boat ramps

Riverfront parks
Aquatic habitat restoration
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Daniel Johnson
110 Linda Drive
Vicksburg MS 39180