APPENDIX 21

PUBLIC INVOLVEMENT AND COORDINATION

A21-1 NOTICE OF INTENT

Drive, Montgomery, AL 36117, (334) 244–3343.

Following the scoping meetings, individuals who have not already submitted their comments should submit them by August 15, 2018, by either:

* Email to act-arc@usace.army.mil, or

* Mail to Mr. Mike Malsom, Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628–0001.

FOR FURTHER INFORMATION CONTACT: Direct questions about the NEPA process to Mr. Mike Malsom by mail at Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628–0001; telephone at (251) 690–2023; electronic facsimile at (251) 694–3815; or email at ACT-ACR@usace.army.mil. You can also request to be added to the mailing list for public distribution of notices, meeting announcements, and documents.

SUPPLEMENTARY INFORMATION: Additional information on the ACT River Basin study will be posted as it becomes available on the Mobile District website at http://www.sam.usace.army.mil/.

The USACE will hold five public scoping meetings during the months of July and August as part of its preparation to conduct the water supply storage reallocation study and update the WCMs for the Alabama Power Company's Weiss and Logan Martin reservoirs in the ACT River Basin. The public is invited to attend the scoping meetings, which will provide information on the study process and afford interested parties the opportunity to submit to USACE input about their issues and concerns regarding that process. Each of the public scoping meetings will be presented in an open house format, allowing time for participants to review specific information and to provide comments either on forms available at the meeting or to a court reporter on-site at the meeting.

Curtis M. Flakes,

Chief, Planning and Environmental Division.

[FR Doc. 2018–14975 Filed 7–12–18; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement

AGENCY: Army Corps of Engineers, DoD.

ACTION: Notice of Intent.

SUMMARY: The U.S. Army Corps of Engineers ("USACE"), Memphis District, Vicksburg District, and the New Orleans District, is announcing its intent to prepare Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (SEIS I) to the 1976 EIS, to cover construction of remaining authorized work on the Mississippi River mainline levees (MRL) feature. Over the past twenty years since the finalization of SEIS I, USACE has determined that various sections (reaches) of the mainline levee system are deficient in varying amounts, and that certain remedial measures need to be undertaken to control seepage and to raise and stabilize the deficient sections of the levee to protect the lower Mississippi River Valley against the Project Design Flood (PDF) and maintain the structural integrity of the MRL system. The Proposed Action of SEIS II is to supplement and, as necessary, augment the 1976 EIS and SEIS I using the primary MR&T goals of: (1) Providing flood protection from the PDF; and (2) developing an environmentally sustainable project; formulating alternatives; identifying significant resources; assessing the direct, indirect, and cumulative impacts to those resources; investigating and environmentally assessing potential borrow areas; developing mitigation measures; and evaluating and selecting a preferred method for the construction of necessary authorized MRL Project features, which may include but are not limited to, implementing seepage control measures and the construction of various remediation measures for deficient levee reaches to bring these reaches to the project design grade. SEIS II will evaluate the potential direct, indirect, and cumulative impacts for an array of alternatives, including a No Action alternative.

FOR FURTHER INFORMATION CONTACT: Comments and questions about SEIS II should be submitted to USACE by email to: MRL-EIS-2@usace.army.mil; or by regular mail to: U.S. Army Corps of Engineers, ATTN: CEMVN–PDC–UDC, 167 North Main Street, Room B–202, Memphis, Tennessee 38103–1894. For additional information, including but not limited to a copy of SEIS I and the 1976 EIS, please visit the Project website at: http://www.mvk.usace.army.mil/MRLSEIS/.

SUPPLEMENTARY INFORMATION:

1. Project Background and Authorization. The MR&T Project (and the MRL feature) was authorized by the Flood Control Act of 1928, as amended. The 1976 EIS was filed with the Council of Environmental Quality on 8 April 1976. SEIS I, which was prepared to supplement the 1976 EIS to evaluate the effects of continued construction of the MRL levee enlargements, stability berms, seepage control, and erosion protection measures, was filed with the Environmental Protection Agency on 31 July 1998. SEIS I focused on the levees of the MRL that were the most deficient in height and on seepage control measures for levee reaches with observable signs of seepage during previous high water events.

The MR&T Project is designed to manage flood risk damages in the alluvial valley between Cape Girardeau, Missouri and the Head of Passes, Louisiana. The goal of the MR&T Project is to provide an environmentally sustainable project for comprehensive flood damage control, protection, and risk reduction from the "Project Design Flood", in the alluvial valley beginning at Cape Girardeau, Missouri to the Head of Passes, Louisiana, by means of levees, floodwalls, floodways, reservoirs, banks stabilization and channel improvements in and along the Mississippi River and its tributaries. The mainline levee system, comprised of levees, floodwalls, backwater areas, floodways, and various control structures, is approximately 1,610 miles long. The PDF is a hypothetical flood that was developed to determine the design flood to be used in designing the MR&T levee system in the lower Mississippi River Basin, and is defined as the "greatest flood having a reasonable probability of occurrence" when the operable features of the entire MR&T Project are considered. The PDF upon which the current design for the construction of the mainline levee system and remaining unconstructed levees is based, is the "Refined 1973

MR&T PDF Flowline.” The Mississippi River mainline levees protect the lower Mississippi River Valley against the PDF by confining flow to the leveed channel, except where it enters backwater areas, overflows several levees designed to overtop and fill tributary basins, or is intentionally diverted into four floodway areas. (A figure which depicts the PDF in cubic feet per second for the lower Mississippi River and its tributaries as set forth in SEIS I will be available for review at the Project website.) The MR&T Project functions as a system and provides flood risk reduction across portions of seven states: Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana (a map of the area will be available on the Project website). The MR&T System includes an extensive levee system; floodways to divert excess flows past critical reaches; channel improvement and stabilization features to protect the integrity of flood risk management measures and to ensure proper alignment and depth of the navigation channel; and a system of reservoirs to regulate flows and backwater areas to provide storage during extreme events. The integrity of the levee system is also bolstered by control measures such as landside berms, drainage trenches, drainage blankets, and relief wells, and tributary basin improvements including levees, headwater reservoirs, and pumping stations that expand flood risk management coverage and improve drainage into adjacent areas within the alluvial valley.

Through evaluation of information and data obtained from levee inspections, seepage analyses, research, studies, and engineering assessments, USACE has concluded that certain levee reaches are not at Project design grade due to effects from various changed conditions, including, but not limited to consolidation of levee materials, subsidence, and changes in river conditions and in survey datums over time. Additionally, advances in geotechnical mapping, data collected from recent high water events, and subsequent seepage analyses that have taken place since the finalization of SEIS I, have revealed the need for additional seepage control measures and the construction of other authorized Project features to facilitate structural integrity and stability of the MRL feature of the MR&T Project. As a result, in October of 2017, USACE completed an engineering risk assessment and programmatic review of the MRL based on the 1973 Refined MR&T Flowline Study. The assessment showed that the integrity of the MRL levee system was at risk because numerous levee reaches are not currently constructed to the pass the PDF due to either height or seepage deficiencies. Based on the results, USACE has determined that SEIS II is necessary to formulate alternatives, identify significant resources, assess the direct, indirect, and cumulative impacts to the significant resources, develop mitigation measures, and evaluate and select a recommended plan.

2. Proposed Action. The Proposed Action is the construction of necessary additional authorized MRL Project features (e.g., levee enlargements; stability berms, underseepage controls such as berms, relief wells, cutoffs, riverside blankets and pit fills; and erosion protection such as slope paving), to improve sections of deficient MRL levees in order to provide the required PDF protection. The Proposed Action, and associated evaluations, does not include reformulation of the MRL feature. Measures to manage flood risk reduction along the mainline levee system from Cape Girardeau, Missouri to Head of Passes, Louisiana, include but are not limited to, raising and widening portions of the levee to the authorized design grade and cross-sections, stabilizing floodwalls, and seepage control (e.g. berms, relief wells, and cutoff trenches).

3. Alternatives. SEIS II will evaluate an array of site specific alternatives, including the No-Action alternative, with a focus to avoid and minimize reasonably foreseeable adverse effects from construction of necessary additional authorized MRL Project features. Alternatives will include evaluations of measures, or combination of measures, along with evaluation of locations of borrow areas that avoid and minimize reasonably foreseeable adverse effects. Potential alternatives may include flood risk reduction measures such as raising and widening portions of the levee to the authorized design grade and cross-sections, installing or stabilizing floodwalls, levee setbacks, and various seepage control measures such as, seepage berms, relief wells with the associated drainage and/or pumping plants for water conveyance, and cutoff trenches. Other alternatives will be developed through the scoping period based on public input. Additionally, SEIS II will identify measures to avoid, offset, or minimize impacts to resources where feasible.

4. Scoping. Scoping is the National Environmental Policy Act (NEPA) process utilized for determining the range of alternatives and significant issues to be addressed in SEIS II. USACE invites full public participation to promote open communication on the issues surrounding the Proposed Action. The public will be involved in the scoping and evaluation process through advertisements, notices, and other means. Project information will also be available on the Project website at: http://www.mvk.usace.army.mil/MRLSEIS/. All individuals, organizations, NGOs, affected Indian tribes, and local, state, and Federal agencies that have an interest are urged to participate in the scoping process. The purpose of this Notice is to obtain suggestions and information that may inform the scope of the issues and range of alternatives to be evaluated in SEIS II, as well as to provide notice and request public input on the reasonably foreseeable effects to natural and cultural resources.

This Notice of Intent commences the formal public scoping comment period which shall continue through October 1, 2018. Scoping is the NEPA process utilized for seeking public involvement in determining the range of alternatives and significant issues to be addressed in SEIS II. USACE invites full public participation to promote open communication in the public scoping phase and invites interested parties to identify potential issues, concerns, and reasonable alternatives that should be considered in SEIS II.

In order for public comments to be recorded for inclusion in the Administrative Record and be considered in the SEIS II development process, members of the public, interested persons and entities must submit their comments to USACE by mail, email, or verbally at the Scoping Meeting(s). Written comments submitted for consideration are due no later than October 1, 2018. Written comments may be submitted: (1) To USACE at public scoping meetings; (2) by regular U.S. Mail mailed to: U.S. Army Corps of Engineers, ATTN: CEMVN–PDC–UDC, 167 North Main Street, Room B–202, Memphis, Tennessee 38103–1894; and (3) by email to: MRL-SEIS-2@usace.army.mil. Please include your name and return address on the first page of your written comments.

All personally identifiable information (for example, name, address, etc.) voluntarily submitted by a commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information. All timely received comment letters will be accessible on the Project website at http://www.mvk.usace.army.mil/MRLSEIS/.

5. Public Scoping Meetings: Public scoping meeting(s) will be held at various locations within the Project Area during approximately July or August of 2018 to present information to the public and to receive comments from the public. The date(s), time(s), and location(s) of the scoping meeting(s) will be publicly announced in advance by USACE on the Project website at: http://www.mvk.usace.army.mil/MRLSEIS/, and in any other forms deemed appropriate once those dates, times, and locations are determined by USACE. Notices of the public scoping meetings will also be sent by USACE through email distribution lists, posted on the Project website, and mailed to public libraries, government agencies, and interested groups and individuals. Scoping meeting dates and locations will also be advertised in local newspapers. Interested parties unable to attend the scoping meetings can access additional information on SEIS II at: http://www.mvk.usace.army.mil/MRLSEIS/.

6. Potentially Significant Issues. SEIS II will analyze the reasonably foreseeable impacts on the human and natural environment resulting from the Proposed Action. The scoping, public involvement, and interagency coordination processes will help identify and define the range of potential significant issues that will be considered. Important resources and issues evaluated in SEIS II could include, but are not limited to, the direct, indirect, and cumulative effects on aquatic resources; bottomland hardwoods; wetlands; waterfowl; wildlife resources; water quality; cultural resources; geology and soils including agricultural land and prime and unique farmland; hydrology and hydraulics; air quality; threatened and endangered species and their critical habitat; socioeconomics; environmental justice; recreation; and cumulative effects of related projects along the MRL. USACE will also consider issues identified and comments made throughout scoping, public involvement, and interagency coordination. USACE expects to better define the issues of concern and the methods that will be used to evaluate those issues through the scoping process.

7. Availability. The current SEIS II development schedule anticipates the release of the draft of SEIS II by USACE for public review and comment in 2020. After it is published, USACE will hold public comment meetings to present the results of studies and identification of a recommended plan, to receive comments, and to address questions concerning the draft SEIS II.

Dated: June 27, 2018.

Michael C. Derosier,

Colonel, U.S. Army, Commander and District Engineer.

[FR Doc. 2018–14972 Filed 7–12–18; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF EDUCATION

Applications for New Awards; Personnel Development To Improve Services and Results for Children With Disabilities—Associate Degree Preservice Program Improvement Grants To Support Personnel Working With Young Children With Disabilities

AGENCY: Office of Special Education and Rehabilitative Services, Department of Education.

ACTION: Notice.

SUMMARY: The Department of Education is issuing a notice inviting applications for new awards for fiscal year (FY) 2018 for Personnel Development to Improve Services and Results for Children with Disabilities—Associate Degree Preservice Program Improvement Grants to Support Personnel Working with Young Children with Disabilities, Catalog of Federal Domestic Assistance (CFDA) number 84.325N.

DATES:

Applications Available: July 13, 2018.

Deadline for Transmittal of Applications: August 13, 2018.

ADDRESSES: For the addresses for obtaining and submitting an application, please refer to our Common Instructions for Applicants to Department of Education Discretionary Grant Programs, published in the Federal Register on February 12, 2018 (83 FR 6003) and available at www.gpo.gov/fdsys/pkg/FR-2018-02-12/pdf/2018-02558.pdf.

FOR FURTHER INFORMATION CONTACT: Julia Martin Eile, U.S. Department of Education, 400 Maryland Avenue SW, Room 5175, Potomac Center Plaza, Washington, DC 20202–5076. Telephone: (202) 245–7431. Email: Julia.Martin.Eile@ed.gov.

If you use a telecommunications device for the deaf (TDD) or a text telephone (TTY), call the Federal Relay Service (FRS), toll free, at 1–800–877–8339.

SUPPLEMENTARY INFORMATION:

Full Text of Announcement

I. Funding Opportunity Description

Purpose of Program: The purposes of this program are to (1) help address State-identified needs for personnel in special education, early intervention, related services, and regular education to work with children, including infants and toddlers, with disabilities; and (2) ensure that those personnel have the necessary skills and knowledge, derived from practices that have been determined through scientifically based research and experience, to be successful in serving those children.

Priorities: In accordance with 34 CFR 75.105(b)(2)(v), the absolute and competitive preference priorities are from allowable activities specified in the statute (see sections 662 and 681 of the Individuals with Disabilities Education Act (IDEA); 20 U.S.C. 1462 and 1481).

Absolute Priority: For FY 2018 and any subsequent year in which we make awards from the list of unfunded applications from this competition, this priority is an absolute priority. Under 34 CFR 75.105(c)(3), we consider only applications that meet this priority.

This priority is:

Associate Degree Preservice Program Improvement Grants To Support Personnel Working With Young Children With Disabilities

Background

The mission of the Office of Special Education and Rehabilitative Services (OSERS) is to improve early childhood, educational, and employment outcomes and raise expectations for all people with disabilities, their families, their communities, and the Nation.

The purpose of this priority is to fund eight Associate Degree Preservice Improvement Grants and improve the quality of existing associate degree programs so that associate degree-level personnel are well prepared to work with infants, toddlers, preschool, and early elementary school children ages birth through 8 (young children) with disabilities and their families in inclusive early childhood programs and elementary schools. Associate degree-level personnel play critical roles in the development and learning of all young children, including young children with disabilities, as child care providers, preschool teachers, assistant teachers, and paraprofessionals. In these roles, associate degree-level personnel can use evidence-based (as defined in this notice) practices (EBPs) to meaningfully include young children with disabilities in early childhood programs and classrooms, individualize interventions and accommodations, collect data to monitor progress, and collaborate with other professionals. In elementary schools, paraprofessionals are often

Respondent's Obligation: Voluntary.

OMB Desk Officer: Ms. Jasmeet Seehra.

You may also submit comments and recommendations, identified by Docket ID number and title, by the following method: *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.

Instructions: All submissions received must include the agency name, Docket ID number, and title for this **Federal Register** document. The general policy for comments and other submissions from members of the public is to make these submissions available for public viewing on the internet at *http://www.regulations.gov* as they are received without change, including any personal identifiers or contact information.

DOD Clearance Officer: Mr. Frederick Licari.

Requests for copies of the information collection proposal should be sent to Mr. Licari at *whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil.*

Aaron T. Siegel,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 2018–18746 Filed 8–28–18; 8:45 am]

BILLING CODE 5001–06–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement

AGENCY: U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Intent; extension of public comment period.

SUMMARY: USACE is announcing the public scoping meeting dates, times, and locations and extending the scoping comment period for the Notice of Intent (NOI) to prepare Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (SEIS I) to the 1976 EIS. The NOI was published in the **Federal Register** on July 13, 2018. The public comment period on the NOI was scheduled to end on October 1, 2018. USACE is extending the comment period by 14 days and will now consider comments received through October 15, 2018.

DATES: The deadline for receipt of scoping comments is extended to October 15, 2018.

ADDRESSES: Written comments should be submitted: (1) To USACE at public scoping meetings; (2) by regular U.S. Mail mailed to: U.S. Army Corps of Engineers, ATTN: CEMVN–PDC–UDC, 167 North Main Street, Room B–202, Memphis, Tennessee 38103–1894; or (3) by email to: *MRL-SEIS-2@usace.army.mil.* Please include your name and return address on the first page of your written comments. All personally identifiable information voluntarily submitted by a commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

FOR FURTHER INFORMATION CONTACT: For direct questions about the NEPA process and upcoming scoping meetings please contact: Mr. Mike Thron, by mail at U.S. Army Corps of Engineers, ATTN: CEMVN–PDC–UDC, 167 North Main Street, Room B–202, Memphis, Tennessee 38103–1894; by telephone at (901) 544–0708; or by email at *MRL-SEIS-2@usace.army.mil.* Additional project and meeting information is also available at the Project website at: *http://www.mvk.usace.army.mil/MRLSEIS/.*

SUPPLEMENTARY INFORMATION: The dates, locations, and times of the public scoping meetings are:

1. September 10, 2018 at the Holiday Inn Blytheville, 1121 East Main Street, Blytheville, Arkansas 72315 from 7 p.m. to 9 p.m.

2. September 11, 2018 at the Vicksburg Convention Center, 1600 Mulberry Street, Vicksburg, Mississippi, 39180 from 7 p.m. to 9 p.m.

3. September 12, 2018 at the Louisiana Department of Environmental Quality, Room C111, 602 North 5th Street, Baton Rouge, Louisiana, 70802 from 7 p.m. to 9 p.m.

4. September 13, 2018 at United States Army Corps of Engineers, New Orleans District Headquarters District Assembly Room, 7400 Leake Avenue, New Orleans, Louisiana, 70118 from 7 p.m. to 9 p.m.

Dated: August 22, 2018.

Edward P. Lambert,

Chief, Environmental Compliance Branch, Regional Planning and Environmental Division South.

[FR Doc. 2018–18723 Filed 8–28–18; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF ENERGY

[FE Docket No. 13–147–LNG]

Change in Control; Delfin LNG, LLC

AGENCY: Office of Fossil Energy, DOE.

ACTION: Notice.

SUMMARY: The Office of Fossil Energy (FE) of the Department of Energy (DOE) gives notice of receipt of a Notice of Change in Control Through Indirect Equity Ownership Changes (Notice), filed July 10, 2018 by Delfin LNG, LLC (Delfin LNG) in FE Docket No. 13–147–LNG. The Notice describes changes to the corporate structure and ownership of Delfin LNG. The Notice was filed under section 3 of the Natural Gas Act (NGA).

DATES: Protests, motions to intervene or notices of intervention, as applicable, and written comments are to be filed using procedures detailed in the Public Comment Procedures section no later than 4:30 p.m., Eastern time, September 13, 2018.

ADDRESSES:

Electronic Filing by email: fergas@hq.doe.gov.

Regular Mail: U.S. Department of Energy (FE–34), Office of Regulation and International Engagement, Office of Fossil Energy, P.O. Box 44375, Washington, DC 20026–4375.

Hand Delivery or Private Delivery Services (e.g., FedEx, UPS, etc.): U.S. Department of Energy (FE–34), Office of Regulation and International Engagement, Office of Fossil Energy, Forrestal Building, Room 3E–042, 1000 Independence Avenue SW, Washington, DC 20585.

FOR FURTHER INFORMATION CONTACT:

Larine Moore or Amy Sweeney, U.S. Department of Energy (FE–34), Office of Regulation and International Engagement, Office of Fossil Energy, Forrestal Building, Room 3E–042, 1000 Independence Avenue SW, Washington, DC 20585, (202) 586–9478; (202) 586–7893.

Cassandra Bernstein or Ronald (R.J.) Colwell, U.S. Department of Energy (GC–76), Office of the Assistant General Counsel for Electricity and Fossil Energy, Forrestal Building, 1000 Independence Avenue SW, Washington, DC 20585, (202) 586–9793; (202) 586–8499.

A21-2 PUBLIC SCOPING

NEWS RELEASE

FOR IMMEDIATE RELEASE

Contact: Sara Robinson
Phone: 601-631-5053
Email: sara.c.robinson@usace.army.mil

Corps schedules public scoping meetings for Mississippi River mainline levees supplemental environmental impact statement

VICKSBURG, Miss. – The U.S. Army Corps of Engineers (USACE) will host four public scoping meetings for the preparation of a supplemental environmental impact statement to address the impacts associated with the construction of remaining authorized work on the Mississippi River mainline levees of the Mississippi River and Tributaries project.

USACE issued a notice of intent to prepare Supplement II to the Final Environmental Impact Statement (SEIS II), Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement and published in the Federal Register on July 13, 2018. This work is one of the major features of the MR&T Project used to provide comprehensive flood damage control and risk reduction beginning at Cape Girardeau, Missouri, to the Head of Passes, Louisiana.

SEIS II will evaluate an array of site-specific alternatives, including the no-action alternative, with a focus to avoid and minimize reasonably foreseeable adverse effects from construction of necessary additional authorized MRL project features. Alternatives will include evaluations of measures, or combination of measures, along with evaluation of locations of borrow areas that avoid and minimize reasonably foreseeable adverse effects. Potential alternatives may include flood risk reduction measures such as raising and widening portions of the levee to the authorized design grade and cross-sections, installing or stabilizing floodwalls, levee setbacks, and various seepage control measures such as, seepage berms, relief wells with the associated drainage and/or pumping plants for water conveyance, and cutoff trenches. Other alternatives will be developed through the scoping period based on public input. Additionally, SEIS II will identify measures to avoid, offset, or minimize impacts to resources where feasible.

The publication of the notice of intent in the Federal Register begins a formal public scoping comment period, which will continue through Oct. 15, 2018. The four public meetings are scheduled from 7-9 p.m. as follows:

- **Sept. 10**: Holiday Inn Blytheville, 1121 East Main Street, Blytheville, Arkansas 72315
- **Sept. 11**: Vicksburg Convention Center, 1600 Mulberry Street, Vicksburg, Mississippi 39180
- **Sept. 12**: Louisiana Department of Environmental Quality, Room C111, 602 North 5th Street, Baton Rouge, Louisiana 70802
- **Sept: 13**: United States Army Corps of Engineers, New Orleans District Headquarters District Assembly Room, 7400 Leake Avenue, New Orleans, Louisiana 70118

Public scoping meetings will present information to the public followed by a public comment period. More information about the public scoping meetings can be found at the following website: http://www.mvk.usace.army.mil/MRLSEIS/. The notice of intent and other content related to the supplemental environmental impact statement are also available on the website. USACE welcomes full public participation to promote open communication in the scoping phase and invites interested parties to identify potential issues, concerns and reasonable alternatives that should be considered.

In order for public comments to be recorded for inclusion in the Administrative Record and be considered in the SEIS II development process, members of the public, interested persons and entities must submit their comments to USACE by mail, email, or verbally at the Scoping Meeting(s). Written comments submitted for consideration are due no later than October 15, 2018 and may be submitted: (1) to USACE at public scoping meetings above; (2) by regular U.S. Mail mailed to: U.S. Army Corps of Engineers, ATTN: CEMVN-PDC-UDC, 167 North Main Street, Room B-202, Memphis, Tennessee 38103-1894; and (3) by email to: MRL-SEIS-2@usace.army.mil. Please include your name and return address on the first page of your written comments. All personally identifiable information voluntarily submitted by a commenter may be publicly accessible. Do not submit confidential business information or otherwise sensitive or protected information.

To read the notice of intent in its entirety, visit the Federal Register at:
https://www.federalregister.gov/documents/2018/07/13/2018-14972/notice-of-intent-to-prepare-supplement-ii-to-the-final-environmental-impact-statement-mississippi

US Army Corps of Engineers®

PUBLIC SCOPING MEETINGS

Mississippi River and Tributaries Project, Mississippi River Levees
Supplemental Environmental Impact Statement II

Time and Locations of Public Scoping Meetings: Four public scoping meetings will be conducted by the U.S. Army Corps of Engineers (USACE) within the study area to present information and receive comments on Supplemental Environmental Impact Statement II (SEIS II) being prepared by USACE. These public scoping meetings have been duly noticed and will be held at the following locations from 7-9 p.m.

- Sept. 10, 2018: Holiday Inn Blytheville, 1121 East Main Street, Blytheville, Arkansas 72315
- Sept. 11, 2018: Vicksburg Convention Center, 1600 Mulberry Street, Vicksburg, Mississippi 39180
- Sept. 12, 2018: Louisiana Department of Environmental Quality, Room C111, 602 North 5th Street, Baton Rouge, Louisiana 70802
- Sept: 13, 2018: United States Army Corps of Engineers, New Orleans District Headquarters District Assembly Room, 7400 Leake Avenue, New Orleans, Louisiana 70118

Preparation of Supplement II to the 1976 Final Environmental Impact Statement: USACE is preparing a second Supplemental Environmental Impact Statement (SEIS II) to the original Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), which will evaluate the potential impacts associated with the construction of remaining authorized work on the Mississippi River (mainline) Levees (MRL) feature of the MR&T Project. SEIS II is the second supplemental environmental impact statement for MRL work on the MR&T Project since the publication of the 1976 EIS and Supplement No. 1 to the 1976 EIS in 1998.

The MRL provides comprehensive flood damage control, protection, and risk reduction from the "Project Design Flood" (PDF) in the alluvial valley beginning at Cape Girardeau, Missouri to the Head of Passes, Louisiana. The PDF is a hypothetical flood that was developed to determine the design flood to be used in designing the MR&T levee system in the lower Mississippi River Basin, and is defined as the "greatest flood having a reasonable probability of occurrence" when the operable features of the entire MR&T Project are considered. Since the publication of the 1976 FEIS and the 1998 SEIS I, USACE has identified certain sections (reaches) of the MRL which are deficient and require the construction of major remedial measures, such as levee enlargements and seepage control measures, to contain the PDF in the lower Mississippi River Valley in an environmentally sustainable manner. SEIS II will evaluate the potential direct, indirect, and cumulative impacts for an array of proposed alternatives and plans, including the No Action alternative, (collectively the "proposed action") to provide the necessary flood protection against the PDF, and also consider mitigation plans and other actions to minimize environmental losses.

A Notice of Intent to prepare SEIS II was published in the *Federal Register* on July 13, 2018. The Draft SEIS II is scheduled to be released by USACE for public review and comment in 2020. Additional information related to SEIS II can be accessed at: *http://www.mvk.usace.army.mil/MRLSEIS/*.

Purpose of Public Scoping Process: Subsequent to the enactment of the National Environmental Policy Act (NEPA) of 1969, as amended, the Council on Environmental Quality (CEQ) was created and tasked with multiple responsibilities which include, but are not limited to, the formulation and recommendation of national policies to promote the improvement of the quality of the environment. CEQ "Regulations for Implementing the Procedural Provisions of NEPA" requires that public scoping be initiated before an environmental impact statement is prepared to identify significant issues related to the proposed action. Through the scoping process, affected federal, state, and local agencies; federally recognized Tribes; and other interested organizations and individuals, are invited to participate in the proposed action evaluation process and assist in determining the scope and depth of significant issues to be analyzed in the environmental impact statement.

USACE requests full public participation and open communication in the public scoping phase of the preparation of SEIS II and invites all interested parties to attend the scoping meetings and comment on issues, concerns, and alternatives for consideration in the preparation of SEIS II.

Written comments must be submitted no later than October 15, 2018 in order to be considered. Written comments may be submitted: (1) to USACE at public scoping meetings; (2) by regular U.S. Mail mailed to: U.S. Army Corps of Engineers, ATTN: CEMVN-PDC-UDC, 167 North Main Street, Room B-202, Memphis, Tennessee 38103-1894; and (3) by email to: *MRL-SEIS-2@usace.army.mil*. *Please include your name and return address on the first page of your written comments*. Please be advised that personally identifiable information that is contained on written comments submitted to USACE, may become a public record and publicly accessible. Therefore, do not submit confidential business information or otherwise sensitive or protected information.

Public Scoping Meeting Agenda: Welcoming Remarks
Project Overview
NEPA and Scoping Process
Public Comments
Closing Remarks

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Lead Project Manager
Daniel Sumerall
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Phone: 601-631-5428

Lead NEPA Coordinator
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Phone: 901-544-0708

Lead Tribal Liaison and Cultural Resources Contact
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Phone: 504-862-2364

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NEPA Coordinator
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Project Manager
Nick Sims
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NEPA Coordinator
Mark Lahare
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Phone: 504-862-1344

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PUBLIC COMMENT FORM

In addition to verbal comments provided to court reporters and/or authorized USACE employees, agents, and representatives at the scoping meetings, written comments may be submitted at the scoping meeting using this form.

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Name: ____

Telephone number (optional): ____

Organization (if any): ____

Address (optional): ____

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E-mail: ____

Comments:

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MR&T Mississippi River Levee & Floodwall Deficiencies

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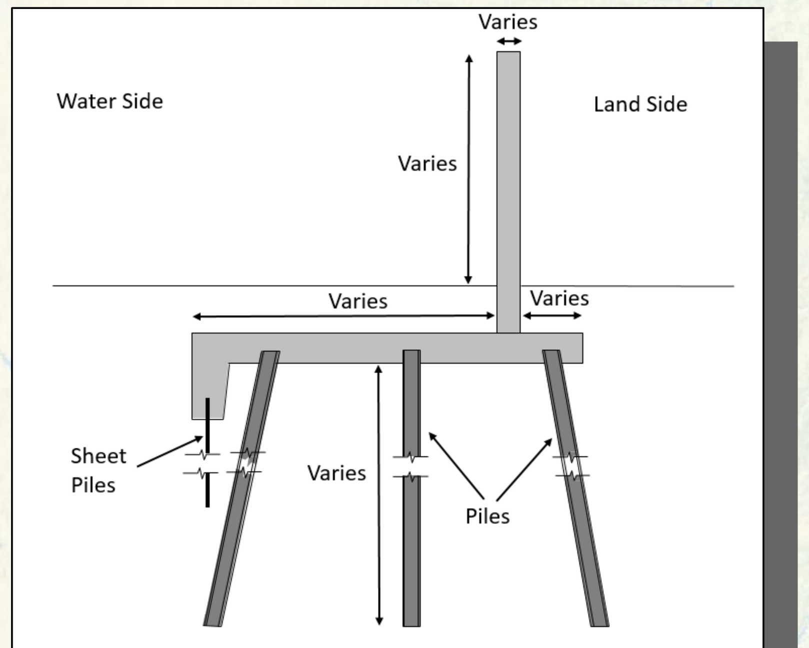

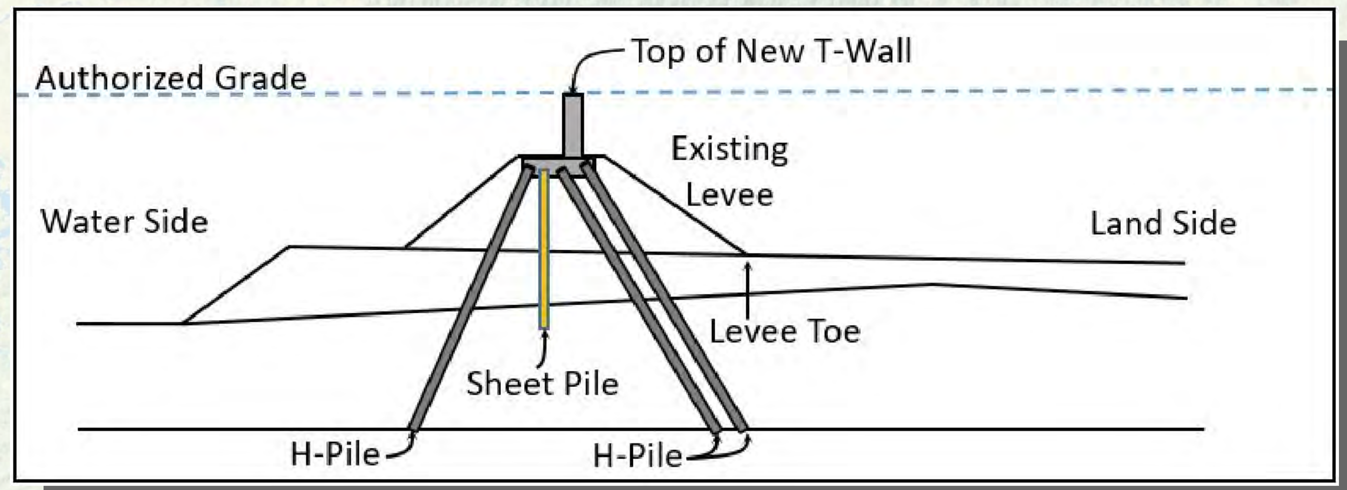

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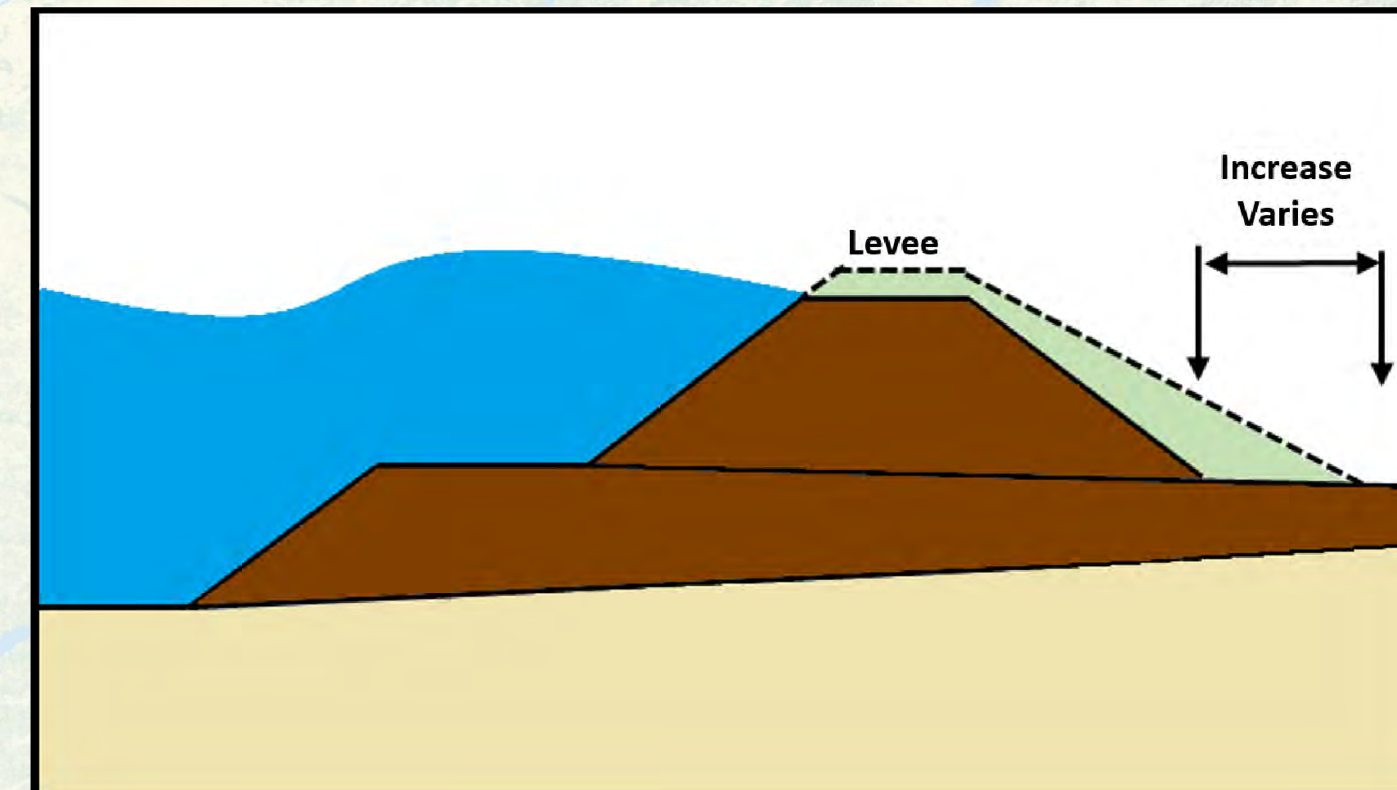

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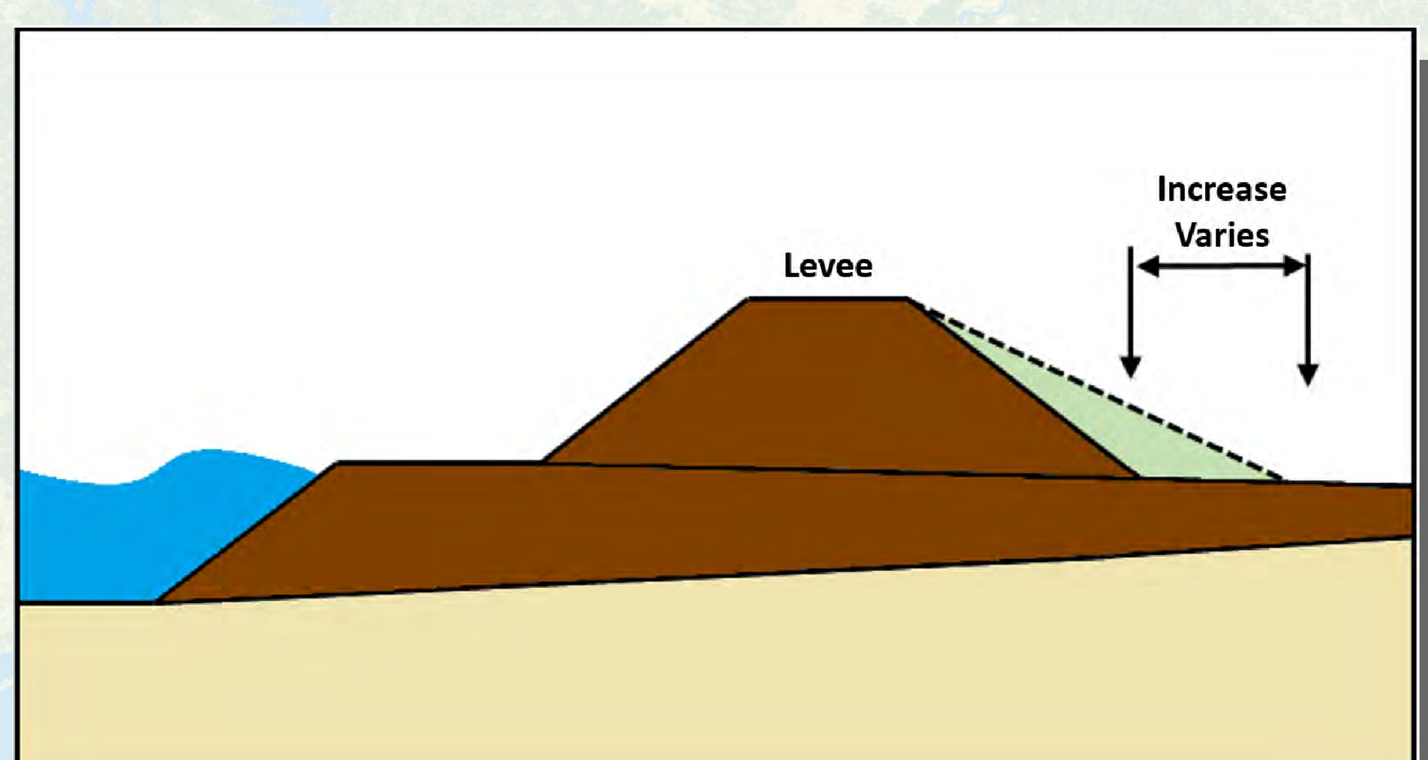

Source: US National Park Service

MR&T Mississippi River Levees
Seepage Deficiencies

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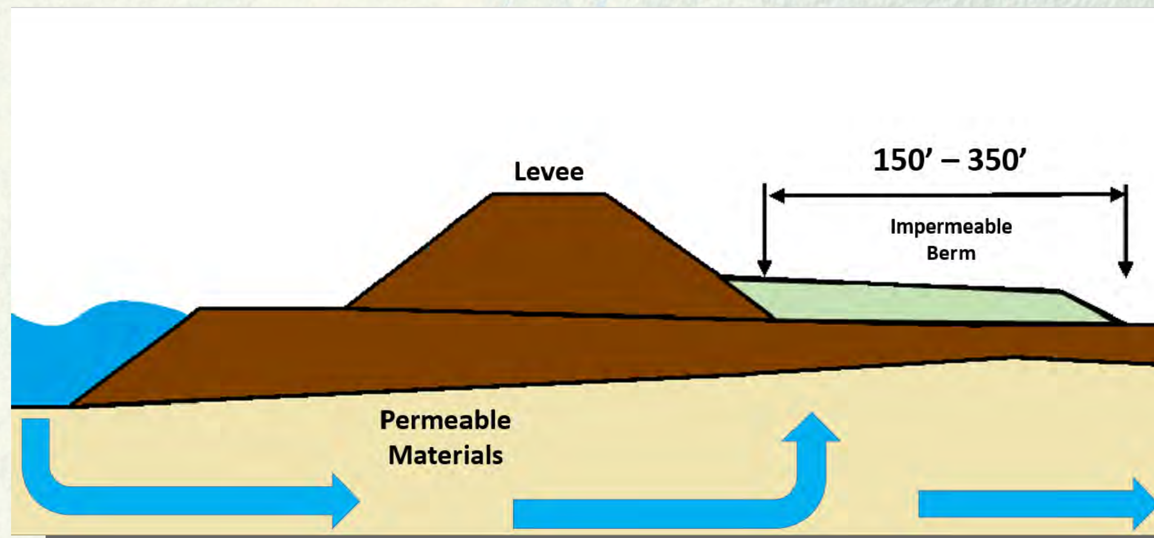

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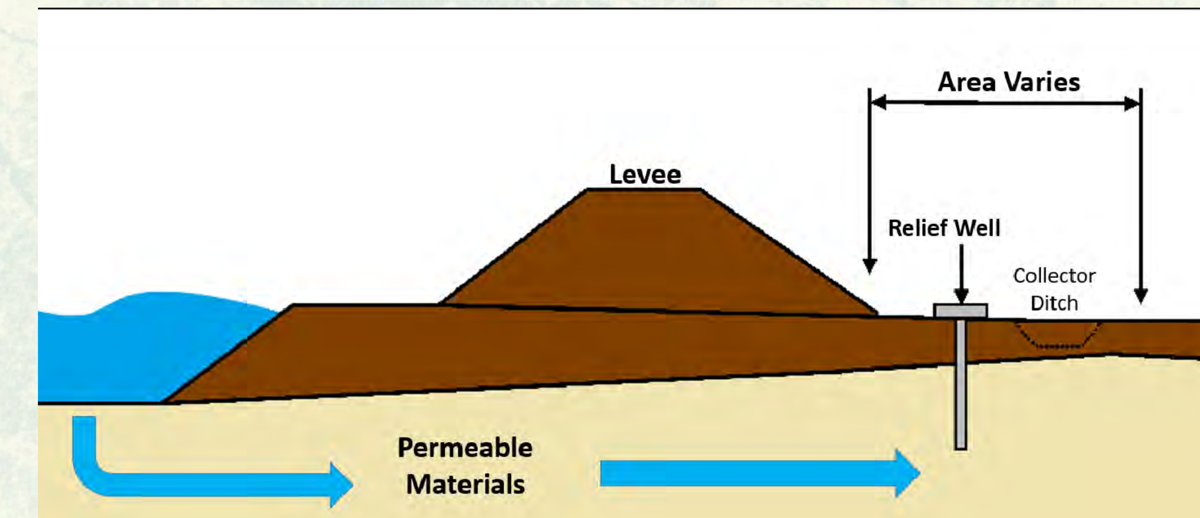

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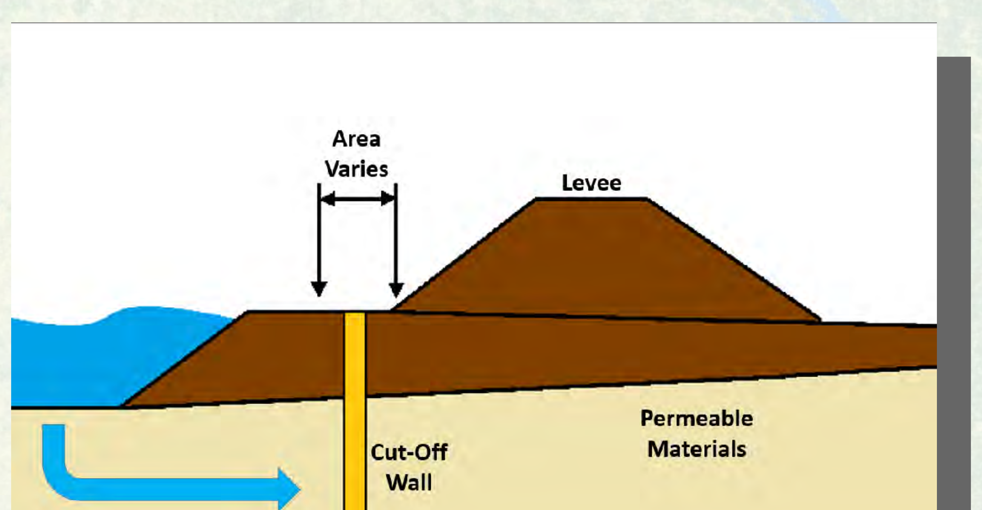
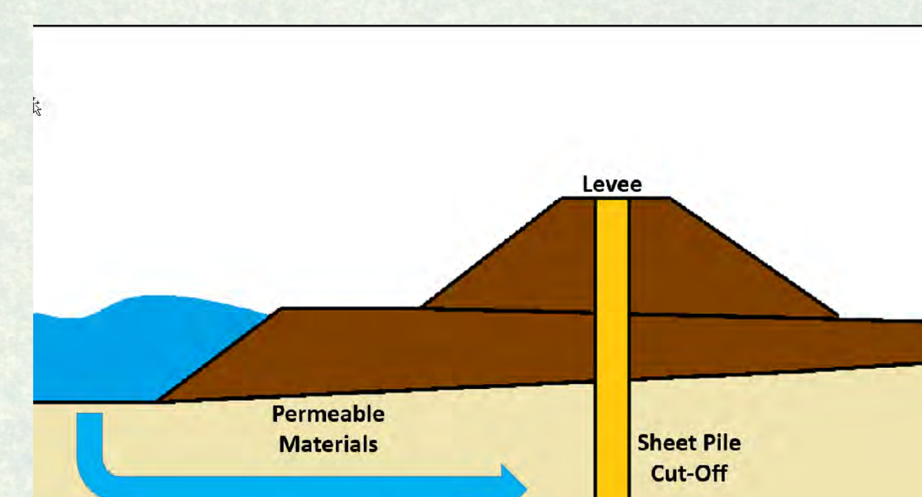


Sheet Pile Cut-Off

Sheet pile cutoff is installed in the levee section to a determined depth to cutoff seepage through any shallow impervious layer and to cutoff seepage through the levee embankment. Upon completion, sheet pile is buried in the levee section.



Source: US National Park Service


St. Louis District
Memphis District
Vicksburg District
New Orleans District
N
Legend
Levee Work Items
Work Type
Floodwall Stability
Slope Stability
Slope Flattening
Grade Deficiency
Seepage
Existing Levee Centerlines
US Army Corps of Engineers
Mississippi Valley Division
Mississippi River and Tributaries Project
MR&T Mississippi River Levees Supplemental Environmental Impact Statement II
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Prepared under the Direction of the President of the Mississippi River Commission
5 Sep 2018
Sheet 1 of 1
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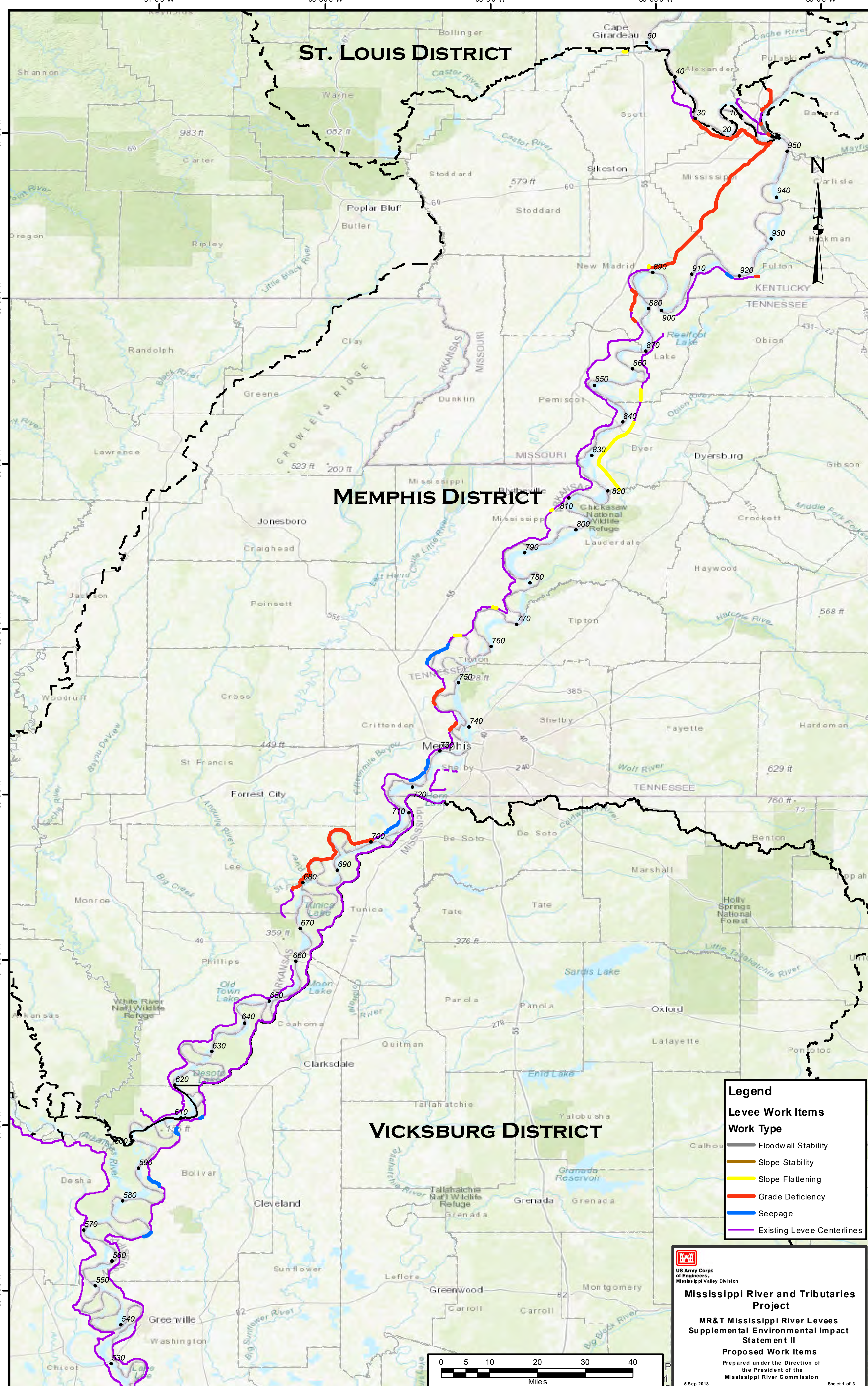
GIS User Community


St. Louis District
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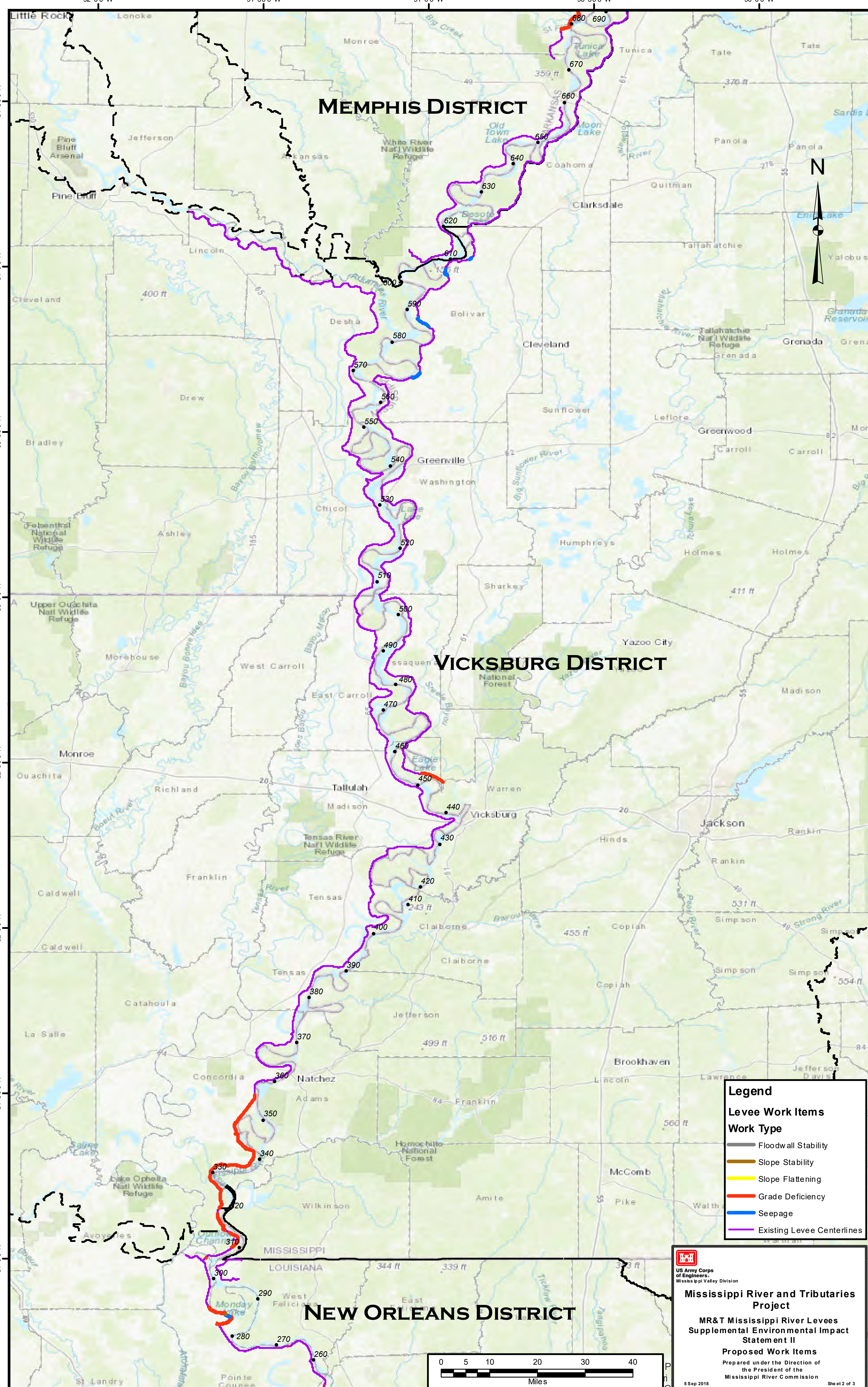
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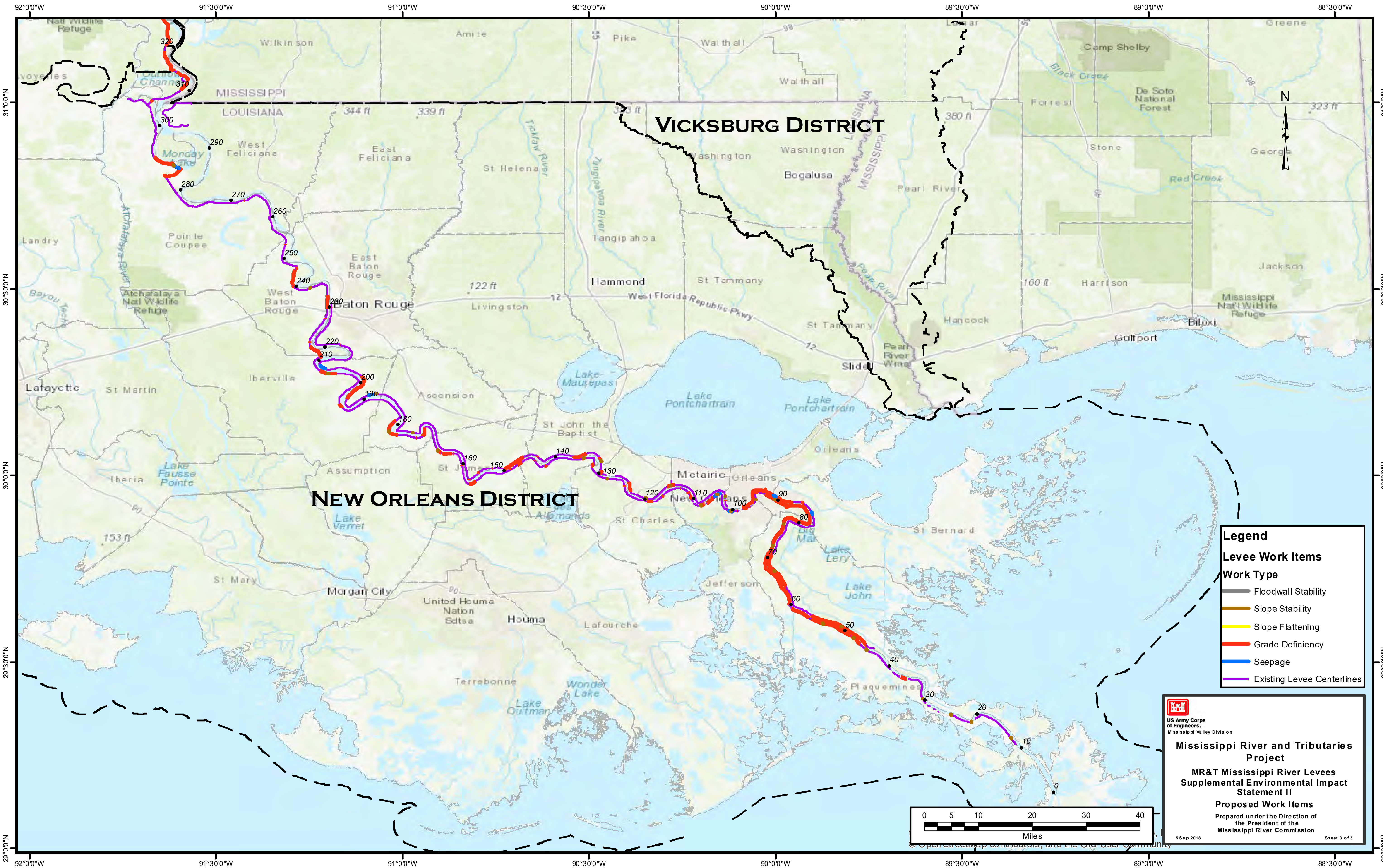
Brookhaven
McComb
Grenada


VICKSBURG DISTRICT
NEW ORLEANS DISTRICT
MISSISSIPPI
LOUISIANA
Baton Rouge
Hammond
Bogalusa
Slidell
Metairie
Houma
Morgan City
Lafayette
Gulfport
Biloxi
Lake Pontchartrain
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Sheet 3 of 3

MR&T MISSISSIPPI RIVER LEVEES SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (SEIS) II PUBLIC SCOPING MEETING

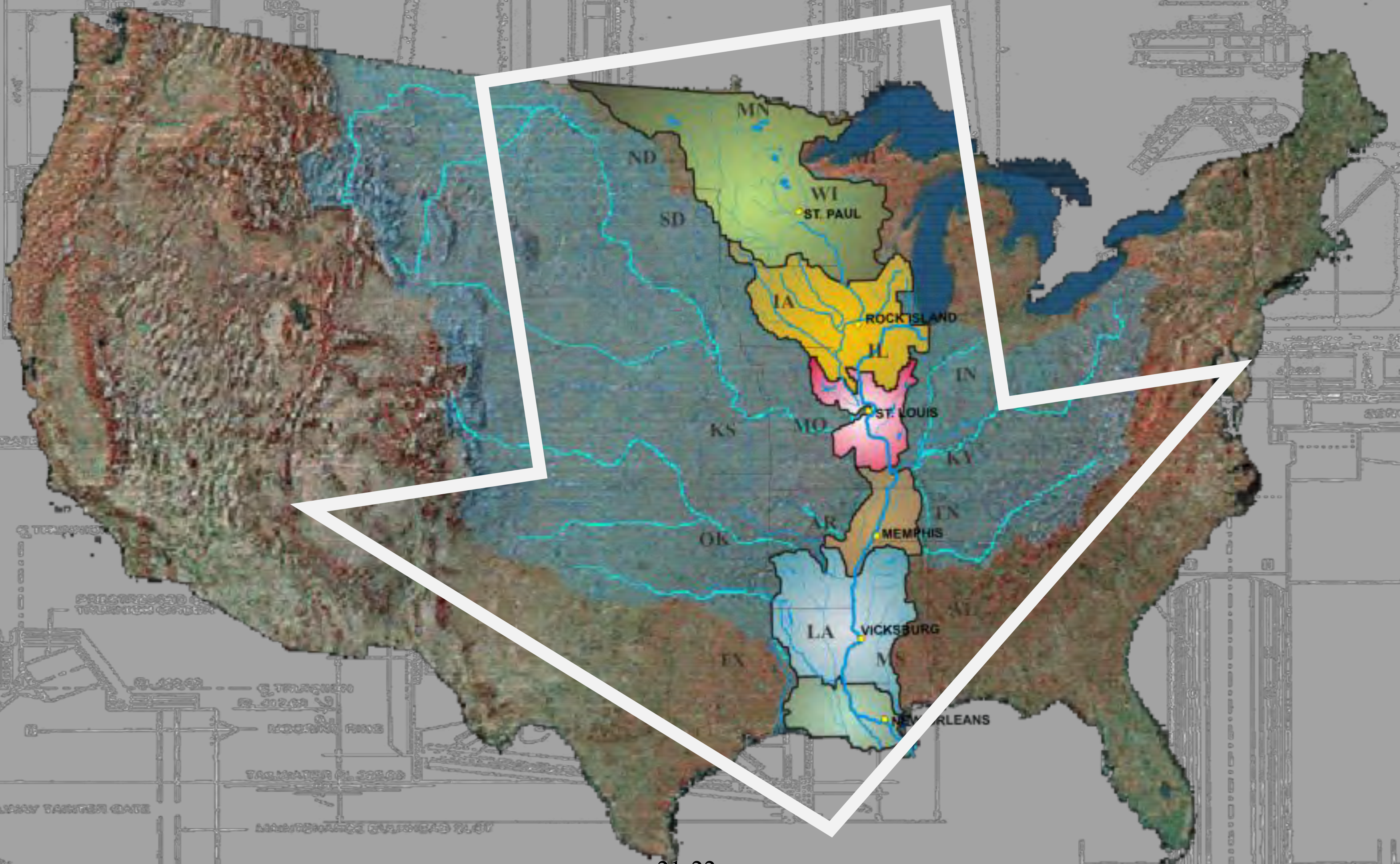
Colonel Michael A. Ellicott

Jason Dickard
Project Manager, Memphis District

Mike Thron
NEPA Coordinator, Memphis District

Blytheville, AR
10 September 2018

Mississippi River and Tributaries System



The Flood Control Act of 1928

After the catastrophic Flood of 1927, Congress approved "An act for the control of floods on the Mississippi River and its tributaries". Through this historic Act, Congress instructed the Mississippi River Commission (MRC) to implement the engineering plan advanced by Major Gen. Edgar Jadwin, Chief of Engineers. The $300 million plan adopted by Congress provided for enlarging and strengthening the levees from Cape Girardeau to the Gulf of Mexico.

Modifying the Jadwin Plan

The 1928 Flood Control Act did not signify the culmination of improvement on the Mississippi River. Despite a then staggering $300 million over ten years, the Jadwin plan quickly proved inadequate to the needs of the valley for both engineering and non-engineering reasons. In the 1930s, the MRC initiated a channel rectification program designed to increase the carrying capacity of the channel. In addition, the Overton Act, passed in 1936, modified the Jadwin Plan by providing for headwater reservoirs in the Yazoo and St. Francis basins. By 1941, the Jadwin Plan had transformed into the truly comprehensive river management program known as the Mississippi River and Tributaries (MR&T) project.

Mississippi River Commission

Maj. Gen.
Richard Kaiser

Angel

RADM Smith

Mattei

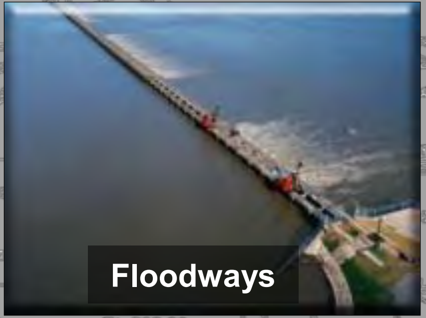
BG Toy

Reeder

BG Owen

- Established in 1879
- Presidential appointed commission; listening, inspecting, partnering, and engineering
- Provides a connection between the public; a construction, operations and maintenance agency; and the executive branch and legislature
- Has established relationships and processes to make recommendations to the Chief of Engineers, the Administration and inform Congress
- Oversees MR&T project – Corps Districts carry out the work

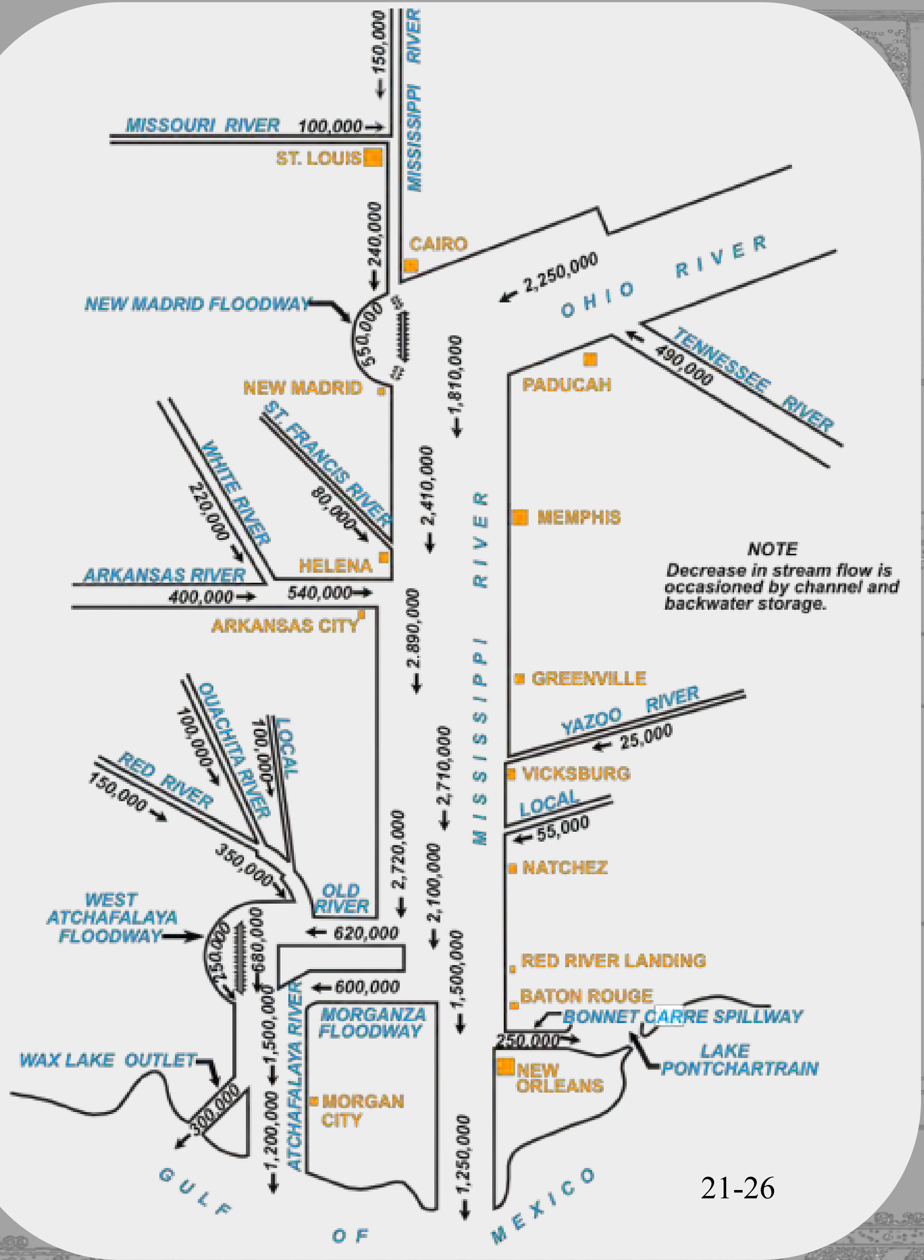
Mississippi River and Tributaries System



An Integrated System

- 35,000-square-mile flood plain
- $15.5 billion invested
- $1 Trillion in flood damages prevented
- $234 billion in flood damages prevented in 2011
- 66.9 to 1 return on investment
- 4 million people protected

Project Design Flood (PDF)



PROJECT DESIGN FLOOD

(58A - EN)

CUBIC FEET PER SECOND

SEPT 1958

Mississippi River Levees

Station	2011	1927 [6/]	1937 [6/]	1973	PDF [5/]
Cairo, IL [1/]	2,100,000 [c/2/3/]	1,626,000	2,010,000 [4/]	1,536,000	2,360,000 [4]
Memphis, TN	2,213,000 [c]	N/A	2,020,000	1,633,000	2,410,000
Helena, AR	2,130,000 [c]	1,756,000	1,968,000	1,627,000	2,490,000
Arkansas City, AR	2,293,000 [c]	1,712,000	2,159,000	1,879,000	2,890,000
Vicksburg, MS	2,320,000 [c]	1,806,000	2,060,000	1,962,000	2,710,000
Natchez, MS	2,260,000 [c]	N/A	2,046,000	2,024,000	2,720,000
Red River Landing, LA	1,641,000 [c]	1,461,000	1,467,000	1,498,000	2,100,000
Baton Rouge, LA	1,436,000 [c]	N/A	1,400,000	1,381,000	1,500,000
N. Orleans, LA	1,230,000 [c/8/]	1,360,000	1,342,000	1,248,000	1,250,000
Morgan City, LA [7/]	512,000 [c]	741,000	493,000	692,000	920,000
Wax Lake Outlet, LA [7/]	323,000 [c]	N/A	N/A	292,000	580,000

C - Peak Discharge, Provisional
1/ Discharge Range at Hickman, KY
2/ Total Confluence Flow of 1,936,000 cfs measured at approximate mile 950.8 at 1400 CDT 5/02/2011 near Wickliffe, KY, prior to operation of Birds Point-New Madrid
3/ Peak Flow Measured 4 May 2011 = 1,730,000 cfs at Hickman plus 370,000 cfs flow through Birds Point-New Madrid Floodway
4/ Includes flow through Birds Point-New Madrid Floodway
5/ Project Design Flood (PDF) provides design flows for MR&T project. Prior to 2011 Flood, MR&T Project was 89% complete. 2011 Flood Flows ~ 80-85% of MR&T PDF Flows.
6/ Reference - "Annual Maximum, Minimum, and Mean Discharges of the Mississippi River and Its Outlets and Tributaries to 1963"
7/ Wax Lake Outlet was constructed from 1937-1942. Prior to that, Lower Atchafalaya River was the major outlet.
8/ New Orleans Mean Daily Flow Measured at Belle Chasse in 2011, Readings at this site are tidally influenced. An instantaneous measurement of 1,320,000 cfs was made on 17 May 2012

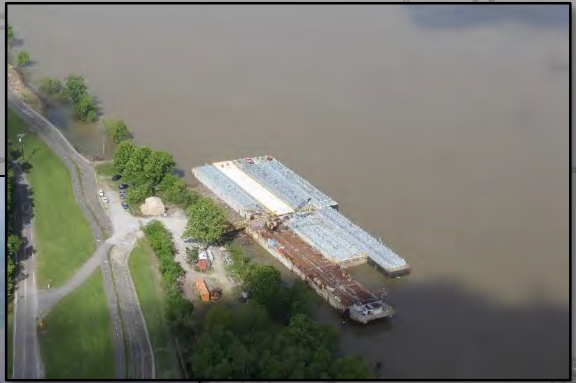
Revised 27 Jan 2012

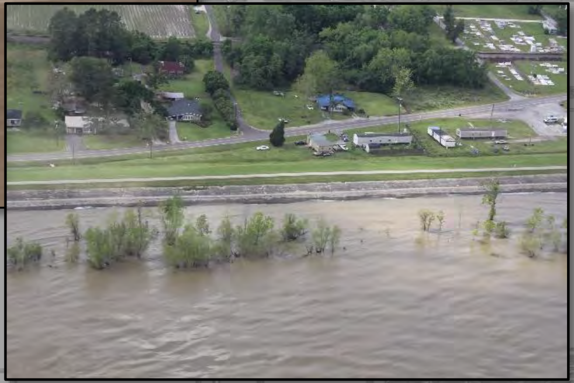
Mississippi River Levees

The Mainline Mississippi River Levee System (MRL) extends from Cape Girardeau, MO to Head of Passes, LA and is approximately 1,610 miles in length.

Construction of the MRL is approximately 79% complete. Assessment and maintenance will be required to ensure the integrity of the MRL after the project is completed.

In November 2017, USACE completed an engineering evaluation for authorized remaining work needed to complete the MRL. The evaluation addressed overtopping, seepage, slope stability, and floodwall stability.





Mississippi River Levees NEPA History

As required by the National Environmental Policy Act (NEPA), an Environmental Impact Statement (EIS) was completed in 1976.

In the 1990's, concerns about the environmental effects and compensatory mitigation for MRL construction activities lead to the completion of a Supplemental Environmental Impact Statement (SEIS) in 1998.

Since 1998, significant flood events have exposed critical seepage areas along the MRL, and subsequent engineering reviews have revealed numerous levee deficiencies that were not included in the 1998 SEIS.

USACE determined in March 2018 that a new SEIS would be required to address these additional items.

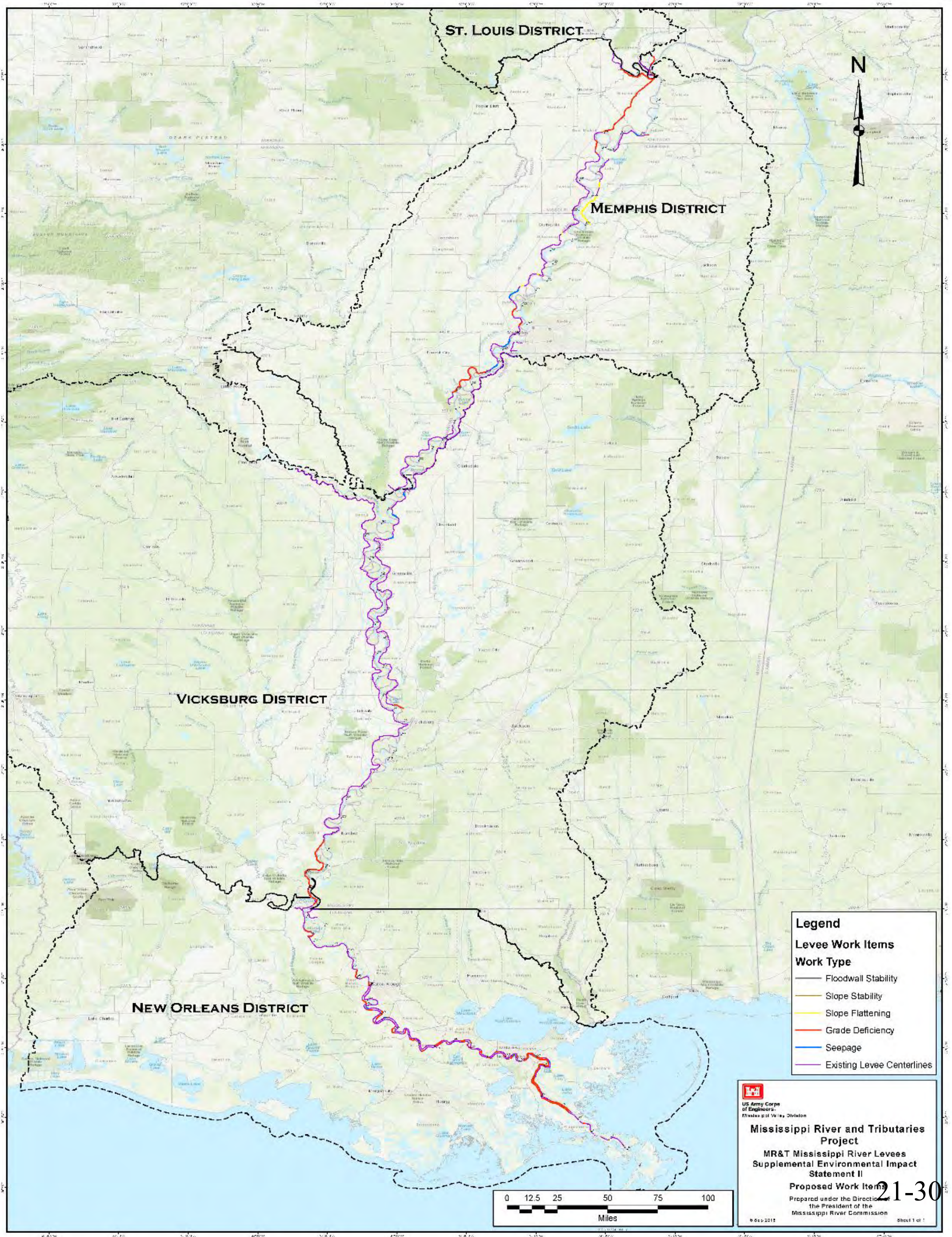
A Notice of Intent was issued in the Federal Register on 13 July 2018.

Description of Recommended Plan
1998 SEIS

District	Work Items	Miles of Enlargement	Miles of Seepage Control Construction
Memphis	31	31.8	74.3
Vicksburg	85	216.8	57.4
New Orleans	12	14.2	0.1
Total	128	262.8	131.8

14

BUILDING STRONG®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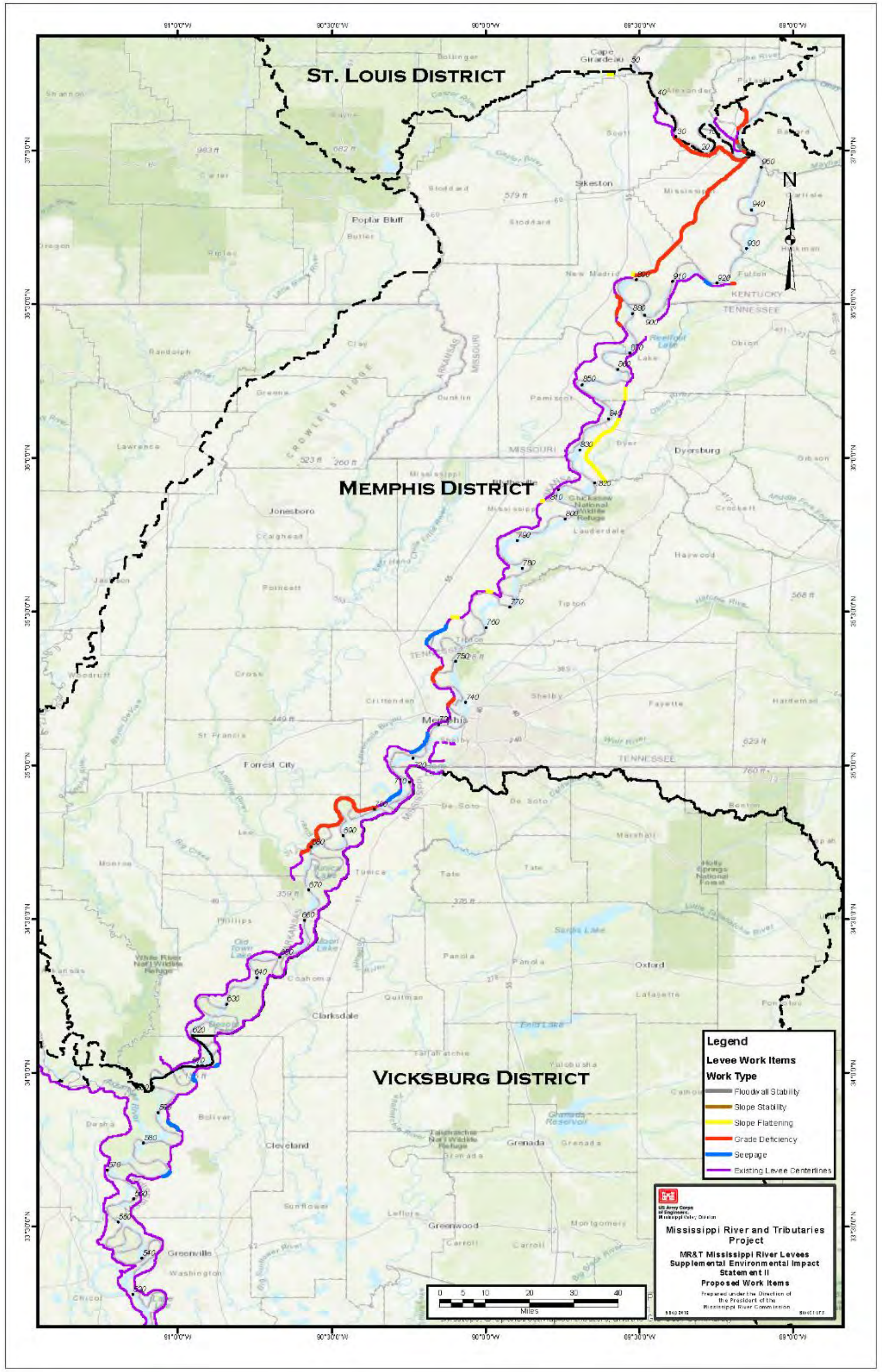
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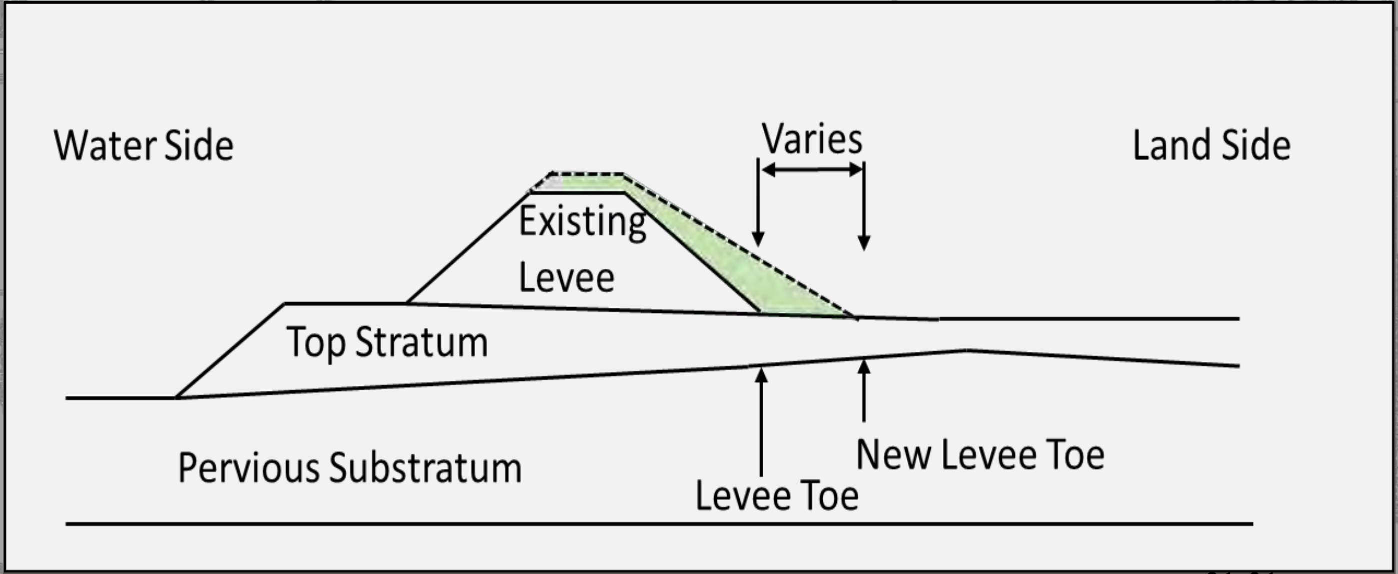

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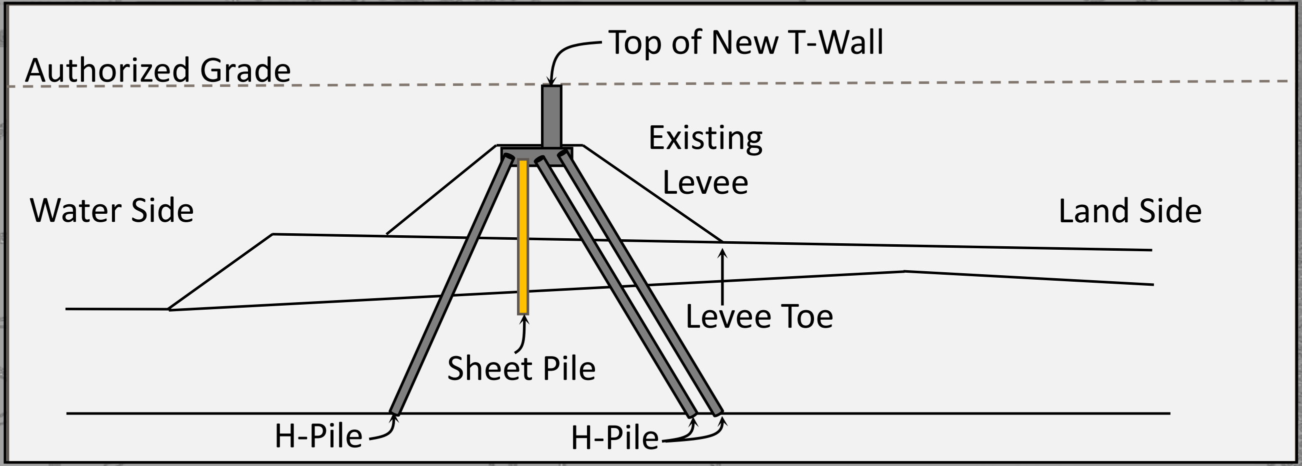

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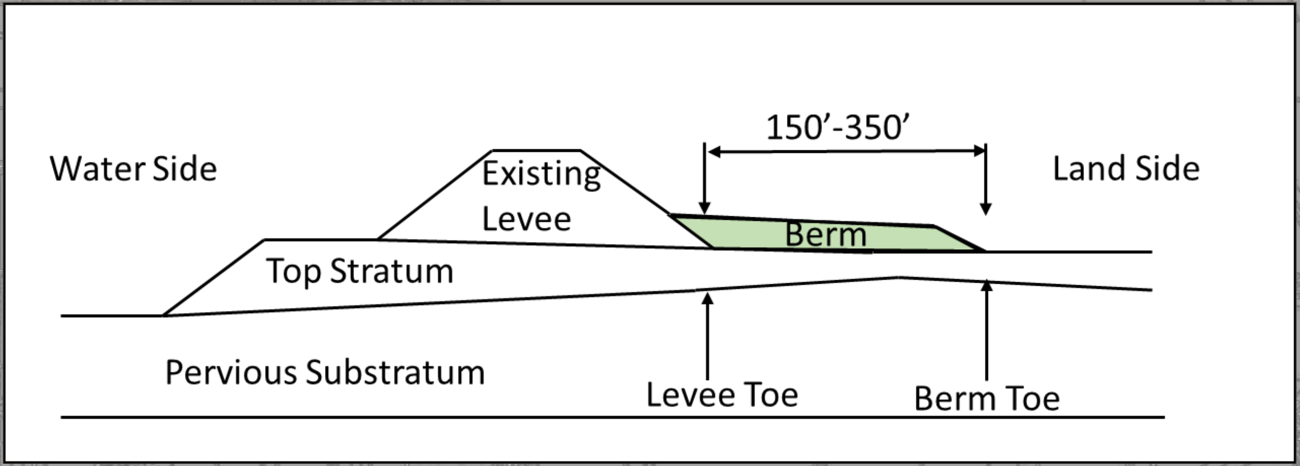

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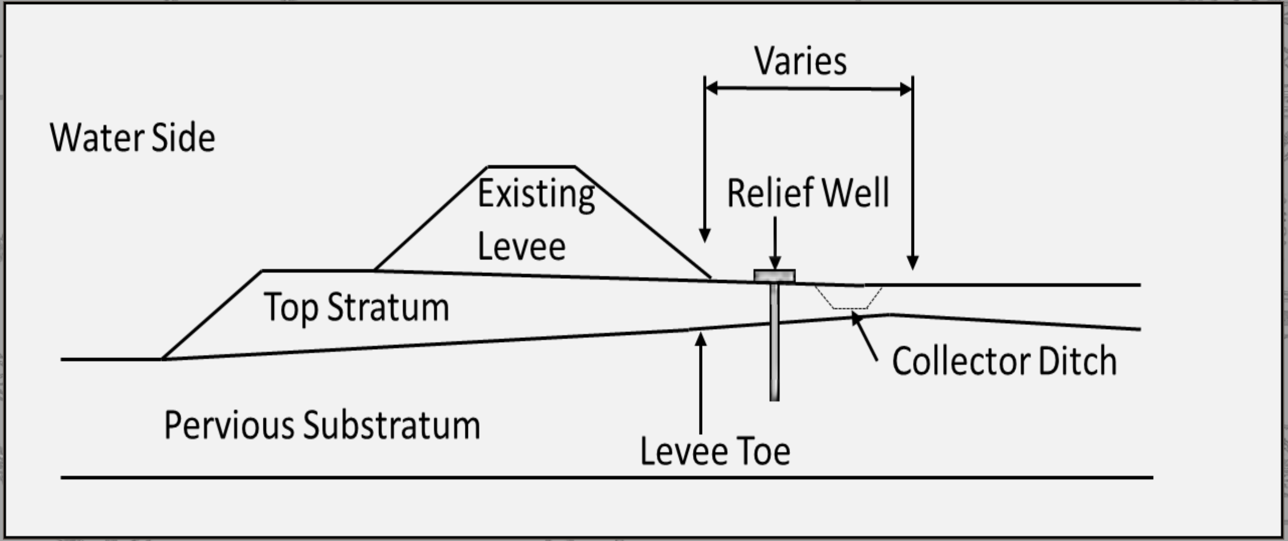

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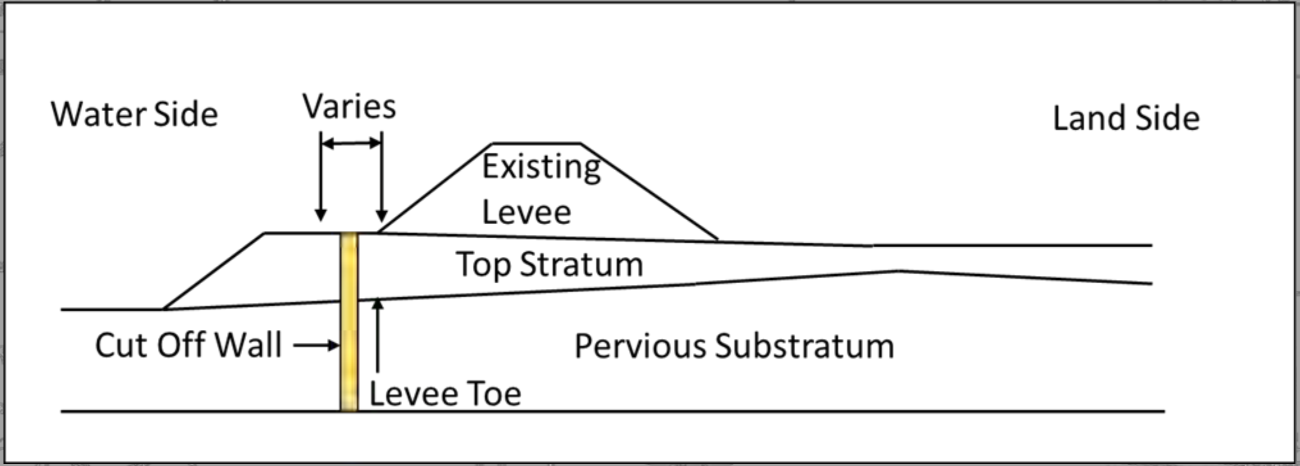

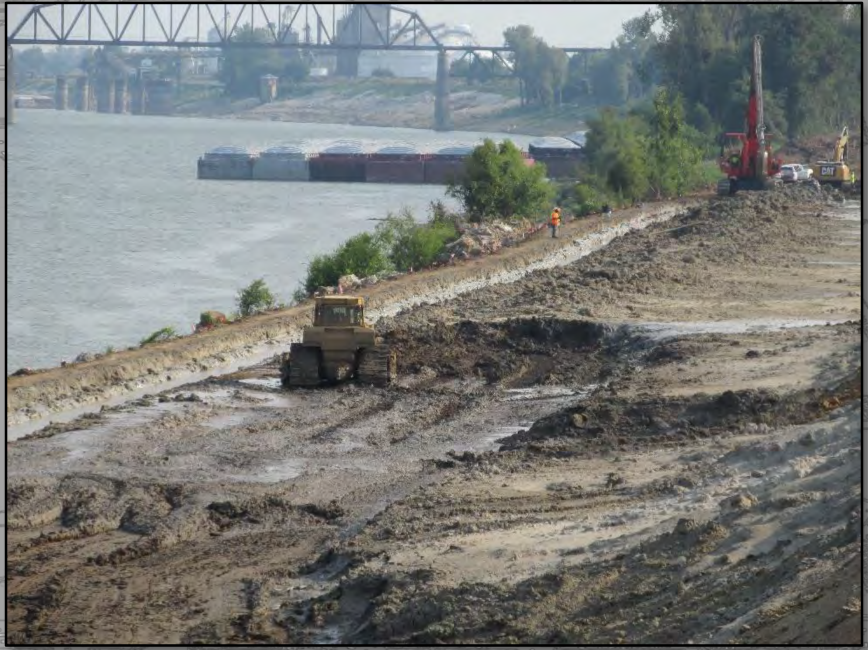

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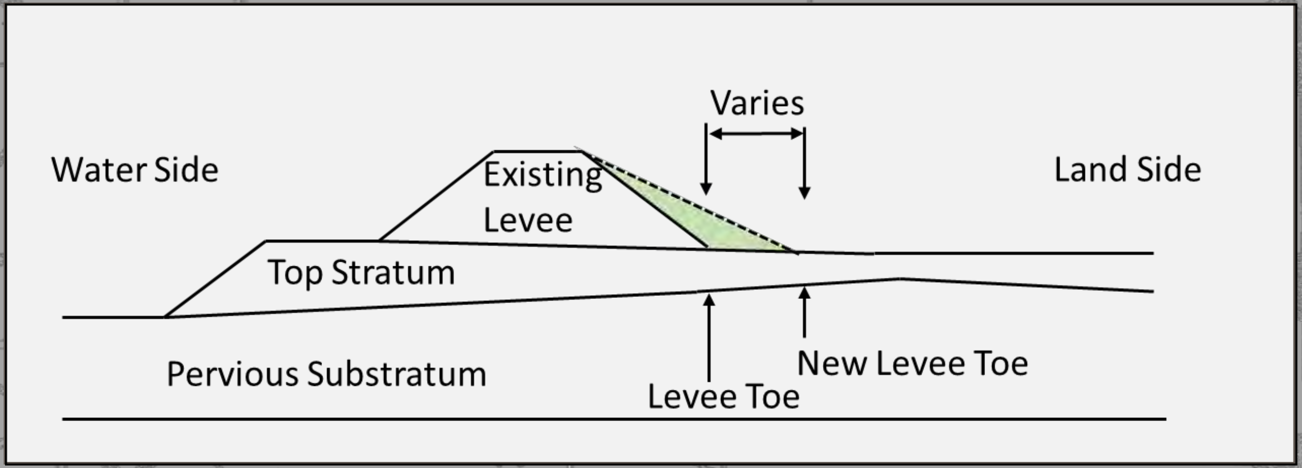


Proposed Schedule MRL SEIS #2

Milestone	Date
Notice of Intent Published	13 July 2018 (A)
Cooperating Agency Kick-off Meeting	30 Aug 2018 (A)
Public Scoping Meetings	10-13 Sept 2018
Public Scoping Period Ends	15 Oct 2018
Draft SEIS Released for Public/Agency Review	January 2020
Final SEIS Published & Record of Decision Signed	July 2020

National Environmental Policy Act (NEPA)

- Basic National Charter for Environmental Protection
- Provides Environmental Information to Public
- Ultimate Goal – Foster Good Decisions

NEPA

- Notice of Intent
  - 13 July 2018
- Scoping

Drive, Montgomery, AL 36117, (334) 244 3343.

Following the scoping meetings, individuals who have not already submitted their comments should submit them by August 15, 2018, by either:

* Email to act-arc@usace.army.mil, or
* Mail to Mr. Mike Malsom, Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628–0001.

FOR FURTHER INFORMATION CONTACT: Direct questions about the NEPA process to Mr. Mike Malsom by mail at Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628 0001; telephone at (251) 690 2023; electronic facsimile at (251) 694–3815; or email at ACT-ACR@usace.army.mil. You can also request to be added to the mailing list for public distribution of notices, meeting announcements, and documents.

SUPPLEMENTARY INFORMATION: Additional information on the ACT River Basin study will be posted as it becomes available on the Mobile District website at http://www.sam.usace.army.mil/.

The USACE will hold five public scoping meetings during the months of July and August as part of its preparation to conduct the water supply storage reallocation study and update the WCMs for the Alabama Power Company's Weiss and Logan Martin reservoirs in the ACT River Basin. The public is invited to attend the scoping meetings, which will provide information on the study process and afford interested parties the opportunity to submit to USACE input about their issues and concerns regarding that process. Each of the public scoping meetings will be presented in an open house format, allowing time for participants to review specific information and to provide comments either on forms available at the meeting or to a court reporter on-site at the meeting.

Curtis M. Flakes,
Chief, Planning and Environmental Division.

[FR Doc. 2018–14975 Filed 7–12–18; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement

AGENCY: Army Corps of Engineers, DoD.

ACTION: Notice of Intent.

SUMMARY: The U.S. Army Corps of Engineers ("USACE"), Memphis District, Vicksburg District, and the New Orleans District, is announcing its intent to prepare Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (SEIS I) to the 1976 EIS, to cover construction of remaining authorized work on the Mississippi River mainline levees (MRL) feature. Over the past twenty years since the finalization of SEIS I, USACE has determined that various sections (reaches) of the mainline levee system are deficient in varying amounts, and that certain remedial measures need to be undertaken to control seepage and to raise and stabilize the deficient sections of the levee to protect the lower Mississippi River Valley against the Project Design Flood (PDF) and maintain the structural integrity of the MRL system. The Proposed Action of SEIS II is to supplement and, as necessary, augment the 1976 EIS and SEIS I using the primary MR&T goals of: (1) Providing flood protection from the PDF; and (2) developing an environmentally sustainable project; formulating alternatives; identifying significant resources; assessing the direct, indirect, and cumulative impacts to those resources; investigating and environmentally assessing potential borrow areas; developing mitigation measures; and evaluating and selecting a preferred method for the construction of necessary authorized MRL Project features, which may include but are not limited to, implementing seepage control measures and the construction of various remediation measures for deficient levee reaches to bring these reaches to the project design grade. SEIS II will evaluate the potential direct, indirect, and cumulative impacts for an array of alternatives, including a No Action alternative.

FOR FURTHER INFORMATION CONTACT: Comments and questions about SEIS II should be submitted to USACE by email to: MRL-EIS-2@usace.army.mil; or by regular mail to: U.S. Army Corps of Engineers, ATTN: CEMVN–PDC–UDC, 167 North Main Street, Room B–202, Memphis, Tennessee 38103–1894. For additional information, including but not limited to a copy of SEIS I and the 1976 EIS, please visit the Project website at: http://www.mvk.usace.army.mil/MRLSEIS/.

SUPPLEMENTARY INFORMATION:

1. Project Background and Authorization. The MR&T Project (and the MRL feature) was authorized by the Flood Control Act of 1928, as amended. The 1976 EIS was filed with the Council of Environmental Quality on 8 April 1976. SEIS I, which was prepared to supplement the 1976 EIS to evaluate the effects of continued construction of the MRL levee enlargements, stability berms, seepage control, and erosion protection measures, was filed with the Environmental Protection Agency on 31 July 1998. SEIS I focused on the levees of the MRL that were the most deficient in height and on seepage control measures for levee reaches with observable signs of seepage during previous high water events.

The MR&T Project is designed to manage flood risk damages in the alluvial valley between Cape Girardeau, Missouri and the Head of Passes, Louisiana. The goal of the MR&T Project is to provide an environmentally sustainable project for comprehensive flood damage control, protection, and risk reduction from the "Project Design Flood", in the alluvial valley beginning at Cape Girardeau, Missouri to the Head of Passes, Louisiana, by means of levees, floodwalls, floodways, reservoirs, banks stabilization and channel improvements in and along the Mississippi River and its tributaries. The mainline levee system, comprised of levees, floodwalls, backwater areas, floodways, and various control structures, is approximately 1,610 miles long. The PDF is a hypothetical flood that was developed to determine the design flood to be used in designing the MR&T levee system in the lower Mississippi River Basin, and is defined as the "greatest flood having a reasonable probability of occurrence" when the operable features of the entire MR&T Project are considered. The PDF upon which the current design for the construction of the mainline levee system and remaining unconstructed levees is based, is the "Refined 1973

Scoping Purpose

- Determine Scope of Significant Issues and Concerns
- Eliminate Issues that are Not Significant

Scoping Importance

- Scoping Process is Key to:
  - Clarifying the Significant Issues to be Analyzed In-Depth
  - Preparing a Concise EIS

Scoping Considerations

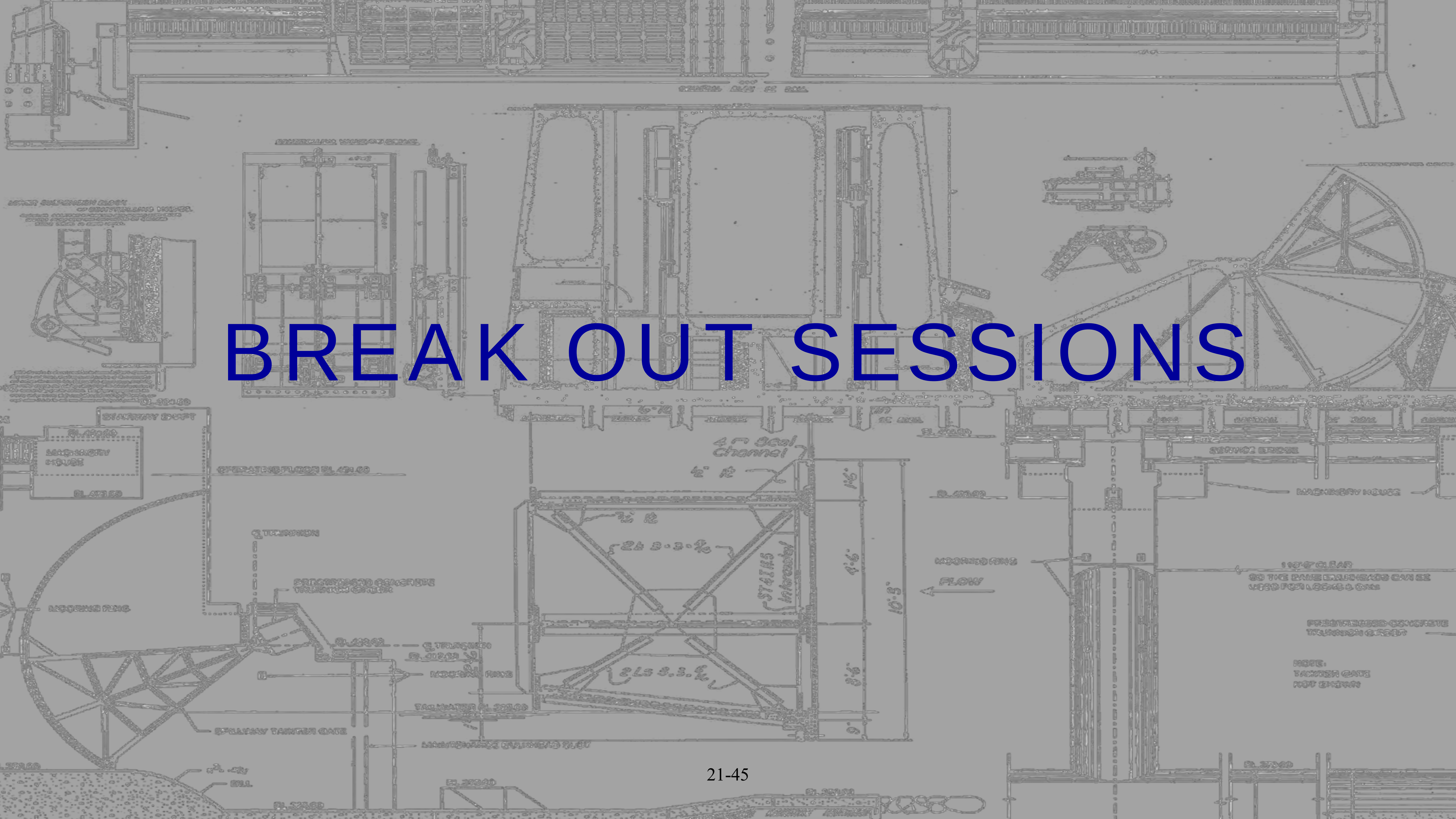
- Pertinent Studies
- Significant Resources
- Issues/Concerns
- Alternative Plans

Significant Resources

- Terrestrial Habitat
- Wetlands
- Water Quality
- Waterfowl
- Aquatic Resources
- Cultural Resources
- Endangered Species
- Agricultural Lands

WE WANT TO HEAR FROM YOU

- Breakout Sessions – Oral Comments
- Written comments may be sent to one of the individuals on the handout, given to us tonight, or e-mailed to: MRL-SEIS-2@usace.army.mil
- All Public Scoping Comments are requested by 15 October 2018



BREAK OUT SESSIONS

SUMMARY & CLOSING THOUGHTS

- For additional information about the project, please visit http://www.mvk.usace.army.mil/MRLSEIS/
- Written comments may be sent to one of the individuals on the contact cards, given to us tonight, or e-mailed to: MRL-SEIS-2@usace.army.mil
- All Public Scoping Comments are requested by 15 October 2018

Blytheville, AR MRL SEIS II Scoping Meeting Comments

10 September 2018

Scoping Meeting Summary

The first of four public scoping meetings for the proposed USACE MRL-SEIS-2 Study was conducted on 10 September 2018 at the Holiday Inn Blytheville, 1121 East Main Street, Blytheville, Arkansas 72315 from 1900-2100. Three members of the public attended the meeting, detailed below.

Jennifer Sheehan, Arkansas Game and Fish Commission

Jimmy Moody, Dyer County Little Levee Drainage District #1

Robert Stainton, The Natural Resources Investment (NRI) Group, LLC

Upon filling out a registration form, attendees received a handout summarizing the purpose of the meeting, basic project information and proposed work reaches, and contact information. Jason Dickard, USACE-MVM Project Manager, conducted a brief presentation summarizing the history of the project and potential project features. Mike Thron, USACE NEPA Coordinator, conducted a brief presentation on the purpose of NEPA and public scoping. At the conclusion of the presentations, USACE opened up the floor for oral comments. Descriptions of the comments received are included below.

There was a question on how funding works for the various work items since the proposed activities would extend for many years.

There was a question on the mitigation process and whether it was feasible to use existing mitigation banks.

There was a comment that activities below the ordinary high water (OHW) mark in the state of Arkansas require coordination with the Arkansas Commission of State Lands Office.

There was a comment that the study should look at species of state concern.

This information was provided by Mike Thron, CEMVN-PDC-U.

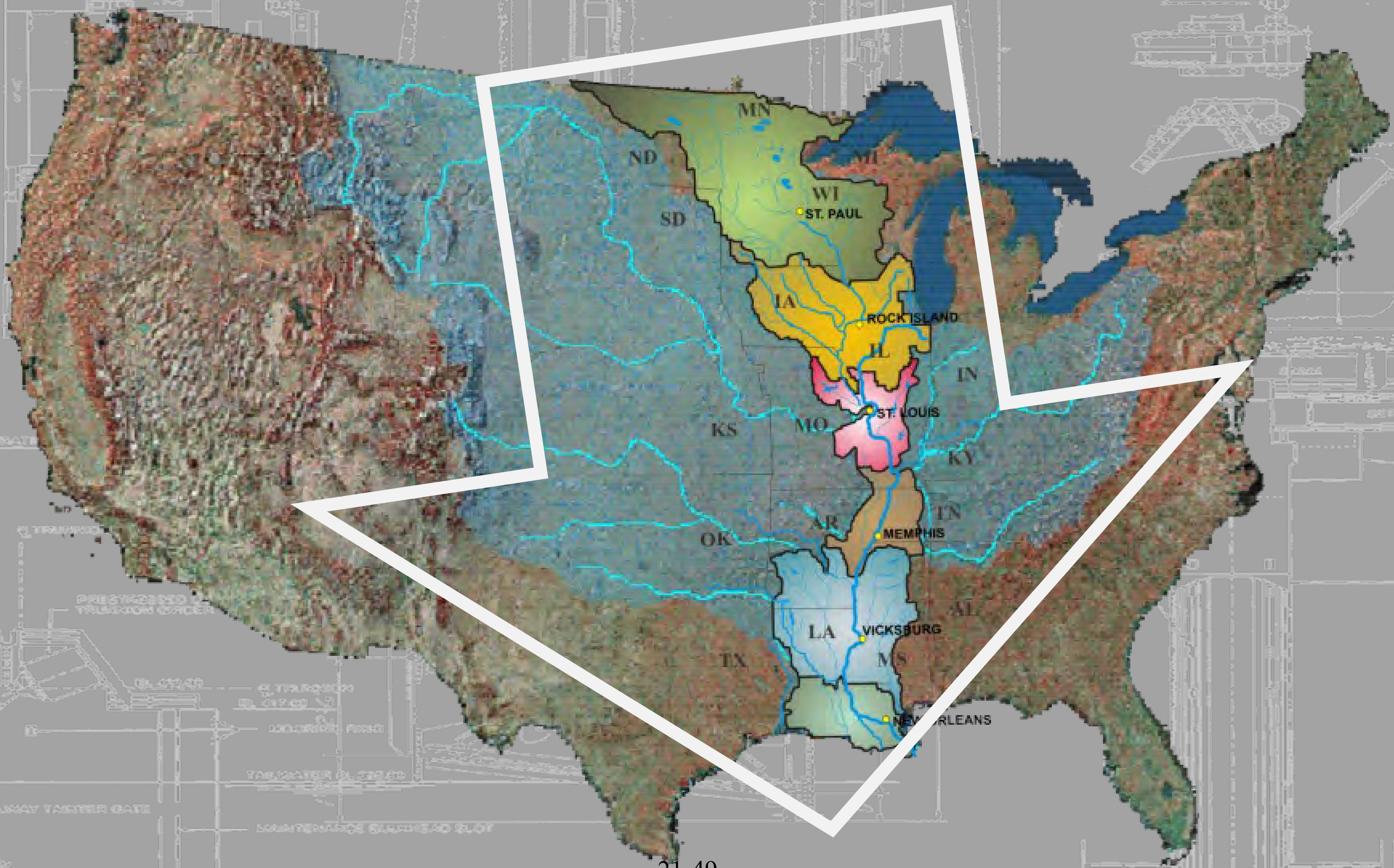
MR&T MISSISSIPPI RIVER LEVEES SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (SEIS) II PUBLIC SCOPING MEETING

Colonel Michael C. Derosier

Daniel Sumerall
Project Manager, Vicksburg District

Brian McPherson
NEPA Coordinator, Vicksburg District

Vicksburg, MS
11 September 2018


MN
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ST. PAUL
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ROCK ISLAND
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ST. LOUIS
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AR
MEMPHIS
OK
AL
LA
VICKSBURG
MS
TX

The Flood Control Act of 1928

After the catastrophic Flood of 1927, Congress approved “An act for the control of floods on the Mississippi River and its tributaries”. Through this historic Act, Congress instructed the Mississippi River Commission (MRC) to implement the engineering plan advanced by Major Gen. Edgar Jadwin, Chief of Engineers. The $300 million plan adopted by Congress provided for enlarging and strengthening the levees from Cape Girardeau to the Gulf of Mexico.

Modifying the Jadwin Plan

The 1928 Flood Control Act did not signify the culmination of improvement on the Mississippi River. Despite a then staggering $300 million over ten years, the Jadwin plan quickly proved inadequate to the needs of the valley for both engineering and non-engineering reasons. In the 1930s, the MRC initiated a channel rectification program designed to increase the carrying capacity of the channel. In addition, the Overton Act, passed in 1936, modified the Jadwin Plan by providing for headwater reservoirs in the Yazoo and St. Francis basins. By 1941, the Jadwin Plan had transformed into the truly comprehensive river management program known as the Mississippi River and Tributaries (MR&T) project.

Mississippi River Commission

Maj. Gen.
Richard Kaiser

Angel

RADM Smith

Mattei

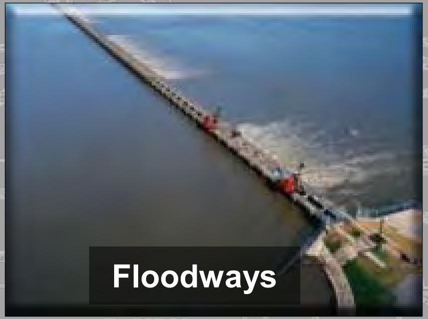
BG Toy

Reeder

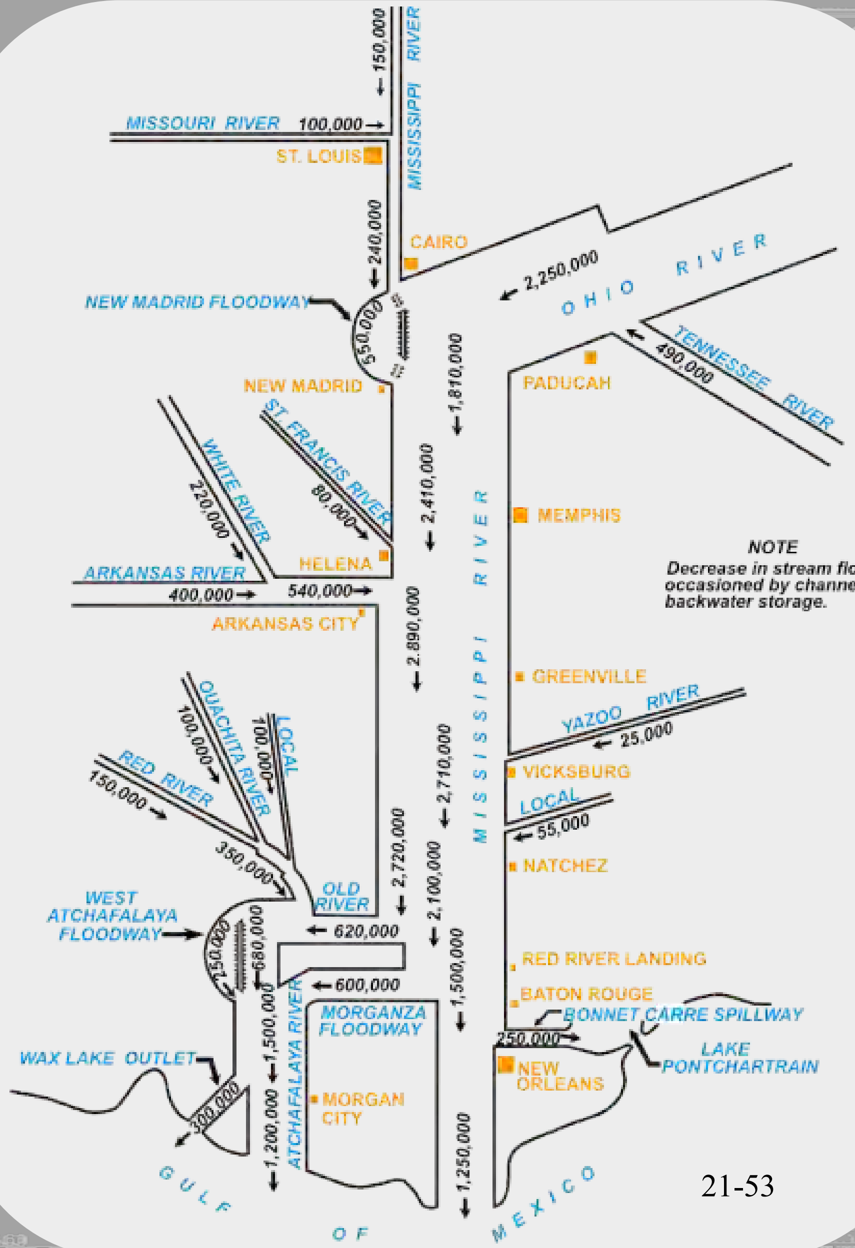
BG Owen

- Established in 1879
- Presidential appointed commission; listening, inspecting, partnering, and engineering
- Provides a connection between the public; a construction, operations and maintenance agency; and the executive branch and legislature
- Has established relationships and processes to make recommendations to the Chief of Engineers, the Administration and inform Congress
- Oversees MR&T project – Corps Districts carry out the work

Mississippi River and Tributaries System



An Integrated System



21-53

PROJECT DESIGN FLOOD

(58A - EN)

CUBIC FEET PER SECOND

SEPT 1958

Station	2011	1927 6/	1937 6/	1973	PDF 5/
Cairo, IL 1/	2,100,000 C/2/3/	1,626,000	2,010,000 4/	1,536,000	2,360,000 4
Memphis, TN	2,213,000 C	N/A	2,020,000	1,633,000	2,410,000
Helena, AR	2,130,000 C	1,756,000	1,968,000	1,627,000	2,490,000
Arkansas City, AR	2,293,000 C	1,712,000	2,159,000	1,879,000	2,890,000
Vicksburg, MS	2,320,000 C	1,806,000	2,060,000	1,962,000	2,710,000
Natchez, MS	2,260,000 C	N/A	2,046,000	2,024,000	2,720,000
Red River Landing, LA	1,641,000 C	1,461,000	1,467,000	1,498,000	2,100,000
Baton Rouge, LA	1,436,000 C	N/A	1,400,000	1,381,000	1,500,000
N. Orleans, LA	1,230,000 C/8/	1,360,000	1,342,000	1,248,000	1,250,000
Morgan City, LA 7/	512,000 C	741,000	493,000	692,000	920,000
Wax Lake Outlet, LA 7/	323,000 C	N/A	N/A	292,000	580,000

C - Peak Discharge, Provisional

1/ Discharge Range at Hickman, KY

2/ Total Confluence Flow of 1,936,000 cfs measured at approximate mile 950.8 at 1400 CDT 5/02/2011 near Wickliffe, KY, prior to operation of Birds Point-New Madrid

3/ Peak Flow Measured 4 May 2011 = 1,730,000 cfs at Hickman plus 370,000 cfs flow through Birds Point-New Madrid Floodway

4/ Includes flow through Birds Point-New Madrid Floodway

5/ Project Design Flood (PDF) provides design flows for MR&T project. Prior to 2011 Flood, MR&T Project was 89% complete. 2011 Flood Flows ~ 80-85% of MR&T PDF Flows.

6/ Reference - "Annual Maximum, Minimum, and Mean Discharges of the Mississippi River and Its Outlets and Tributaries to 1963"

7/ Wax Lake Outlet was constructed from 1937-1942. Prior to that, Lower Atchafalaya River was the major outlet.

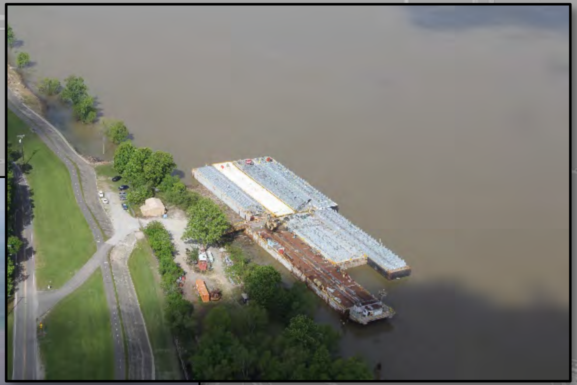
8/ New Orleans Mean Daily Flow Measured at Belle Chasse in 2011, Readings at this site are tidally influenced. An instantaneous measurement of 1,320,000 cfs was made on 17 May 2012

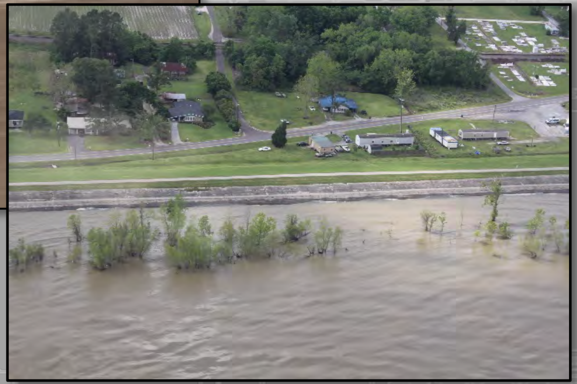
Revised 27 Jan 2012

The Mainline Mississippi River Levee System (MRL) extends from Cape Girardeau, MO to Head of Passes, LA and is approximately 1,610 miles in length.

Construction of the MRL is approximately 79% complete. Assessment and maintenance will be required to ensure the integrity of the MRL after the project is completed.

In November 2017, USACE completed an engineering evaluation for authorized remaining work needed to complete the MRL. The evaluation addressed overtopping, seepage, slope stability, and floodwall stability.





Vicksburg Gage

1927 - Gage 62.0 (if levees had held)

2011 - Gage 57.1

1927 - Gage 56.2 (as happened)

1937 - Gage 53.2

1929 - Gage 52.9

1973 - Gage 51.6

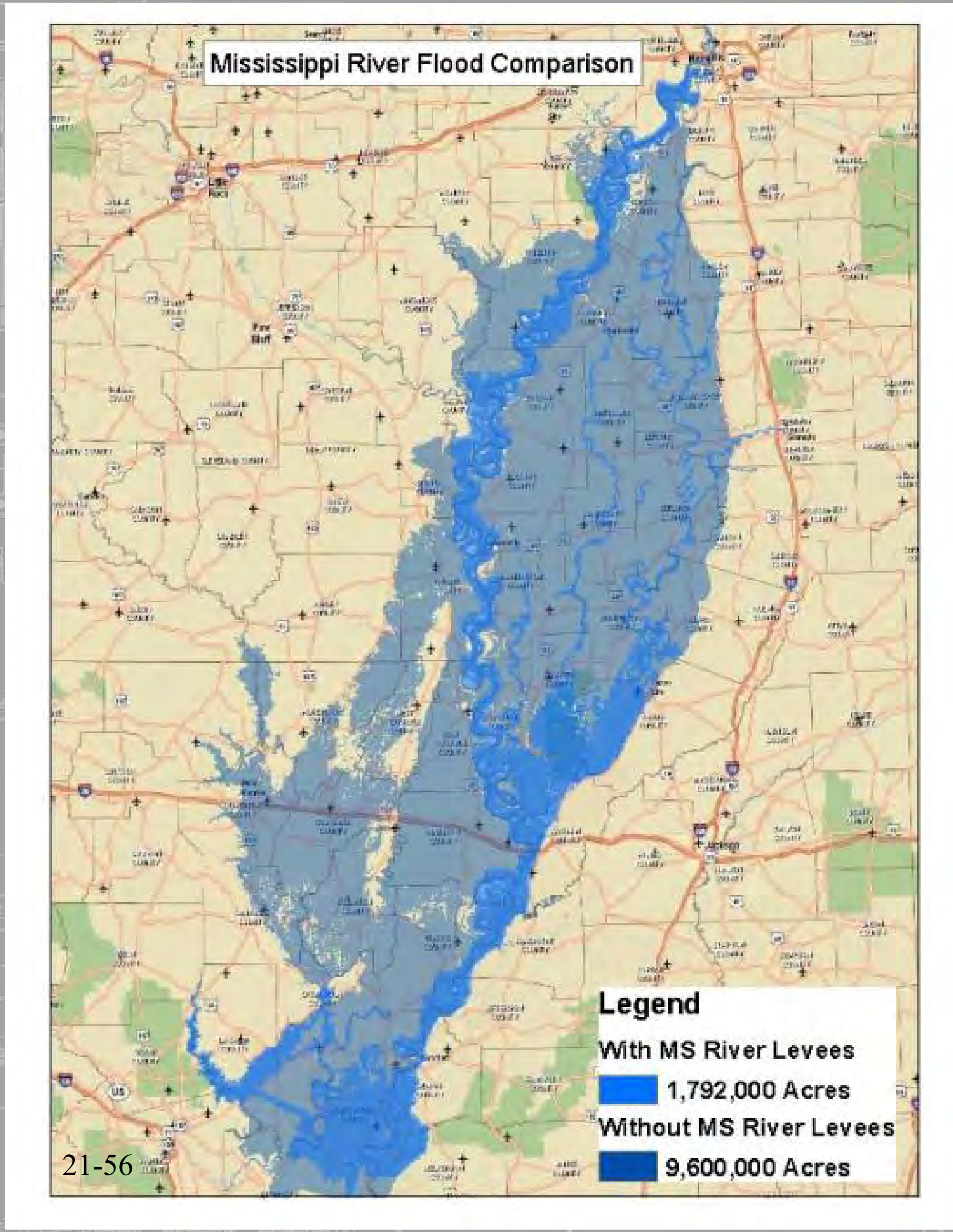
2008 - Gage 51.0

1932 - Gage 49.5

1983 - Gage 49.3

1945 - Gage 47.5

1961 - Gage 44.9

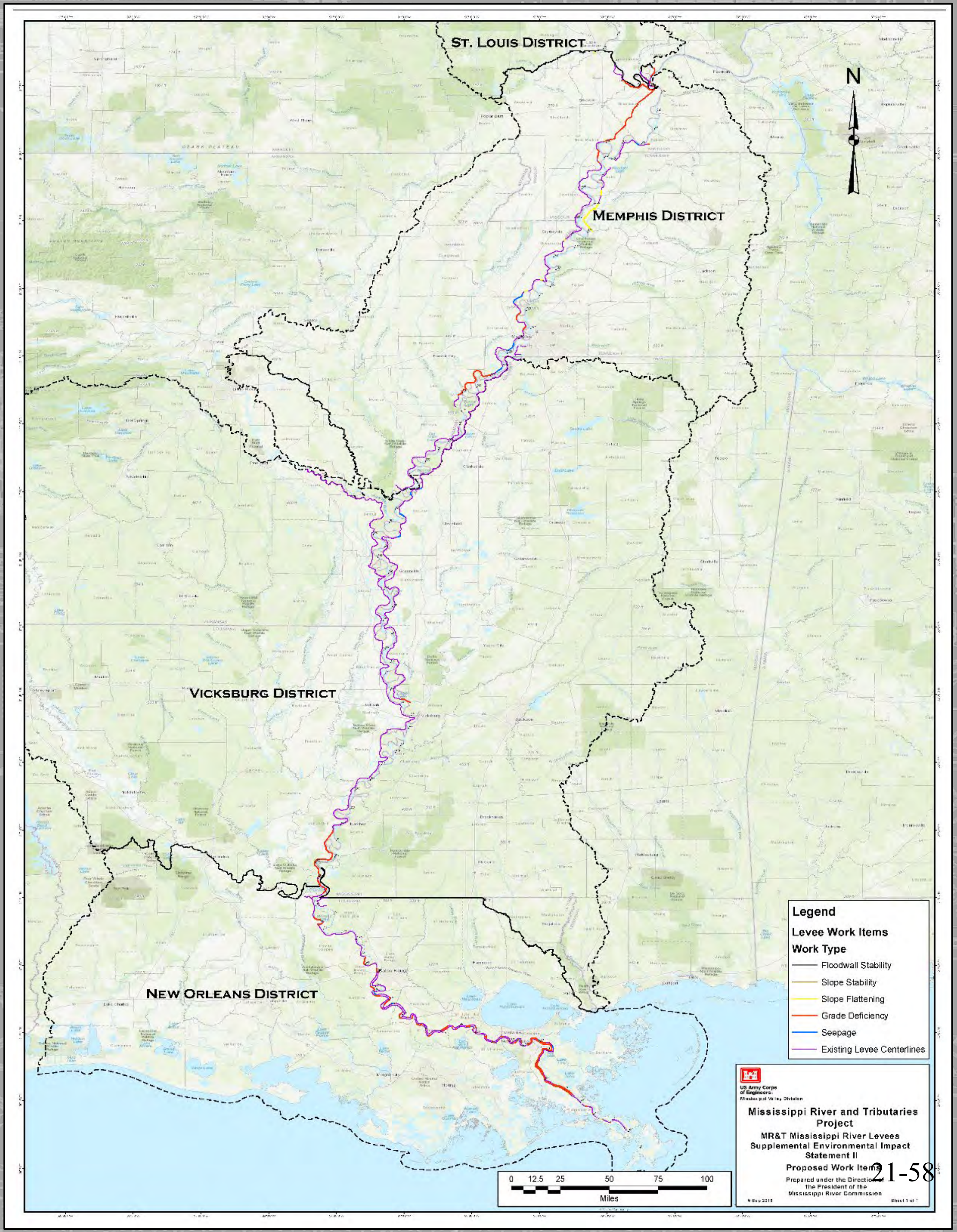


Mississippi River Levees NEPA History

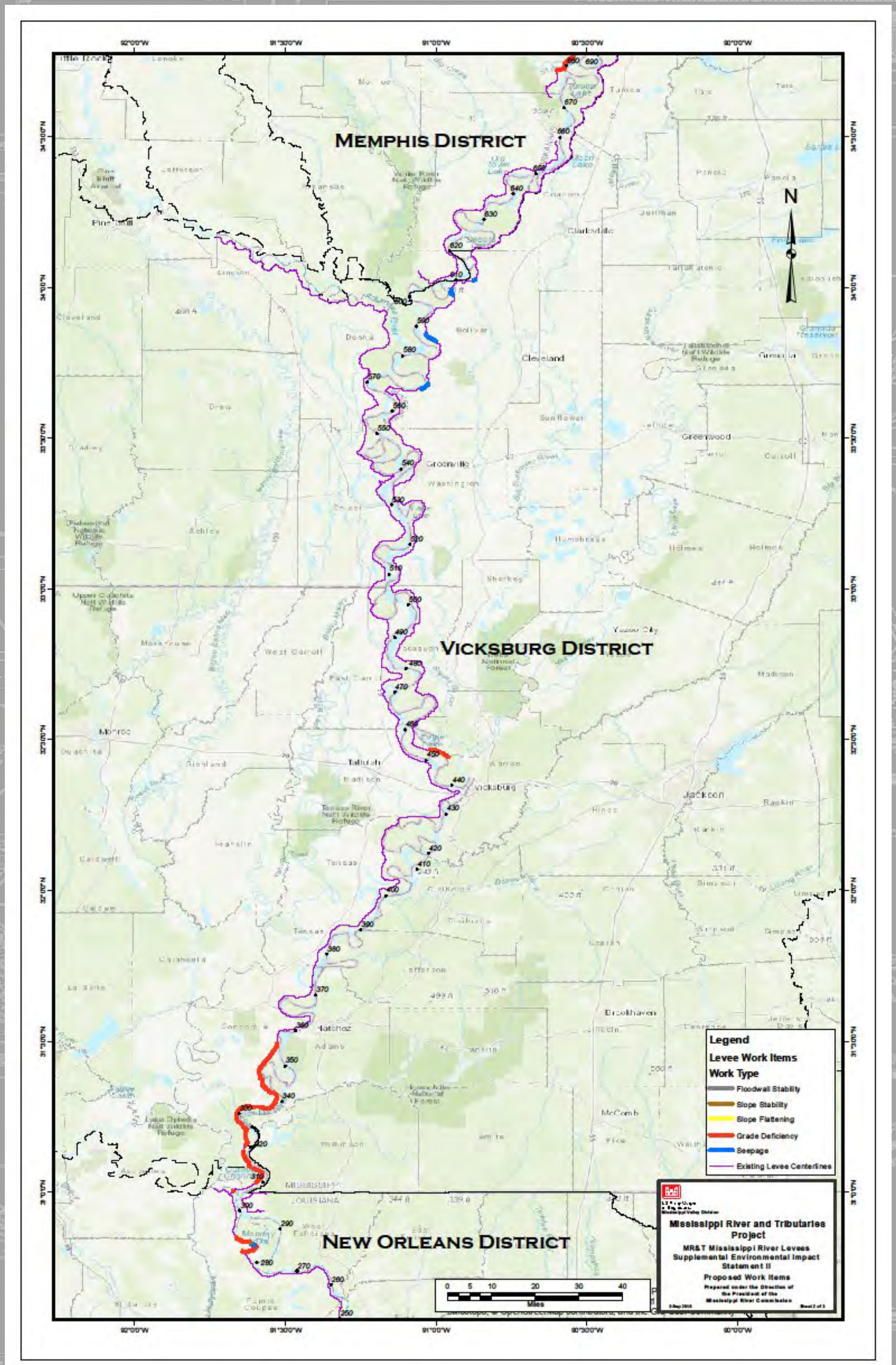
Description of Recommended Plan
1998 SEIS

District	Work Items	Miles of Enlargement	Miles of Seepage Control Construction
Memphis	31	31.8	74.3
Vicksburg	85	216.8	57.4
New Orleans	12	14.2	0.1
Total	128	262.8	131.8

BUILDING STRONG®



St. Louis District
N
Memphis District
Vicksburg District
New Orleans District
Legend
Levee Work Items
Work Type
Floodwall Stability
Slope Stability
Slope Flattening
Grade Deficiency
Seepage
Existing Levee Centerlines
US Army Corps of Engineers
Mississippi Valley Division
Mississippi River and Tributaries Project
MR&T Mississippi River Levees Supplemental Environmental Impact Statement II
Proposed Work Items
Prepared under the Direction of the President of the Mississippi River Commission
Sheet 1 of 1
0 12.5 25 50 75 100
Miles



Memphis District
N
Vicksburg District
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Levee Work Items
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Mississippi River and Tributaries Project
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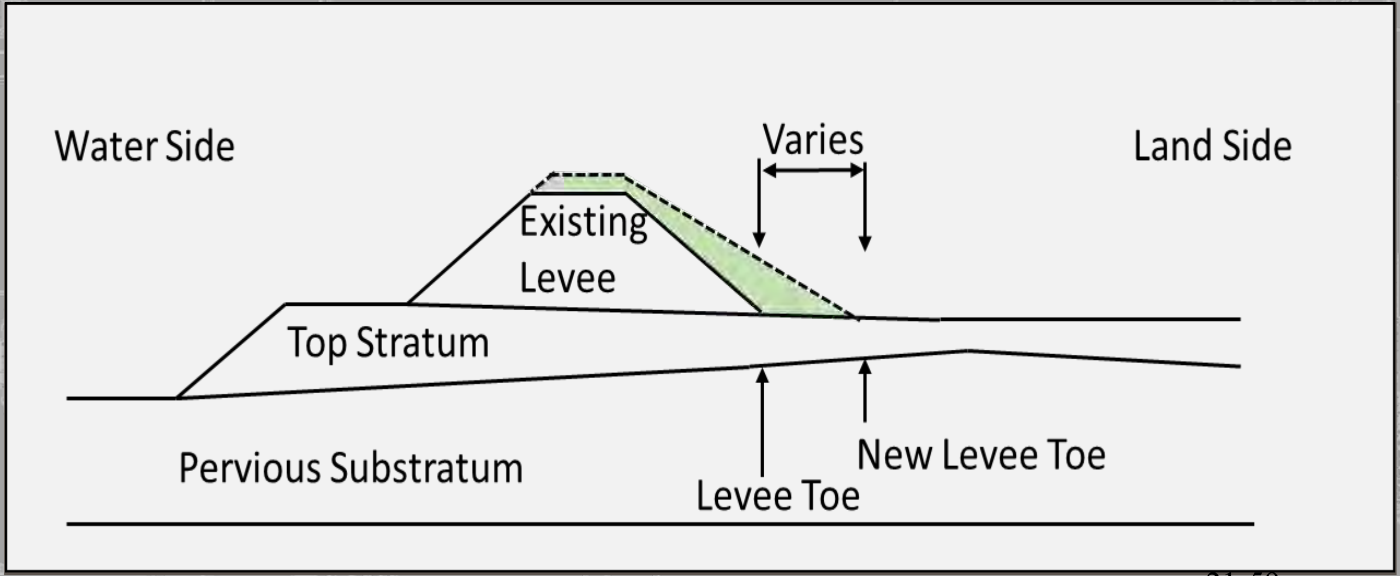
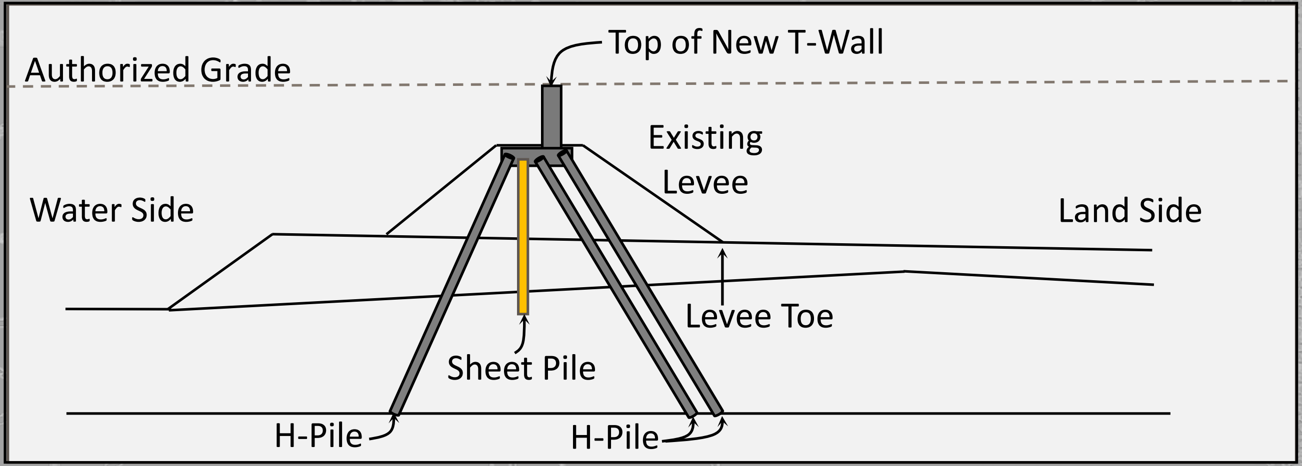
Proposed Work Items
0 5 10 20 30 40
Miles
Vicksburg
Natchez
Jackson
Greenville
Cleveland

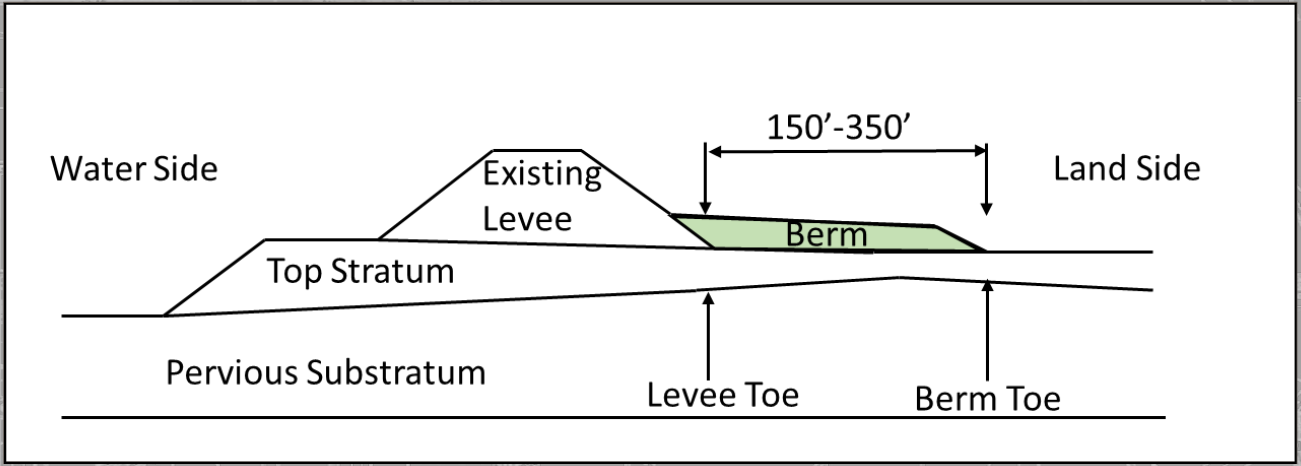
Levee enlargements are conducted in locations where the existing levee is not at the authorized grade. Depending on the location of the project, these raises may occur on the landside, riverside, or straddle the existing levee section.



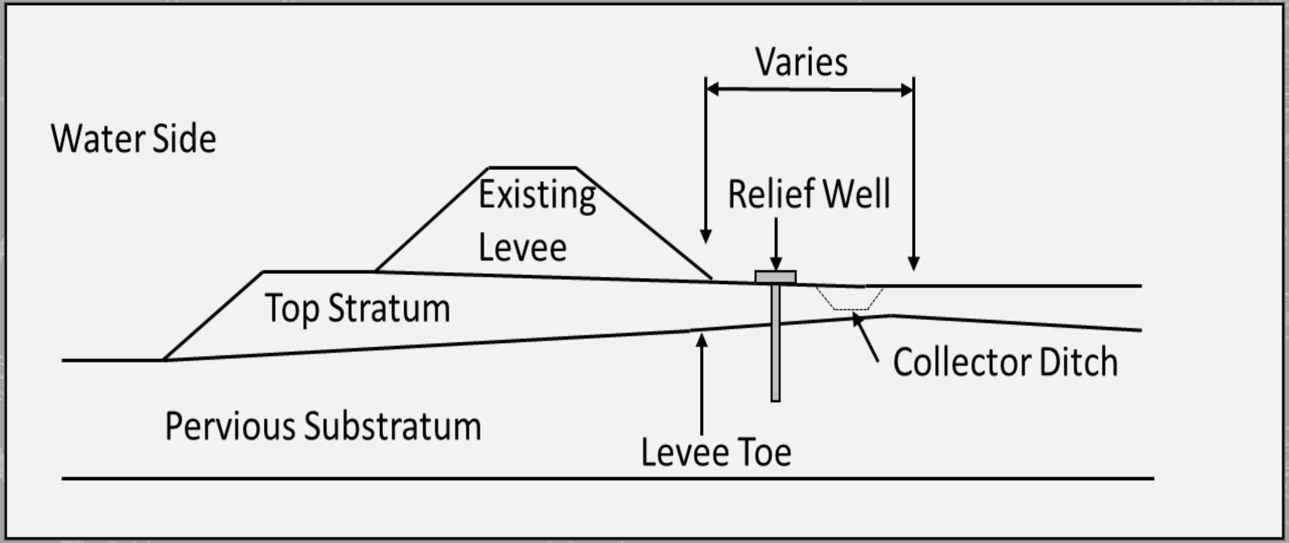
Urban areas typically require floodwalls rather than levees to reduce impacts to residences and businesses. These floodwalls can have stability concerns or height deficiencies that must be addressed.



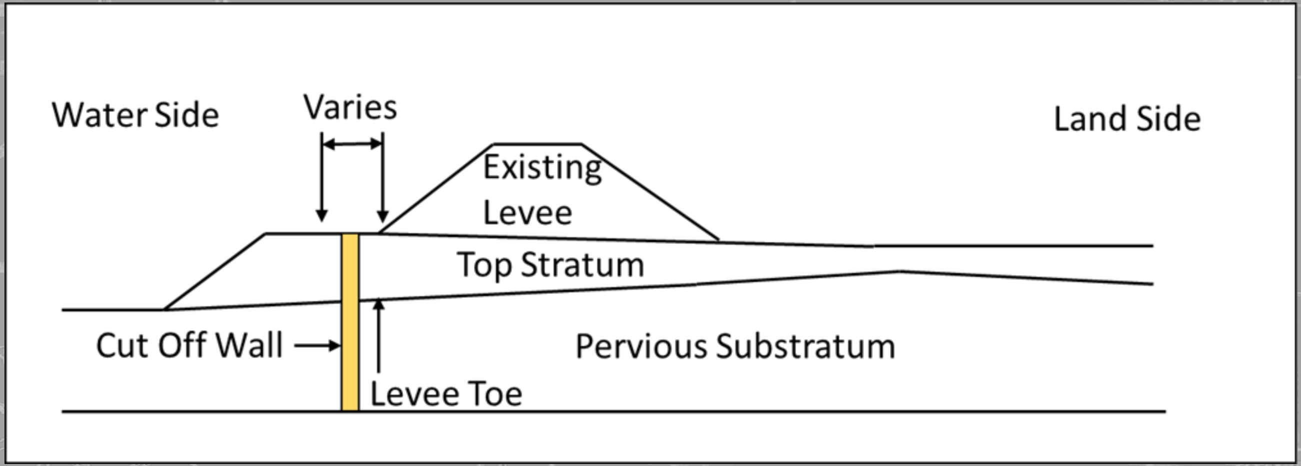
Seepage berms are constructed on the landside of the levee using impervious soils to reinforce existing top stratum and to reduce underseepage pressure near the toe of the levee. Upon construction, berms are turfed and mowed to prevent erosion or encroachment of undesired vegetation.

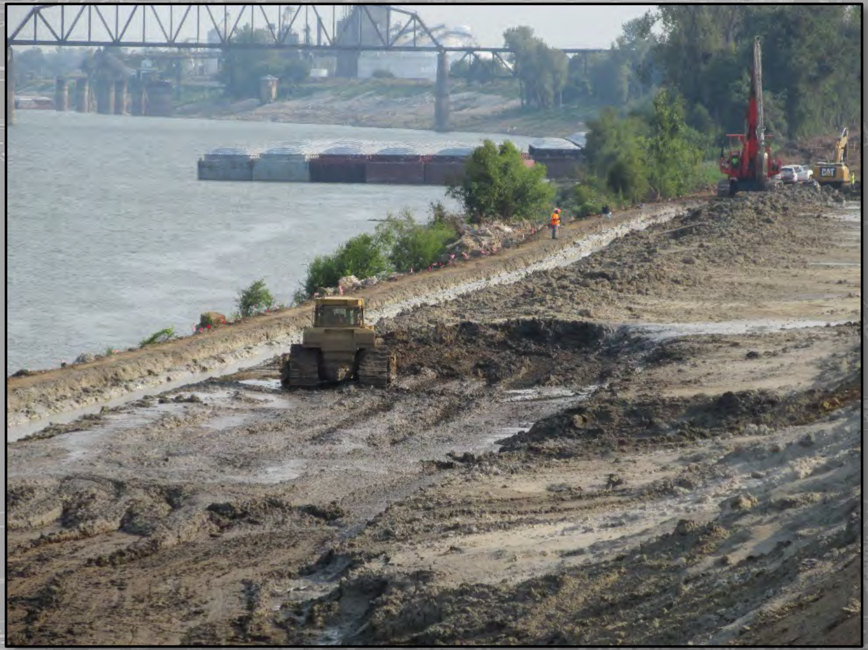


Relief wells are vertically installed wells consisting of a well screen surrounded by a filter material designed to prevent in-wash of foundation materials into the well. Relief wells intercept underseepage and provide a controlled outlet for the water while minimizing material transport underneath the levee.

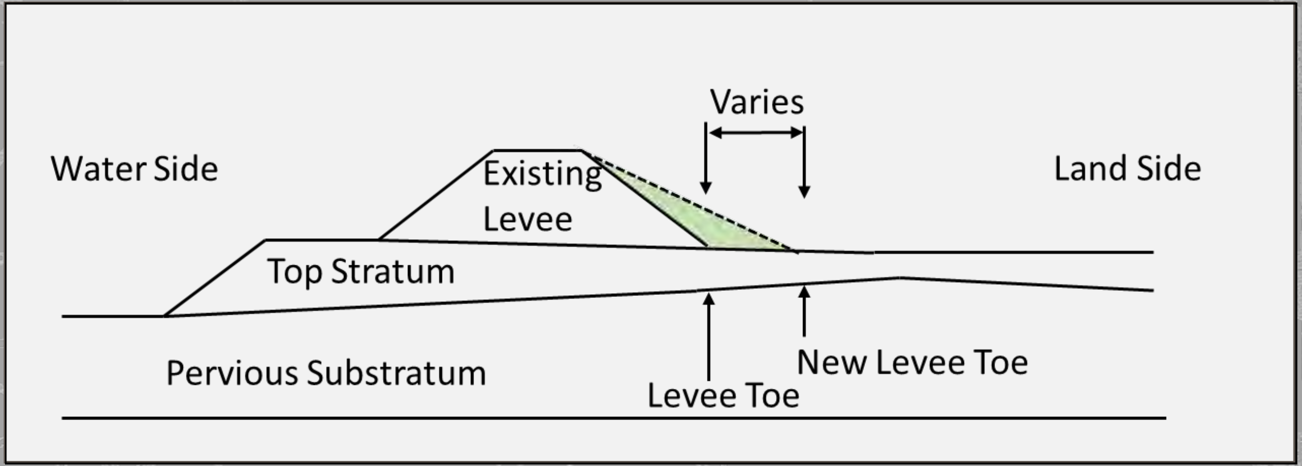


A slurry trench is installed on the river side to a determined depth to cutoff seepage through any deep pervious layers.





Areas with recurring levee slides require measures beyond ordinary O&M repairs. In these locations, the slopes of the levee will be flattened to reduce the chances of slide recurrence.



Milestone	Date
Notice of Intent Published	13 July 2018 (A)
Cooperating Agency Kick-off Meeting	30 Aug 2018 (A)
Public Scoping Meetings	10-13 Sept 2018
Public Scoping Period Ends	15 Oct 2018
Draft SEIS Released for Public/Agency Review	January 2020
Final SEIS Published & Record of Decision Signed	July 2020

National Environmental Policy Act (NEPA)

NEPA

- 13 July 2018

Drive, Montgomery, AL 36117, (334) 244 3343.

Following the scoping meetings, individuals who have not already submitted their comments should submit them by August 15, 2018, by either:

* Email to act-arc@usace.army.mil, or

* Mail to Mr. Mike Malsom, Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628–0001.

FOR FURTHER INFORMATION CONTACT: Direct questions about the NEPA process to Mr. Mike Malsom by mail at Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628 0001; telephone at (251) 690 2023; electronic facsimile at (251) 694–3815; or email at ACT-ACR@usace.army.mil. You can also request to be added to the mailing list for public distribution of notices, meeting announcements, and documents.

SUPPLEMENTARY INFORMATION: Additional information on the ACT River Basin study will be posted as it becomes available on the Mobile District website at http://www.sam.usace.army.mil/.

The USACE will hold five public scoping meetings during the months of July and August as part of its preparation to conduct the water supply storage reallocation study and update the WCMs for the Alabama Power Company's Weiss and Logan Martin reservoirs in the ACT River Basin. The public is invited to attend the scoping meetings, which will provide information on the study process and afford interested parties the opportunity to submit to USACE input about their issues and concerns regarding that process. Each of the public scoping meetings will be presented in an open house format, allowing time for participants to review specific information and to provide comments either on forms available at the meeting or to a court reporter on-site at the meeting.

Curtis M. Flakes,

Chief, Planning and Environmental Division.

[FR Doc. 2018–14975 Filed 7–12–18; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement

AGENCY: Army Corps of Engineers, DoD.

ACTION: Notice of Intent.

SUMMARY: The U.S. Army Corps of Engineers ("USACE"), Memphis District, Vicksburg District, and the New Orleans District, is announcing its intent to prepare Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (SEIS I) to the 1976 EIS, to cover construction of remaining authorized work on the Mississippi River mainline levees (MRL) feature. Over the past twenty years since the finalization of SEIS I, USACE has determined that various sections (reaches) of the mainline levee system are deficient in varying amounts, and that certain remedial measures need to be undertaken to control seepage and to raise and stabilize the deficient sections of the levee to protect the lower Mississippi River Valley against the Project Design Flood (PDF) and maintain the structural integrity of the MRL system. The Proposed Action of SEIS II is to supplement and, as necessary, augment the 1976 EIS and SEIS I using the primary MR&T goals of: (1) Providing flood protection from the PDF; and (2) developing an environmentally sustainable project; formulating alternatives; identifying significant resources; assessing the direct, indirect, and cumulative impacts to those resources; investigating and environmentally assessing potential borrow areas; developing mitigation measures; and evaluating and selecting a preferred method for the construction of necessary authorized MRL Project features, which may include but are not limited to, implementing seepage control measures and the construction of various remediation measures for deficient levee reaches to bring these reaches to the project design grade. SEIS II will evaluate the potential direct, indirect, and cumulative impacts for an array of alternatives, including a No Action alternative.

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Scoping Importance

- Clarifying the Significant Issues to be Analyzed In-Depth
- Preparing a Concise EIS

Scoping Considerations

Significant Resources

WE WANT TO HEAR FROM YOU

MRL-SEIS-2@usace.army.mil

BREAK OUT SESSIONS

SUMMARY & CLOSING THOUGHTS

http://www.mvk.usace.army.mil/MRLSEIS/

MRL-SEIS-2@usace.army.mil

US Army Corps of Engineers ®

MR&T Project - Mississippi River Levees Supplemental Environmental Impact Statement II Public Scoping Meeting

Name: Angela Erves

Organization (if any): USFWS / LMRCC

Address: [redacted]

Telephone (optional): [redacted]

E-mail: [redacted]

The e-mail address provided on this form will be used to notify you of future actions. Please just let us know if you would like to be contacted by a method other than e-mail.

US Army Corps of Engineers ®

MR&T Project - Mississippi River Levees
Supplemental Environmental Impact Statement II
Public Scoping Meeting

Name: PETER NIMROD

Organization (if any): MS LEVEE BOARD

Address: [redacted]

Telephone (optional): [redacted]

E-mail: [redacted]

The e-mail address provided on this form will be used to notify you of future actions. Please just let us know if you would like to be contacted by a method other than e-mail.

US Army Corps of Engineers ®

MR&T Project - Mississippi River Levees Supplemental Environmental Impact Statement II Public Scoping Meeting

Name: Jeff Montgomery

Organization (if any): ______

Address: ______

______

Telephone (optional): [redacted]

E-mail: ______

The e-mail address provided on this form will be used to notify you of future actions. Please just let us know if you would like to be contacted by a method other than e-mail.

Vicksburg, MS MRL SEIS II Scoping Meeting Comments

11 September 2018

Funding: How is this project being funded?

Project is needed: “No Action” is not an option; the project protects too many people

“Avoid and Minimize” from 1998 SEIS is working.

- Use material that is close
- Work with affected land owners for mutual benefit

Borrow Areas provide valuable habitat

- Environmental Design/Reforestation are both good
- Waterfowl management beneficial also despite larger footprint due to shallower depths

Relief Wells are advantageous due to reduction of borrow needs

Riverside/Straddle Enlargements are preferred

Flood protection is needed because we are not able to pass PDF

Recurring slides are a concern in some locations in MS

Besides T&E species, we are encouraged to consider “At-risk” species as well

Water quality of MS River oxbow lakes is concerning; numerous dead fish (likely Asian Carp) have recently been found in oxbow lakes

This information was provided by Brian McPherson, CEMVN-PDC-LDC.

MR&T MISSISSIPPI RIVER LEVEES SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (SEIS) II PUBLIC SCOPING MEETING

Colonel Michael N. Clancy

Nick Sims
Senior Project Manager, New Orleans District

Mark Lahare
NEPA Coordinator, New Orleans District

Baton Rouge, LA
12 September 2018

Tonight's Agenda

National Environmental Policy Act (NEPA)

NOTICE OF INTENT

- 13 July 2018

32642 Federal Register / Vol. 83, No. 135 / Friday, July 13, 2018 / Notices

Drive, Montgomery, AL 36117, (334) 244 3343.

Following the scoping meetings, individuals who have not already submitted their comments should submit them by August 15, 2018, by either:

* Email to act-arc@usace.army.mil, or
* Mail to Mr. Mike Malsom, Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628–0001.

FOR FURTHER INFORMATION CONTACT: Direct questions about the NEPA process to Mr. Mike Malsom by mail at Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628 0001; telephone at (251) 690 2023; electronic facsimile at (251) 694–3815; or email at ACT-ACR@usace.army.mil. You can also request to be added to the mailing list for public distribution of notices, meeting announcements, and documents.

SUPPLEMENTARY INFORMATION: Additional information on the ACT River Basin study will be posted as it becomes available on the Mobile District website at http://www.sam.usace.army.mil/.

The USACE will hold five public scoping meetings during the months of July and August as part of its preparation to conduct the water supply storage reallocation study and update the WCMs for the Alabama Power Company's Weiss and Logan Martin reservoirs in the ACT River Basin. The public is invited to attend the scoping meetings, which will provide information on the study process and afford interested parties the opportunity to submit to USACE input about their issues and concerns regarding that process. Each of the public scoping meetings will be presented in an open house format, allowing time for participants to review specific information and to provide comments either on forms available at the meeting or to a court reporter on-site at the meeting.

Curtis M. Flakes,
Chief, Planning and Environmental Division.

[FR Doc. 2018–14975 Filed 7–12–18; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement

AGENCY: Army Corps of Engineers, DoD.

ACTION: Notice of Intent.

SUMMARY: The U.S. Army Corps of Engineers ("USACE"), Memphis District, Vicksburg District, and the New Orleans District, is announcing its intent to prepare Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (SEIS I) to the 1976 EIS, to cover construction of remaining authorized work on the Mississippi River mainline levees (MRL) feature. Over the past twenty years since the finalization of SEIS I, USACE has determined that various sections (reaches) of the mainline levee system are deficient in varying amounts, and that certain remedial measures need to be undertaken to control seepage and to raise and stabilize the deficient sections of the levee to protect the lower Mississippi River Valley against the Project Design Flood (PDF) and maintain the structural integrity of the MRL system. The Proposed Action of SEIS II is to supplement and, as necessary, augment the 1976 EIS and SEIS I using the primary MR&T goals of: (1) Providing flood protection from the PDF; and (2) developing an environmentally sustainable project; formulating alternatives; identifying significant resources; assessing the direct, indirect, and cumulative impacts to those resources; investigating and environmentally assessing potential borrow areas; developing mitigation measures; and evaluating and selecting a preferred method for the construction of necessary authorized MRL Project features, which may include but are not limited to, implementing seepage control measures and the construction of various remediation measures for deficient levee reaches to bring these reaches to the project design grade. SEIS II will evaluate the potential direct, indirect, and cumulative impacts for an array of alternatives, including a No Action alternative.

FOR FURTHER INFORMATION CONTACT: Comments and questions about SEIS II should be submitted to USACE by email to: MRL-EIS-2@usace.army.mil; or by regular mail to: U.S. Army Corps of Engineers, ATTN: CEMVN–PDC–UDC, 167 North Main Street, Room B–202, Memphis, Tennessee 38103–1894. For additional information, including but not limited to a copy of SEIS I and the 1976 EIS, please visit the Project website at: http://www.mvk.usace.army.mil/MRLSEIS/.

SUPPLEMENTARY INFORMATION:

1. Project Background and Authorization. The MR&T Project (and the MRL feature) was authorized by the Flood Control Act of 1928, as amended. The 1976 EIS was filed with the Council of Environmental Quality on 8 April 1976. SEIS I, which was prepared to supplement the 1976 EIS to evaluate the effects of continued construction of the MRL levee enlargements, stability berms, seepage control, and erosion protection measures, was filed with the Environmental Protection Agency on 31 July 1998. SEIS I focused on the levees of the MRL that were the most deficient in height and on seepage control measures for levee reaches with observable signs of seepage during previous high water events.

The MR&T Project is designed to manage flood risk damages in the alluvial valley between Cape Girardeau, Missouri and the Head of Passes, Louisiana. The goal of the MR&T Project is to provide an environmentally sustainable project for comprehensive flood damage control, protection, and risk reduction from the "Project Design Flood", in the alluvial valley beginning at Cape Girardeau, Missouri to the Head of Passes, Louisiana, by means of levees, floodwalls, floodways, reservoirs, banks stabilization and channel improvements in and along the Mississippi River and its tributaries. The mainline levee system, comprised of levees, floodwalls, backwater areas, floodways, and various control structures, is approximately 1,610 miles long. The PDF is a hypothetical flood that was developed to determine the design flood to be used in designing the MR&T levee system in the lower Mississippi River Basin, and is defined as the "greatest flood having a reasonable probability of occurrence" when the operable features of the entire MR&T Project are considered. The PDF upon which the current design for the construction of the mainline levee system and remaining unconstructed levees is based, is the "Refined 1973

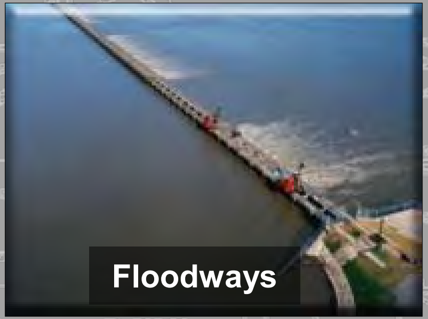
Scoping Purpose and Importance

Scoping Considerations

Significant Resources

WE WANT TO HEAR FROM YOU

Mississippi River and Tributaries Project



An Integrated System

- **Reduce Flood Risk**
- **Facilitate Navigation**
- **Restore Damaged Ecosystems**

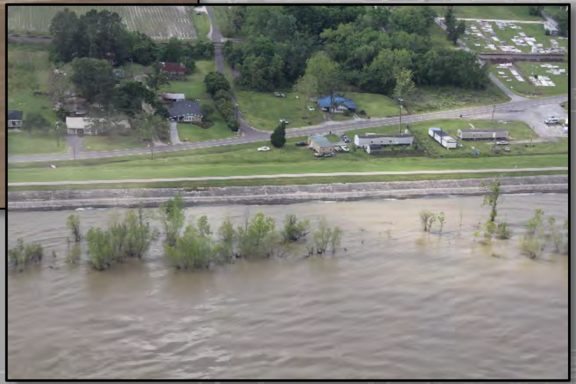
- **$15.5 billion invested**
- **$1 Trillion in flood damages prevented**
- **$234 billion in flood damages prevented in 2011**
- **66.9 to 1 return on investment**
- **4 million people protected**

The Mainline Mississippi River Levee System (MRL) extends from Cape Girardeau, MO to Head of Passes, LA and is approximately 1,610 miles in length.

Project goal is to pass the Project Design Flood (PDF) and address seepage concerns

Construction is approximately 79% complete. Assessment and maintenance will be required to ensure the integrity of the MRL after the project is completed.

In November 2017, USACE completed an engineering evaluation for authorized remaining work needed to complete the MRL. The evaluation addressed overtopping, seepage, slope stability, and floodwall stability.



Station	2011	1927 6/	1937 6/	1973	PDF 5/
Cairo, IL 1/	2,100,000 C/2/3/	1,626,000	2,010,000 4/	1,536,000	2,360,000 4
Memphis, TN	2,213,000 C	N/A	2,020,000	1,633,000	2,410,000
Helena, AR	2,130,000 C	1,756,000	1,968,000	1,627,000	2,490,000
Arkansas City, AR	2,293,000 C	1,712,000	2,159,000	1,879,000	2,890,000
Vicksburg, MS	2,320,000 C	1,806,000	2,060,000	1,962,000	2,710,000
Natchez, MS	2,260,000 C	N/A	2,046,000	2,024,000	2,720,000
Red River Landing, LA	1,641,000 C	1,461,000	1,467,000	1,498,000	2,100,000
Baton Rouge, LA	1,436,000 C	N/A	1,400,000	1,381,000	1,500,000
N. Orleans, LA	1,230,000 C/8/	1,360,000	1,342,000	1,248,000	1,250,000
Morgan City, LA 7/	512,000 C	741,000	493,000	692,000	920,000
Wax Lake Outlet, LA 7/	323,000 C	N/A	N/A	292,000	580,000

C - Peak Discharge, Provisional

1/ Discharge Range at Hickman, KY

2/ Total Confluence Flow of 1,936,000 cfs measured at approximate mile 950.8 at 1400 CDT 5/02/2011 near Wickliffe, KY, prior to operation of Birds Point-New Madrid

3/ Peak Flow Measured 4 May 2011 = 1,730,000 cfs at Hickman plus 370,000 cfs flow through Birds Point-New Madrid Floodway

4/ Includes flow through Birds Point-New Madrid Floodway

5/ Project Design Flood (PDF) provides design flows for MR&T project. Prior to 2011 Flood, MR&T Project was 89% complete. 2011 Flood Flows ~ 80-85% of MR&T PDF Flows.

6/ Reference - "Annual Maximum, Minimum, and Mean Discharges of the Mississippi River and Its Outlets and Tributaries to 1963"

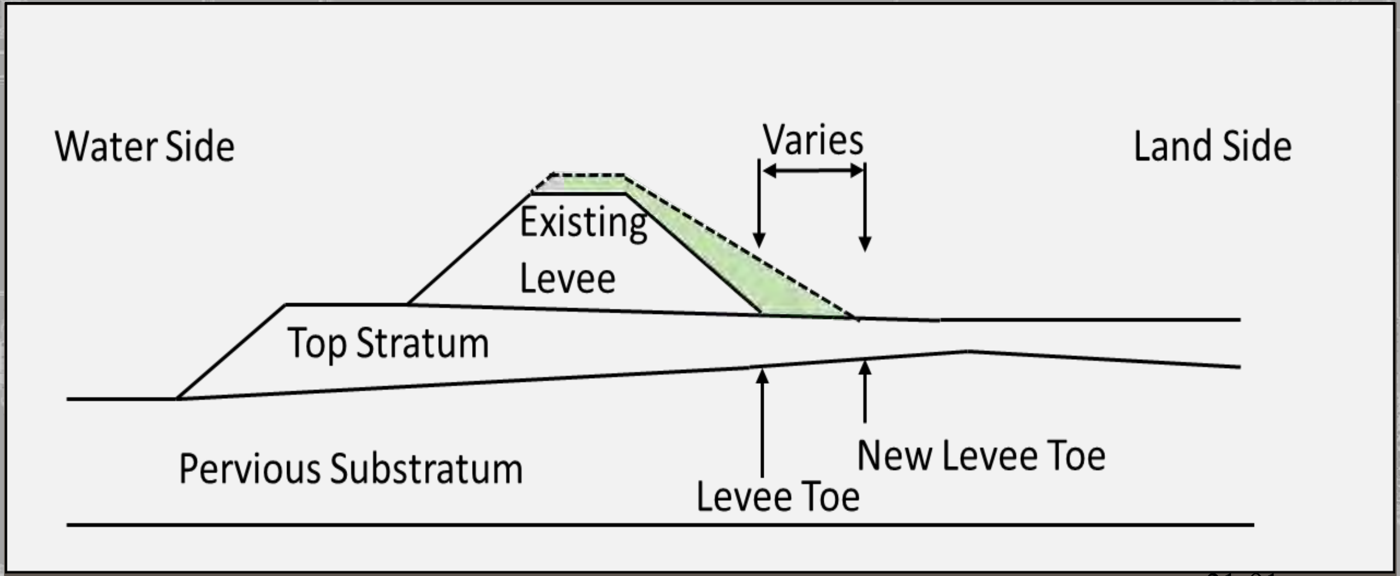
7/ Wax Lake Outlet was constructed from 1937-1942. Prior to that, Lower Atchafalaya River was the major outlet.

8/ New Orleans Mean Daily Flow Measured at Belle Chasse in 2011, Readings at this site are tidally influenced. An instantaneous measurement of 1,320,000 cfs was made on 17 May 2012

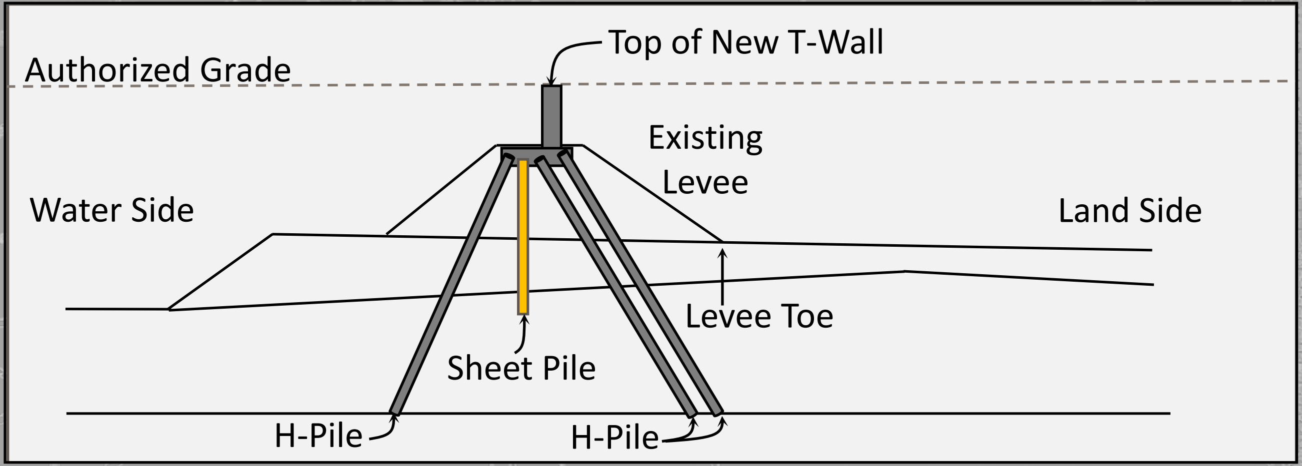
Revised 27 Jan 2012

Vicksburg District
New Orleans District
Legend
Levee Work Items
Work Type
Floodwall Stability
Slope Stability
Slope Flattening
Grade Deficiency
Seepage
Existing Levee Centerlines
Mississippi River and Tributaries Project
MR&T Mississippi River Levees Supplemental Environmental Impact Statement II
Proposed Work Items
Prepared under the Direction of the President of the Mississippi River Commission
Miles
Baton Rouge
Lake Pontchartrain
Morgan City
Houma
Hammond
Slidell
Bogalusa
Gulfport
Metairie
Lafayette

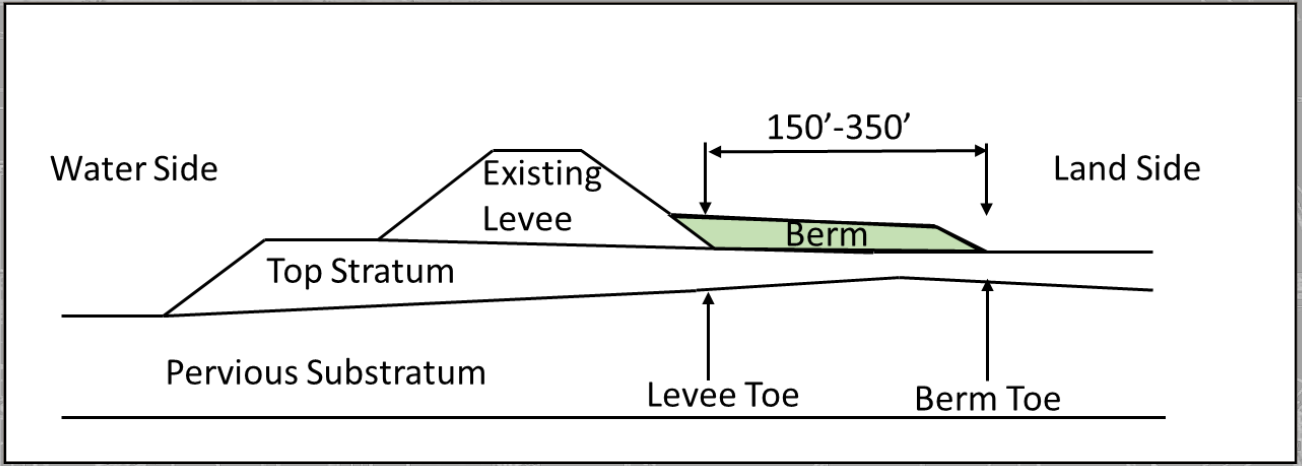
Levee enlargements are conducted in locations where the existing levee is not at the authorized grade. Depending on the location of the project, these raises may occur on the landside, riverside, or straddle the existing levee section.



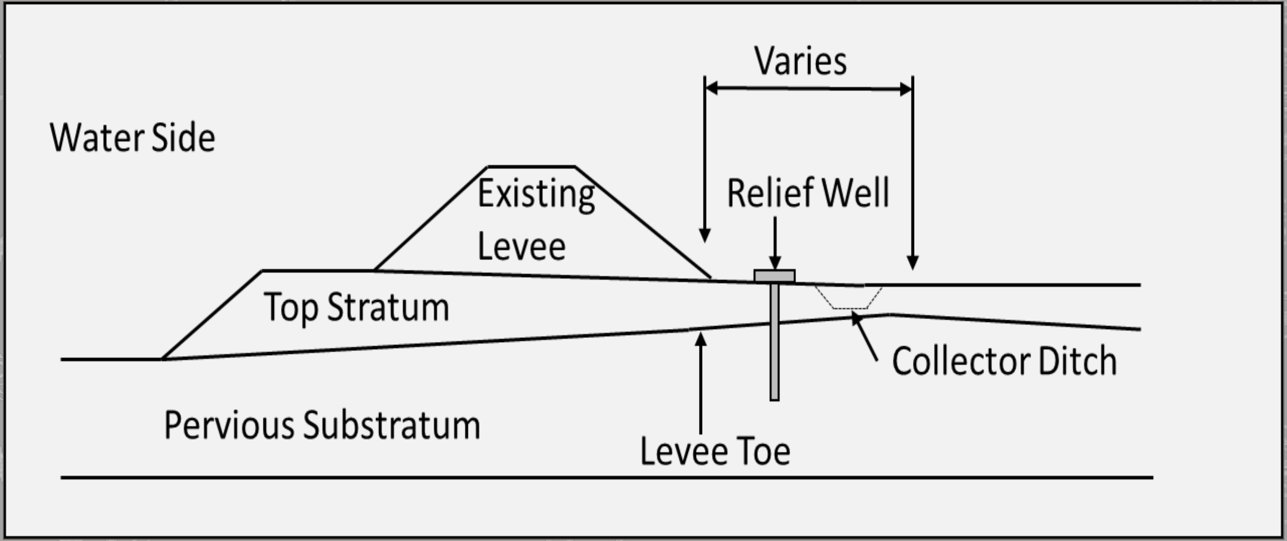
Urban areas typically require floodwalls rather than levees to reduce impacts to residences and businesses. These floodwalls can have stability concerns or height deficiencies that must be addressed.



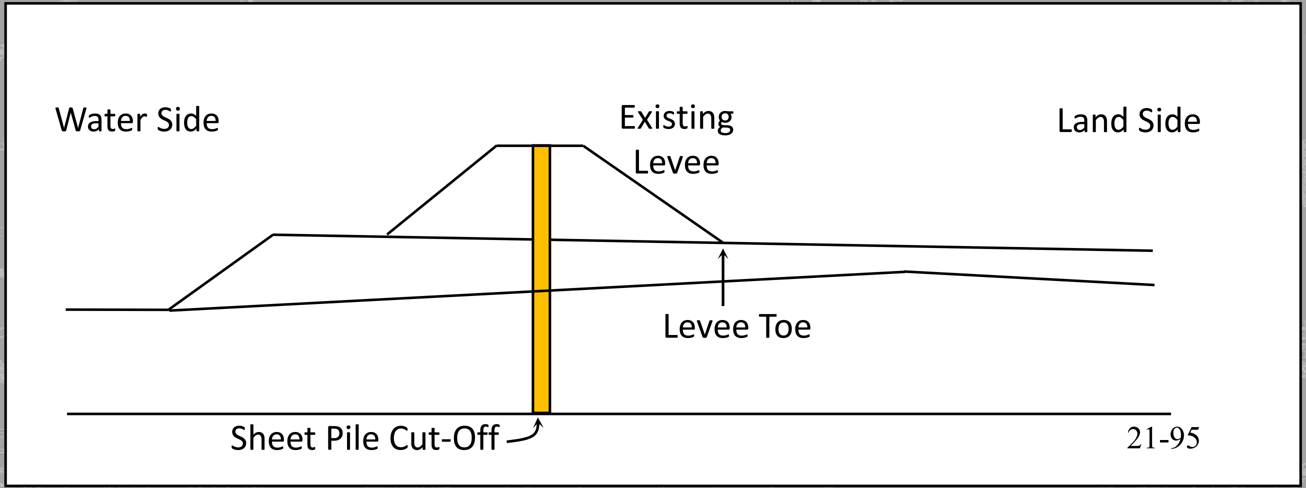
Seepage berms are constructed on the landside of the levee using impervious soils to reinforce existing top stratum and to reduce underseepage pressure near the toe of the levee. Upon construction, berms are turfed and mowed to prevent erosion or encroachment of undesired vegetation.



Relief wells are vertically installed wells consisting of a well screen surrounded by a filter material designed to prevent in-wash of foundation materials into the well. Relief wells intercept underseepage and provide a controlled outlet for the water while minimizing material transport underneath the levee.



Sheet pile cutoff is installed in the levee section to a determined depth to cutoff seepage through any shallow pervious layer and to cutoff seepage through the levee embankment. Upon completion, sheet pile is buried in the levee section.



Mississippi River Levees NEPA History

Description of Recommended Plan
1998 SEIS

District	Work Items	Miles of Enlargement	Miles of Seepage Control Construction
Memphis	31	31.8	74.3
Vicksburg	85	216.8	57.4
New Orleans	12	14.2	0.1
Total	128	262.8	131.8

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BUILDING STRONG®

Milestone	Date
Notice of Intent Published	13 July 2018 (A)
Cooperating Agency Kick-off Meeting	30 Aug 2018 (A)
Public Scoping Meetings	10-13 Sept 2018
Public Scoping Period Ends	15 Oct 2018
Draft SEIS II Released for Public/Agency Review	January 2020
Final SEIS II Published & Record of Decision Signed	July 2020

WE WANT TO HEAR FROM YOU

US Army Corps of Engineers
New Orleans District

ATTENDANCE RECORD

Date: 12 September 2018	MR&T MRL SEIS

PLEASE PRINT CLEARLY

	Name	Organization	City	State	Zip	Email
1	Sara Krupa	LADNR	Baton Rouge	LA	70802	
2	Jeff Harris	LDNR	Baton Rouge	LA	70808	
3	Brian Vosburg	CPRA	Baton Rouge	LA	70808	
4	Andrew I Harrison Jr	Harrison Law LLC	BR			[redacted]
5	Joey Tureau	Ascension Parish	Gonzales	LA	70737	[redacted]
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U.S. Army Corps of Engineers

Public Scoping Meeting

Mississippi River & Tributaries Project,
Mississippi River Levees Supplemental
Environmental Impact Statement II

Date: September 12, 2018

Time: 7:00 p.m. – 9:00 p.m.

Location: Louisiana Department of
Environmental Quality, Room C111,
602 North 5th Street, Baton Rouge,
LA 70802

Host: U.S. Army Corps of Engineers,
New Orleans District

Reported by:
Katherine Curtis,
Certified Court Reporter

FACILITATOR: Alright, everybody; I think we'll go ahead and get started. I'm going to try the try and true method. As soon as we begin, people will show up. I think we'll go a little less formal than was originally planned. However, we do still want to provide all the information that we were going to and then give you time to comment. Overall, the focus is not on our presentation to you, but for us our focus is to turn the meeting over to you and get your comments, concerns and thoughts on the process. I'll kind of get into that a little bit later. But if I can, I'd like to turn the floor over to Colonel Clancy for opening.

COLONEL CLANCY: Is there anybody in here who is not a government employee?

(Inaudible)

NEPA came along in 1970, the Environmental Impact Statement in 1976, supplement that in 1998, and now here we are; we're about to supplement again. We have work to do on the Mississippi River levees. EIS is only concerning the Mississippi River levees.

(Inaudible) Parameters as part of the EIS onto the work that needs to be done. We know there are sections of the levees that are deficient in height. There are sections of the levees that seep. Every time we have a flood, we discover new places that have problems. (Inaudible) the levee system on the last three couple of years, we'll say since 2011. 2011 flood, the December of 2016 and the flood of this spring were three of the top 10 floods in the last 100 years. Every flood that brings us new surprises.

So, that's really what we're here to do. We're supplementing for the second time the Environmental Impact Statement for Mississippi River levees. So, we, all three districts in the valley, can continue to work on, improve, maintain the system and bring it up to design standards.

So, I'm going to turn it over to some of our technical experts who are going to talk the specifics mixed in. Nick Simms is going to talk the specifics of what we're planning to do on the levees and then Mark

Lahare will talk to you about the Environmental Compliance Act. And we're here for you guys. Four folks in the room are non (inaudible) employees. Please, if you have any questions, ask; that's what we are here to do. Thank you.

FACILITATOR: Thank you, sir. Again, kind of our plan is to provide you with some information in the beginning with two short presentations. First, we're going to have Mark Lahare talk the National Environmental Policy Act, and then we'll follow that with Nick Simms on the Mississippi River and Tributaries Levee system itself, and then we're going to turn it to you.

With concurrence with our speakers, unlike what we originally planned, if you have questions as we present to you, feel free to ask. I do ask though if you do ask a question or make a comment, please use a microphone because we do have court reporters that have to dictate everything we do, and we want to make sure we get everything accurately. And with that note, I'll turn it to Mark.

MR. MARK LAHARE: Can everyone hear me okay? Is this better or worse? It's good? Okay.

Good evening, ladies and gentlemen. We appreciate everyone coming out tonight. My name is Mark Lahare. I am the National Environmental Policy Act Coordinator for the Mississippi River Levee Project for the New Orleans District.

Tonight, as was previously stated, we are here to discuss the preparation of the Second Supplemental Environmental Impact Statement for the Mississippi River levee feature of the Mississippi River and Tributaries Project. The purpose of the Second Supplemental Environmental Impact Statement is to address work items on the Mississippi River levee that were not originally addressed under the 1976 Mississippi River and Tributaries Environmental Impact Statement or the 1998 Supplemental Environmental Impact Statement. A draft copy of the second supplement will be made available for public review and comment in early of January 2020.

The National Environmental Policy Act,

or NEPA, is the basic national charter for environmental compliance. One of the primary requirements of NEPA is that it directs federal agencies to rigorously evaluate the environmental impacts in any alternatives to any major federal actions that could significantly affect the quality of the human environment prior to making it in decisions.

Some of the tools through which this is accomplished are environmental (inaudible) or environmental impact statements. The overall goal of NEPA is to foster good decision making by federal agencies. And this is done through a collaborative process by working with and gathering input from federal, state and local resource agencies, federally recognized tribes, stakeholders, non-governmental organizations, interested parties and private citizens such as yourselves.

When a federal agency proposes to undertake a major federal action, one of the first requirements under NEPA is to publish a Notice of Intent in the Federal Register.

The Notice of Intent for the post project was published on Friday, July 13 of 2018. The Notice of Intent is primarily meant to provide brief background, historical information on the project, a brief overview of the action being proposed, any known significant issues or concerns associated with the project, and most importantly, and the reason we are here tonight, initiate the scoping process.

Just a side note, a web link to a copy of the Notice of Intent is available on our project website if you wish to download and review it.

So, as I said, the purpose of tonight's meeting is to assist the Corps in identifying any significant resources, issues and concerns that you feel should be addressed in the Supplemental Environmental Impact Statement. Your input here tonight is a key asset to that process. The scoping meeting, and the one scheduled for tomorrow night at the Corps of Engineers New Orleans District headquarters building, is made to provide you with an opportunity to voice your concerns, questions and comments on the proposed project.

So, some of the areas of consideration that may aid you in providing input to us are pertinent studies. For example, what environmental or socioeconomic studies do you think may be needed for the report. Also, are there any existing studies or pertinent information to the project that you feel should be incorporated in the report. Other topics such as significant resources, issues and concerns would be what are some of the major issues and concerns that should be analyzed. And similarly, what do you feel are the significant resources in the project area that warrant further consideration.

So, as you're thinking about these topics tonight, please also consider how these may play a part in determining what types of alternatives should be evaluated in the report.

So, as you can see behind me, these are some of the resources within the project area that we have already identified as being significant. Some of these are taken from prior reports and prior studies. But it is important to understand that this list is in no way final. If you know of other important resources, we ask you to please voice those here tonight.

So, to wrap up tonight, we want to hear from you. At the end of the overall presentation, we will have a formal comment period to receive oral comments on the proposed study. And let me stress all comments are important. And it is vital that each of you provide your views and concerns relative to the project. Alternatively, if you would like to provide your written comments as opposed to oral comments; you may mail them to one of the individuals on the comment cards; or you may email them to the address listed on the contact card; or you can detach the comment page listed as public comment form from your handout and hand them to any Corps personnel that is present here tonight. We just request that all comments associated with the scoping process be dated no later than October 15, 2018.

Finally, before we move into the formal comment period of the meeting, I'd like to ask our Senior Project Manager, Mr. Nick Simms, to come up and discuss some of the specifics about the Mississippi River levee feature here and in the New Orleans District. Thank you.

MR. NICK SIMMS:

Thank you, Mark. Good evening. As Mark said, my name is Nick Simms. I'm the Senior Project Manager for the Mississippi River Levees in the New Orleans District Corps of Engineers.

Now, what Mark kind of went over with you is the main purpose of why we're here. We want to hear from you; that is the main purpose of this meeting. What I'm going to go over is some background on the actual project and get into some of the specifics on the type of work that we're actually going to do, go into some of the footprints, some of the impacts that you might see.

Now, one thing, and Mark said this but I'm going to reiterate it, nothing that we have right now is set in stone. Nothing has been finalized. Again, we want to get your input and that is the main purpose of this meeting.

So, first off, let’s go into a little background. The Mississippi River Levee Construction Project is a subset of the overarching, what I call, mega project known as the Mississippi River and Tributaries, or MRT project. Now, the MRT project is one of the nation’s most successful and comprehensive projects. You see the numbers here. It’s almost a 70 to 1 return on our investment: one trillion in flood damages prevented, 234 billion in flood damages prevented in 2012 alone. So, very successful project and it’s able to do this because it’s part of an integrated system. And that integrated system consists of channel improvements, tributary improvements, floodways and levees; which again, is the main purpose of the supplement to the Environmental Impact Statement and the main reason that we’re here today.

So, the Mississippi River Levee

Construction Project consists of addressing height deficiencies and seepage concern along the main line of the Mississippi River. The Mainline Mississippi Levees run from Cape Girardeau, Missouri, down to Head of Pass, Louisiana. That’s roughly 1,600 miles of river and when you account from the East and West Bank, that’s about 2,200 miles of actual levee.

The purpose of the project is again seepage control and address height deficiencies. We want to build these levees up to what’s known as the Congressionally Authorized Height to convey what’s known as the project of design flood. Essentially, we want to keep the water within the banks of the Mississippi River. In a nutshell, that’s what the project is trying to do.

Now, the project right now is approximately 79 percent complete. There’s still about 500 miles of deficient levees. The project as it stands is capable of passing historic floods. We’ve seen it 2011 and in 2016. But until it is completed, the project cannot pass that Project Design

Flood. So, that is why we still have to go out there and do this additional work, to raise those 500 miles of additional levees. And again, that is the purpose of this supplement to the Environmental Impact Statement.

So, I mentioned the project design flow. I won't spend too much time on this slide, but you can see here some of the flow rates that we've seen in specific events. Again, the project can pass historic floods. As you see here looking toward the middle of Baton Rouge in 2011, right at 1.4 CFS when the Project Design Flood is 1.5. So, again, the project is capable of passing it, but without significant flood (inaudible) we can't pass that PDF until we get the rest of this work completed.

So, what you see here is a map of the levees in the New Orleans District, and this shows the areas that we currently have identified as height deficiencies and seepage deficiencies. I know it's kind of hard to see but the red, those are height deficiencies, and the blue areas are the seepage deficiencies. So, this is the work that will be specified in the EIS. What we're going to do in these specific areas, the footprints that we're going to impact, what type of work will be there. So, looking at this map, it might be a little alarming. It looks like none of the levees have been worked on, but that's certainly not the case. Colonel mentioned this, work has been going on for years on this project, had the 1976 EIS, supplement in 1998. What those documents covered and what the Corps has been working on since then is addressing the most deficient areas and the most critical seepage areas. So, the majority of the deficiencies that you see here are about one to two foot. So, it's not as bad as it seems when you look at this map because again the most critical areas either have been or are currently being addressed.

You saw the areas that are deficient and the seepage areas. So, what type of work will we be doing with this project that will be documented in the Environmental Impact Statement Supplement? Well, again, height deficiencies and seepage deficiencies. To deal with height deficiencies, there's really two ways to fix that. You've got levee enlargements or flood walls. Here, you see levee enlargements. I'm sure everyone is familiar with this. You build the levee up to, again, that Congressionally Authorized Height to convey the Project Design Flood.

The types of impacts that you're looking at with this type of work, well, if you go up you have to go out, also. So, you could increase the footprint of the levee. It could have some impacts associated with that. In addition, you have to have the dirt or the borrow to go in and do that actual lift. So, wherever you get that borrow from you could have impact in that area, also.

The second way to address the height deficiency is a flood wall. This is more for urban areas where, again, you can't go out because you might be confined by buildings in the area, so you put a flood wall there. The impacts are not nearly as much as the levee enlargement. You're pretty much staying within the existing footprint, but you could have other impacts: noise, things like that, anything associated with an urban environment. But this is the second way that we will look to address the height deficiencies with the project.

So, that covers the height deficiencies. Now, we have the seepage concerns. So, when we have a flood event the water comes up, puts pressure on the levees and you can see underseepage come through. That seepage can come through at the toe of the levee. It starts to move material. You could even have a levee failure. So, that's why that has to be addressed. Three main ways to address that: that's through seepage berms, relief wells or sheet pile cut-off walls. Here, you see the seepage berm very similar to the levee enlargement and what the impacts are. What you're doing here is you're building a berm out on a levee toe and essentially putting weight down to push that seepage out away from the toe, so you don't get that material moving. Impacts associated with seepage berm is similar to the levee lifts. You're expanding the footprint; you're going out and then wherever you get the dirt from you're also going to have impacts associated with that.

Next way to address the seepage is through relief wells. As the name implies you are relieving the pressure here. Basically, you're drilling a well down and you could have a controlled flow to help alleviate that seepage. The impacts with this are not as much with the actual well as they are typically drilled within the existing footprint, but that water has to go somewhere. If the existing drainage system cannot hold that water, we might have to make some drainage improvements that could expand the impact, expand the footprint and you could have some impacts associated with that, also.

And the third way to address the seepage is through a sheet pile cut-off wall. This is essentially a flood wall in reverse. You're just going down and, as the name implies, cutting off the seepage. Impacts with this are pretty minor for the most part because, again, you're staying within the existing footprint. You could have the need for some minimal borrow to come put behind this wall, but the impacts with this are pretty much pretty minor.

Okay, and this last slide, again, we've mentioned it but history of the NEPA on the Mississippi River levee's original Environmental Impact Statement was completed in 1976 and then the supplement in 1998. And here we are today with the second supplement to address the remaining work that we've identified.

In 1998, you see the number of items, the number of miles, seepage control constructions that we did. And it's important, again, I want to really impress on you that this just identifies the most critical areas, the critical deficiencies, the critical seepage areas. You look here at the New Orleans District, you see only 12 items. That's a little misleading. One of these items was a levee enlargement that spanned the entire region of Jefferson Parish. But again, the purpose of this is to address those most critical items. And as you saw on the previous map, the other items that we've identified, while they are important, the deficiencies there are not nearly as high as these are.

Schedule for the SEIS number two, as Mark mentioned, Notice of Intent was published in July. We had the cooperating agency meeting kick-off about two weeks ago; we've had the public scoping meetings today and the previous nights and we have one more tomorrow in New Orleans. And then, as Mark mentioned, the scoping period will end on October 15, and we're looking to have a draft document in January of 2020 and the final in July of 2020.

Alright, so that ends my portion of the presentation. Again, as we tried to relay to you we really want to hear from you, get your comments. So, Ricky, I'll turn it back over to you.

FACILITATOR: So, this is where we would turn it over to you for comments. And it doesn't have to be comment tonight. There is opportunity to comment up to October 15. Tonight, if you don't want to say it in front of us we do have court reporters outside as well as up front. Or you can write a comment and send it to, or provide it to, any Corps person here, and we'll make sure that it gets in the record. So, I ask that if you have any questions, comments, caveat for any questions we may not have the answer, we're very early, we're kind of at the kick-off of the marathon, and so we'll try to answer anything you have. If you have any complaints, like that you've got a bone to pick with Mark, I'll allow that too. So, I turn it to you guys. Does anybody have any questions, thoughts? I really do thank you guys for coming in.

MR. BRIAN WASBURG: I have a question. For the record I do work with geologists for CPRA; however, I am here under my own volition tonight as a private citizen. I find Mississippi River issues fascinating. And one of the things I have always had a question about are the seepage wells, the relief wells that you had up earlier, Nick. Is there any resource that you know of that lists the number of, total number of relief wells in a district or in any subdivision of that district by parish? Has there ever been any calculations of how much water goes out?

MR. NICK SIMMS: Well, the first part of the question, just the number of relief wells per district, I know we do have that, and we've actually have been going through that, documenting how many relief wells there are. As far as the flows that each of them put out, I am unaware of that, but we can check on that. I don't know. Mark, are you aware of anything like that?

MR. MARK LAHARE: There's no database that I know of.

MR. NICK SIMMS: Yeah, I know we know the number of wells, but as far as that data, it seems like something we may have. So, we can certainly check on that.

MR. BRIAN WASBURG: And I would assume that those, they can't be more that 100 feet deep. Do you happen to know off hand what the depth of those wells are?

MR. NICK SIMMS: It varies. Some go 50 feet, some go 75. It really just depends on how deep that seepage is. That is really what guides it.

MR. BRIAN WASBURG: Is there any thought given to modeling, I guess, the surface run-off of that? Because I've seen pretty significant, just about 30 miles north of here, 25 miles north of here on Pointe Coupee on the West Bank, there's a big run-up. I drove past it for 15 years, 20 years, as long as they've been there. And I notice that there are often issues with the amount of water in the ditch. And you know, just relieving that water and making sure there's a proper place for it to go is probably the biggest concern that I have about that, if I had one to mention.

I do appreciate the mechanics of it and what it does. That's just one thing I've always wanted to know.

MR. NICK SIMMS: And that is one of the biggest concerns we have with it, too. Like I mentioned, that water has to go somewhere. So, we do, do the analysis; do, do the modeling to see if the existing drainage can handle the increase in flows. If it can't, then we will go in and do some improvements, or we may even look to pump it back over the river. We've done that, or over the levee and back into the river; we've done that in certain cases also.

But yeah, that's certainly a part of the analysis and any relief wells that are installed. We actually have another project in that area, I mean, just north of the region you're referring to. And that's what we're going through right now is looking at the modeling to see where the water will go, to see how much can stay in there.

UNKNOWN SPEAKER: Nick, why don't you speak to who is the responsible party to facilitate that drainage where we accept that water.

MR. NICK SIMMS: Yeah, that's a good point. So, once we do turn over the project, it is on the local sponsor, which would be the levee district and that, to keep the drainage areas clean, to keep them unobstructed so that water can keep going through. There have been times, I mean, you get the trash and the dirt in there. It can clog up the systems, which kind of lead to some of the problems that you were talking about.

UNKNOWN SPEAKER: And then one other thing I'll add, is you asked about flow rates. Flow rates are going to vary per location of each well.

(Overlap in speakers)

MR.BRIAN WASBURG: I was just wondering if there had been some, it seems to me there are estimates of how much water you're going to need to move. There's an estimate somewhere of how much water is coming out of those wells.

UNKNOWN SPEAKER: Yeah, we typically have that. And some of the levee districts actually keep a running tally of how much flow is coming out of each wells per minute.

MR. BRIAN WASBURG: I'd be very interested in looking at that information because I've made some back-of-the-envelope calculations on what I think it is, but I can talk to y'all about it offline. Thanks for answering the question that I had.

FACILITATOR: Do we have any other comments, questions? I don't want to keep anybody longer than we do. But we will be standing around for a little while if you have any questions you want to just sit here and discuss. But unless there's any objection I'll go ahead and close the meeting. And if anything comes up later, feel free, we definitely urge you to send in email, by mail or anything like that. Feel free to join us tomorrow.

CERTIFICATE

I, Katherine McCartney Curtis, Certified Court Reporter, do hereby certify that the foregoing transcription of an audio recording was prepared and transcribed by me and is a true and correct transcript to the best of my ability and understanding; that the transcript has been prepared in compliance with transcript formal guidelines required by statute or by rules of the board or by the Supreme Court of Louisiana, and that I am not related to counsel or to the parties herein nor am I otherwise interested in the outcome of the matter.

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MR&T MISSISSIPPI RIVER LEVEES SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (SEIS) II PUBLIC SCOPING MEETING

Colonel Michael N. Clancy

Nick Sims
Senior Project Manager, New Orleans District

Mark Lahare
NEPA Coordinator, New Orleans District

New Orleans, LA
13 September 2018

Tonight's Agenda

National Environmental Policy Act (NEPA)

NOTICE OF INTENT

- 13 July 2018

Drive, Montgomery, AL 36117, (334) 244 3343.

Following the scoping meetings, individuals who have not already submitted their comments should submit them by August 15, 2018, by either:

* Email to act-arc@usace.army.mil, or

* Mail to Mr. Mike Malsom, Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628–0001.

FOR FURTHER INFORMATION CONTACT: Direct questions about the NEPA process to Mr. Mike Malsom by mail at Inland Environment Team, Environment and Resources Branch, Planning and Environmental Division, USACE-Mobile, Post Office Box 2288, Mobile, AL 36628 0001; telephone at (251) 690 2023; electronic facsimile at (251) 694–3815; or email at ACT-ACR@usace.army.mil. You can also request to be added to the mailing list for public distribution of notices, meeting announcements, and documents.

SUPPLEMENTARY INFORMATION: Additional information on the ACT River Basin study will be posted as it becomes available on the Mobile District website at http://www.sam.usace.army.mil/.

The USACE will hold five public scoping meetings during the months of July and August as part of its preparation to conduct the water supply storage reallocation study and update the WCMs for the Alabama Power Company's Weiss and Logan Martin reservoirs in the ACT River Basin. The public is invited to attend the scoping meetings, which will provide information on the study process and afford interested parties the opportunity to submit to USACE input about their issues and concerns regarding that process. Each of the public scoping meetings will be presented in an open house format, allowing time for participants to review specific information and to provide comments either on forms available at the meeting or to a court reporter on-site at the meeting.

Curtis M. Flakes,
Chief, Planning and Environmental Division.

[FR Doc. 2018–14975 Filed 7–12–18; 8:15 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement

AGENCY: Army Corps of Engineers, DoD.

ACTION: Notice of Intent.

SUMMARY: The U.S. Army Corps of Engineers ("USACE"), Memphis District, Vicksburg District, and the New Orleans District, is announcing its intent to prepare Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (SEIS I) to the 1976 EIS, to cover construction of remaining authorized work on the Mississippi River mainline levees (MRL) feature. Over the past twenty years since the finalization of SEIS I, USACE has determined that various sections (reaches) of the mainline levee system are deficient in varying amounts, and that certain remedial measures need to be undertaken to control seepage and to raise and stabilize the deficient sections of the levee to protect the lower Mississippi River Valley against the Project Design Flood (PDF) and maintain the structural integrity of the MRL system. The Proposed Action of SEIS II is to supplement and, as necessary, augment the 1976 EIS and SEIS I using the primary MR&T goals of: (1) Providing flood protection from the PDF; and (2) developing an environmentally sustainable project; formulating alternatives; identifying significant resources; assessing the direct, indirect, and cumulative impacts to those resources; investigating and environmentally assessing potential borrow areas; developing mitigation measures; and evaluating and selecting a preferred method for the construction of necessary authorized MRL Project features, which may include but are not limited to, implementing seepage control measures and the construction of various remediation measures for deficient levee reaches to bring these reaches to the project design grade. SEIS II will evaluate the potential direct, indirect, and cumulative impacts for an array of alternatives, including a No Action alternative.

FOR FURTHER INFORMATION CONTACT: Comments and questions about SEIS II should be submitted to USACE by email to: MRL-EIS-2@usace.army.mil; or by regular mail to: U.S. Army Corps of Engineers, ATTN: CEMVN–PDC–UDC, 167 North Main Street, Room B–202, Memphis, Tennessee 38103–1894. For additional information, including but not limited to a copy of SEIS I and the 1976 EIS, please visit the Project website at: http://www.mvk.usace.army.mil/MRLSEIS/.

SUPPLEMENTARY INFORMATION:

1. Project Background and Authorization. The MR&T Project (and the MRL feature) was authorized by the Flood Control Act of 1928, as amended. The 1976 EIS was filed with the Council of Environmental Quality on 8 April 1976. SEIS I, which was prepared to supplement the 1976 EIS to evaluate the effects of continued construction of the MRL levee enlargements, stability berms, seepage control, and erosion protection measures, was filed with the Environmental Protection Agency on 31 July 1998. SEIS I focused on the levees of the MRL that were the most deficient in height and on seepage control measures for levee reaches with observable signs of seepage during previous high water events.

The MR&T Project is designed to manage flood risk damages in the alluvial valley between Cape Girardeau, Missouri and the Head of Passes, Louisiana. The goal of the MR&T Project is to provide an environmentally sustainable project for comprehensive flood damage control, protection, and risk reduction from the "Project Design Flood", in the alluvial valley beginning at Cape Girardeau, Missouri to the Head of Passes, Louisiana, by means of levees, floodwalls, floodways, reservoirs, banks stabilization and channel improvements in and along the Mississippi River and its tributaries. The mainline levee system, comprised of levees, floodwalls, backwater areas, floodways, and various control structures, is approximately 1,610 miles long. The PDF is a hypothetical flood that was developed to determine the design flood to be used in designing the MR&T levee system in the lower Mississippi River Basin, and is defined as the "greatest flood having a reasonable probability of occurrence" when the operable features of the entire MR&T Project are considered. The PDF upon which the current design for the construction of the mainline levee system and remaining unconstructed levees is based, is the "Refined 1973

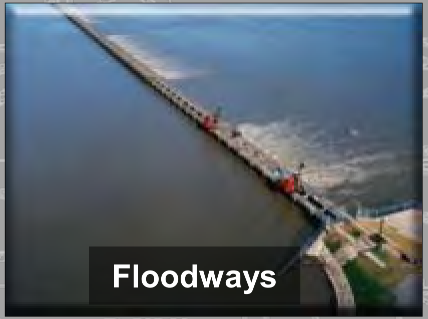
Scoping Purpose and Importance

Scoping Considerations

Significant Resources

WE WANT TO HEAR FROM YOU

Mississippi River and Tributaries Project



An Integrated System

- **Reduce Flood Risk**
- **Facilitate Navigation**
- **Restore Damaged Ecosystems**

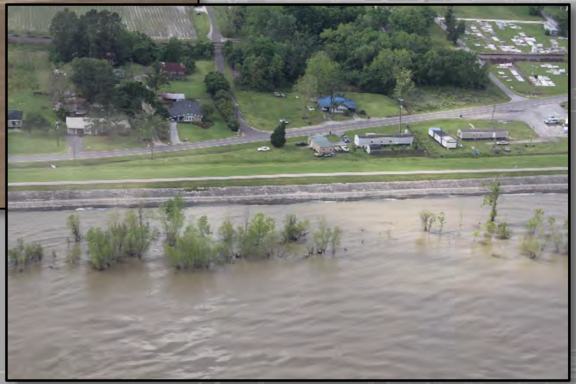
- **$15.5 billion invested**
- **$1 Trillion in flood damages prevented**
- **$234 billion in flood damages prevented in 2011**
- **66.9 to 1 return on investment**
- **4 million people protected**

The Mainline Mississippi River Levee System (MRL) extends from Cape Girardeau, MO to Head of Passes, LA and is approximately 1,610 miles in length.

Project goal is to pass the Project Design Flood (PDF) and address seepage concerns

Construction is approximately 79% complete. Assessment and maintenance will be required to ensure the integrity of the MRL after the project is completed.

In November 2017, USACE completed an engineering evaluation for authorized remaining work needed to complete the MRL. The evaluation addressed overtopping, seepage, slope stability, and floodwall stability.



Station	2011	1927 [6/]	1937 [6/]	1973	PDF [5/]
Cairo, IL [1/]	2,100,000 [C/2/3/]	1,626,000	2,010,000 [4/]	1,536,000	2,360,000 [4]
Memphis, TN	2,213,000 [C]	N/A	2,020,000	1,633,000	2,410,000
Helena, AR	2,130,000 [C]	1,756,000	1,968,000	1,627,000	2,490,000
Arkansas City, AR	2,293,000 [C]	1,712,000	2,159,000	1,879,000	2,890,000
Vicksburg, MS	2,320,000 [C]	1,806,000	2,060,000	1,962,000	2,710,000
Natchez, MS	2,260,000 [C]	N/A	2,046,000	2,024,000	2,720,000
Red River Landing, LA	1,641,000 [C]	1,461,000	1,467,000	1,498,000	2,100,000
Baton Rouge, LA	1,436,000 [C]	N/A	1,400,000	1,381,000	1,500,000
N. Orleans, LA	1,230,000 [C/8/]	1,360,000	1,342,000	1,248,000	1,250,000
Morgan City, LA [7/]	512,000 [C]	741,000	493,000	692,000	920,000
Wax Lake Outlet, LA [7/]	323,000 [C]	N/A	N/A	292,000	580,000

C - Peak Discharge, Provisional

1/ Discharge Range at Hickman, KY

2/ Total Confluence Flow of 1,936,000 cfs measured at approximate mile 950.8 at 1400 CDT 5/02/2011 near Wickliffe, KY, prior to operation of Birds Point-New Madrid

3/ Peak Flow Measured 4 May 2011 = 1,730,000 cfs at Hickman plus 370,000 cfs flow through Birds Point-New Madrid Floodway

4/ Includes flow through Birds Point-New Madrid Floodway

5/ Project Design Flood (PDF) provides design flows for MR&T project. Prior to 2011 Flood, MR&T Project was 89% complete. 2011 Flood Flows ~ 80-85% of MR&T PDF Flows.

6/ Reference - "Annual Maximum, Minimum, and Mean Discharges of the Mississippi River and Its Outlets and Tributaries to 1963"

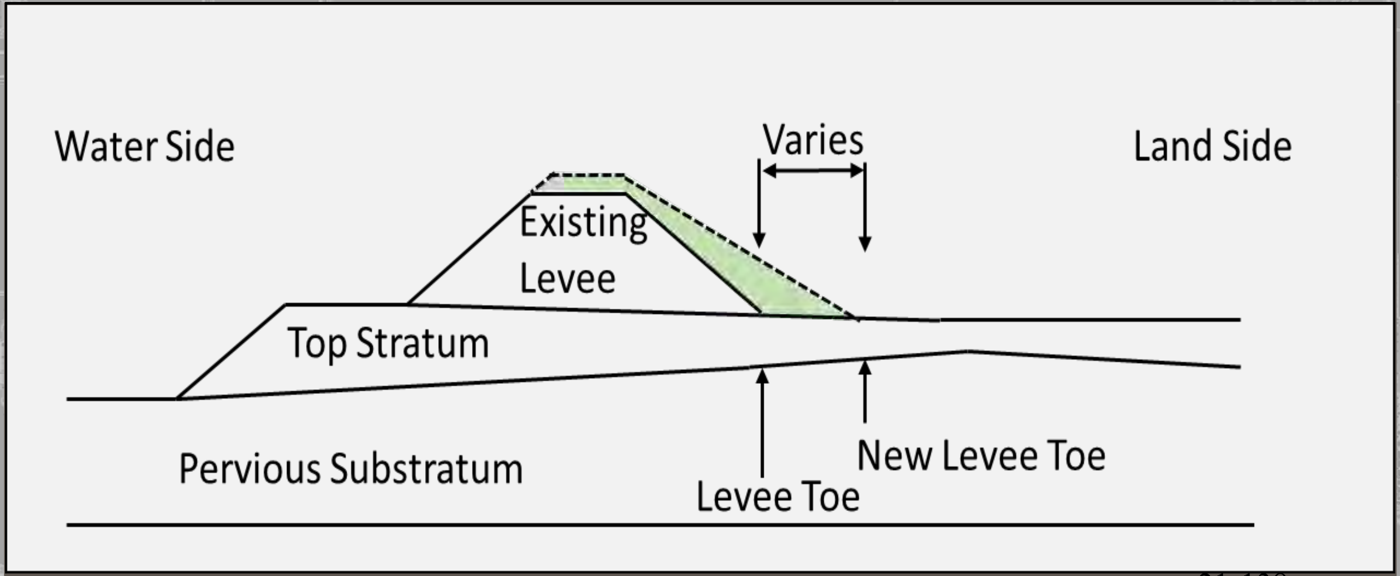
7/ Wax Lake Outlet was constructed from 1937-1942. Prior to that, Lower Atchafalaya River was the major outlet.

8/ New Orleans Mean Daily Flow Measured at Belle Chasse in 2011, Readings at this site are tidally influenced. An instantaneous measurement of 1,320,000 cfs was made on 17 May 2012

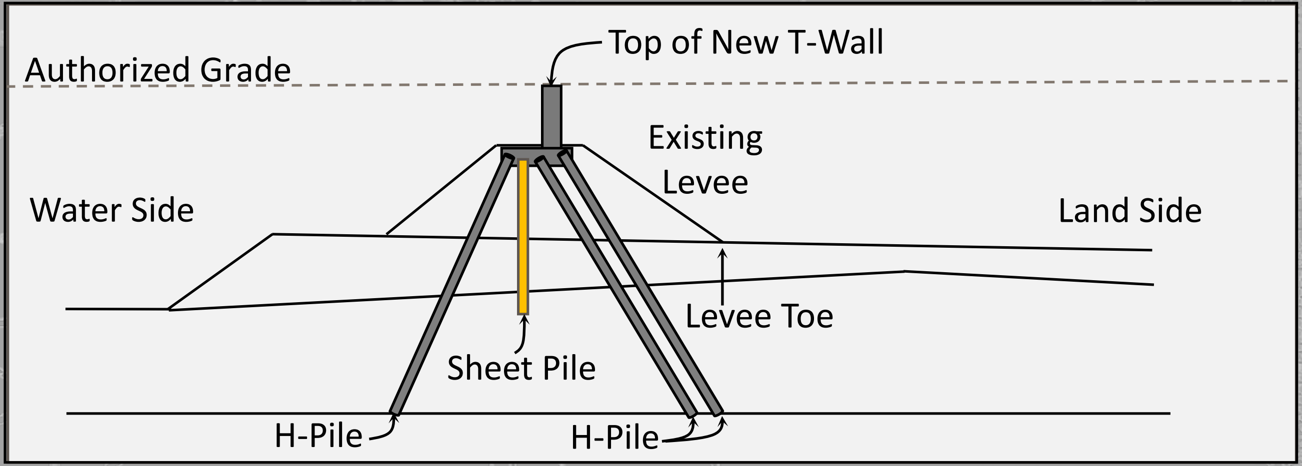
Revised 27 Jan 2012

VICKSBURG DISTRICT
NEW ORLEANS DISTRICT
MISSISSIPPI
LOUISIANA
Baton Rouge
Lafayette
Hammond
Bogalusa
Slidell
Gulfport
Metairie
Morgan City
Houma
Lake Pontchartrain
Lake Maurepas
Camp Shelby
De Soto National Forest
Legend
Levee Work Items
Work Type
Floodwall Stability
Slope Stability
Slope Flattening
Grade Deficiency
Seepage
Existing Levee Centerlines
Mississippi River and Tributaries Project
MR&T Mississippi River Levees
Supplemental Environmental Impact Statement II
Proposed Work Items
Prepared under the Direction of the President of the Mississippi River Commission
Miles

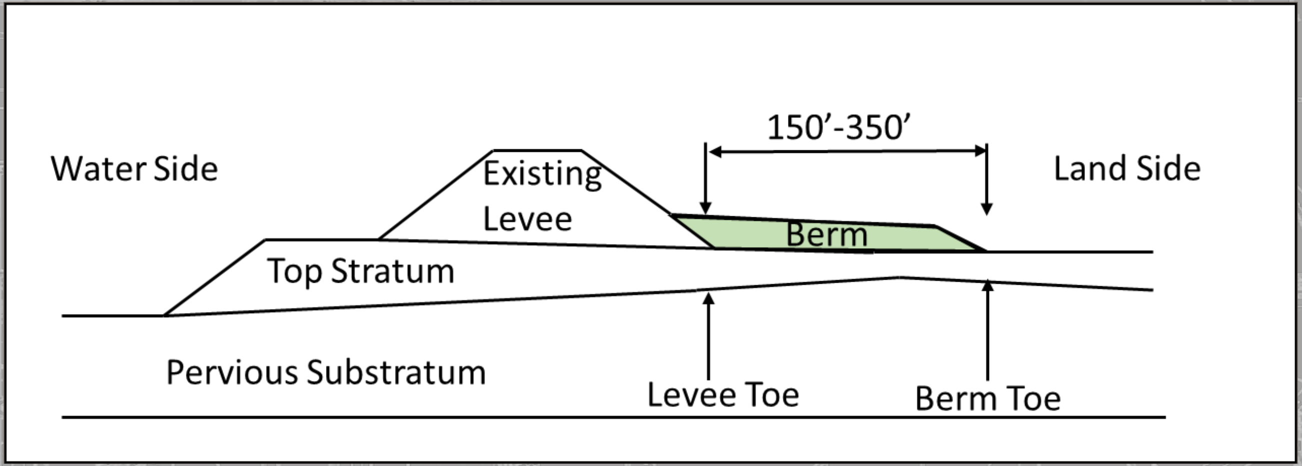
Levee enlargements are conducted in locations where the existing levee is not at the authorized grade. Depending on the location of the project, these raises may occur on the landside, riverside, or straddle the existing levee section.



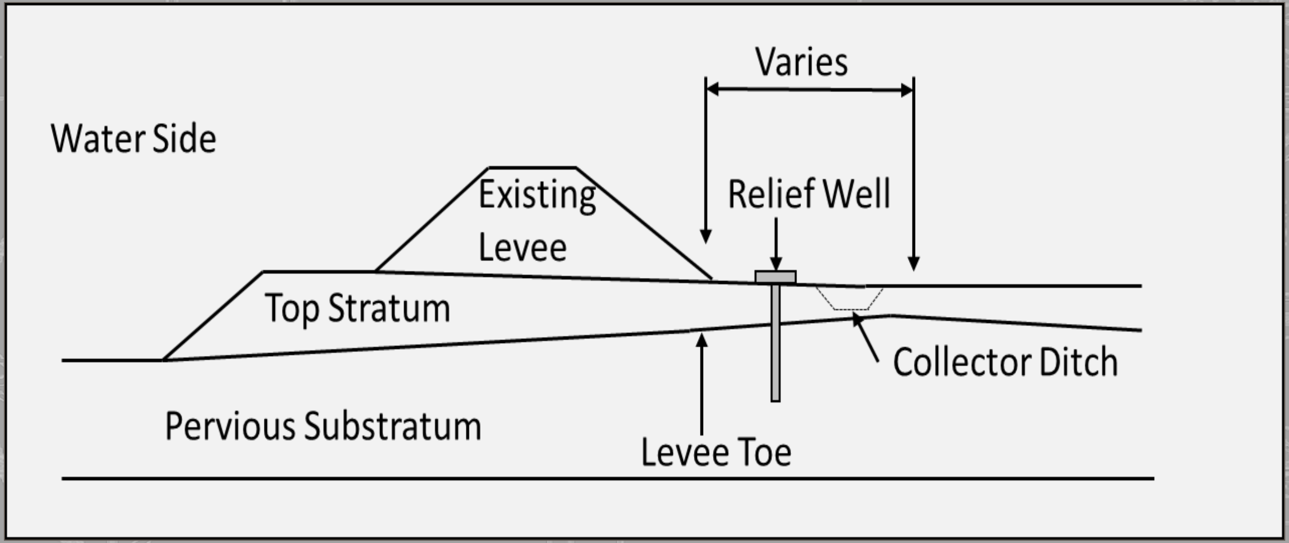
Urban areas typically require floodwalls rather than levees to reduce impacts to residences and businesses. These floodwalls can have stability concerns or height deficiencies that must be addressed.



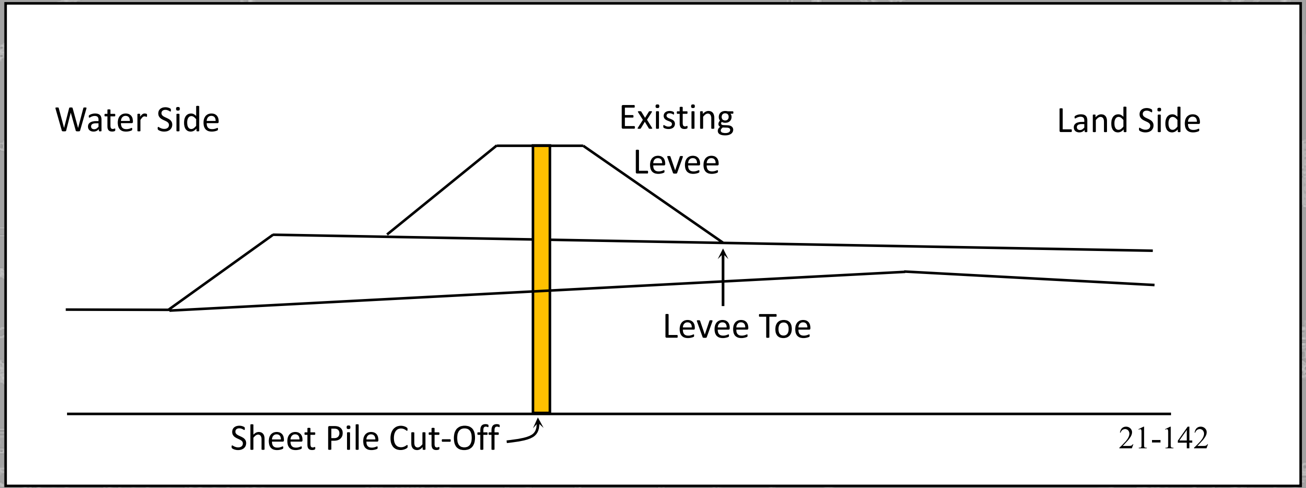
Seepage berms are constructed on the landside of the levee using impervious soils to reinforce existing top stratum and to reduce underseepage pressure near the toe of the levee. Upon construction, berms are turfed and mowed to prevent erosion or encroachment of undesired vegetation.



Relief wells are vertically installed wells consisting of a well screen surrounded by a filter material designed to prevent in-wash of foundation materials into the well. Relief wells intercept underseepage and provide a controlled outlet for the water while minimizing material transport underneath the levee.



Sheet pile cutoff is installed in the levee section to a determined depth to cutoff seepage through any shallow pervious layer and to cutoff seepage through the levee embankment. Upon completion, sheet pile is buried in the levee section.



Mississippi River Levees NEPA History

Description of Recommended Plan
1998 SEIS

District	Work Items	Miles of Enlargement	Miles of Seepage Control Construction
Memphis	31	31.8	74.3
Vicksburg	85	216.8	57.4
New Orleans	12	14.2	0.1
Total	128	262.8	131.8

14

BUILDING STRONG®

Milestone	Date
Notice of Intent Published	13 July 2018 (A)
Cooperating Agency Kick-off Meeting	30 Aug 2018 (A)
Public Scoping Meetings	10-13 Sept 2018
Public Scoping Period Ends	15 Oct 2018
Draft SEIS II Released for Public/Agency Review	January 2020
Final SEIS II Published & Record of Decision Signed	July 2020

WE WANT TO HEAR FROM YOU

US Army Corps of Engineers
New Orleans District

A21-2.7.2 Meeting Summary

ATTENDANCE RECORD

Date: 13 September 2018	MR&T MRL SEIS

PLEASE PRINT CLEARLY

	Name	Organization	City	State	Zip	Email
1	SHANE P. LANDRY	PLAQUEMINES PARISH Gov.	Belle Chasse			[redacted]
2	Matt Rota *	Gulf Restoration Network	NO	LA	70112	
3	Brad Humber	NRI Group, LLC	Gautier	MS	39553	
4	Paul T. West	JP West / HATCH	N.O	LA	70119	
5	Richard Boe	Self / Public	Metairie	LA	70001	
6	Cathy Breaux	FWS	Lab	LA		
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UNITED STATES ARMY CORPS OF ENGINEER

PUBLIC MEETING ON SUPPLEMENTAL EIS TO ADDRESS

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT,

MISSISSIPPI RIVER LEVEES SUPPLEMENTAL ENVIRONMENTAL

IMPACT STATEMENT II

Public Scoping Meeting held on Thursday September 13, 2018 at 7:00 p.m - 9:00 p.m. at the United States Corps of Engineers, New Orleans District Headquarters, located in the District Assembly Room, 7400 Leake Avenue, New Orleans, Louisiana, 70118.

REPORTED BY:

Tammy LeBlanc Joseph
Certified Court Reporter

PROCEEDINGS

MR. BOYETTE:

Thank you everyone. Welcome to the New Orleans District. We appreciate you coming out tonight. I see a lot of familiar faces. So, tonight is the scoping meeting and with it being a scoping meeting, our primary focus is to hear from you. We are looking for your comments, your concerns, your issues, your thoughts as we progress with the second supplemental environmental impact statement for the Mississippi River Levees.

As a, kind of an effort to make sure that we give quite a few options for providing those comments, you have multiple ways tonight that you will be able to provide. One, we do have certified court reporters that you can, at any time during the meeting, deliver your statement, dictate your statement to them. As well as, we'll have a, what I will call, a public comment portion where you would be able to present your comments to the audience or to the speakers, to us. Everything that is said tonight will be recorded by a dedicated certified court reporter.

However, we do understand that it is not always the most eager, or everybody is not always the most eager to present publically. At the front of the door we have, I'm going to call it, a comment packet that kind of outlines what we are here tonight for as well as the back page is a written comment section and you can always fill that out, provide to anyone here that works for the Corp and we will make sure that it gets in the right place.

So, those are kind of the options that will be available to you throughout the night. We will have a few presentations to start the meeting with and then we will go into the session. I'll kind of go over that a little bit more in a moment but right now I would like to turn the floor over to Colonel Michael Clancy.

COLONEL CLANCY:

All right. Hey, good evening everyone. I'm Colonel Mike Clancy. I'm the New Orleans District Engineer. So, we are here tonight to public meetings. Explain to the public what we are up to, to comply with the National Environmental Policy Act in a major federal action that requires an update of NEPA documents.

So, this year, in 2018, we are celebrating the 300th anniversary of New Orleans. We've been at work on the levees in New Orleans, in particular, for 300 years. So, it's kind of a never-ending process.

The Corp got heavily involved in the Mississippi River levees after the '27 flood with the Flood Control Act of 1928 created the Mississippi River and Tributaries System. There are many components of the MR&T, the levees, spillways, the Bonnet Carre, Morganza, Channel Improvement works, other work up river, working in the Atchafalaya.

The EIS, the original EIS for the MR&T system for the Mississippi River levees was done in 1976. We worked for years under that. First supplement was done in 1998 and all the work we've done since '98 has fallen under that supplement. We are now at the point where we see the need for additional work. We will explain what that work is. We are still in the process of developing that but a combination of levee lifts to get the levees to the right designed height or seepage work. It could be cutoff walls, bermed. Again, we will have Nick Sims, our project manager, explain some of the work we are proposing to do.

So, this is supplement number two to the Mississippi River levee EIS. For this EIS we are not working anything with the Atchafalaya, anything with the spillways, work control manuals, none of that. It's really just the Mississippi River levees.

The levees work as a system so this is a three district efforts from Memphis, Vicksburg and New Orleans district, all working together. Basically, the same design criteria for the levees up and down the river. So, this one supplement will cover all three districts and the work we are proposing to do.

I do want assure everybody that the levees are in good shape. The levee maintenance, levee work is a never ending process. Like I said, we have been at it for 300 years. We will be at it as long as humans live on the Mississippi River to help defend us against the annual flood of the river. We are going to have to do work. We acknowledge that there will be some environmental consequences and that's what this meeting is all about. To get your input on your concerns, how you'd like us to scope this EIS.

With that, I will turn over to some of our more technical experts who can explain exactly the work we are proposing and then how the EIS supplement process will work and how the public can get involved. I think I'll be followed by Nick, huh?

MR. SIMS:

No, Mark actually.

COLONEL CLANCY:

Or Mark, okay.

MR. BOYETTE:

So, before we get to Mark, just a little, if you want to ahead and show it, by all means. Just want to give you an idea of what we are looking at tonight. Mark will deliver a presentation on the NEPA section followed by Chris -- Nick. Why am I calling you Chris Sims lately?

MR. SIMS:

(Inaudible)

MR. BOYETTE:

I know but I've been seeing your

e-mails -- followed by Nick to discuss the actual levee system themselves, what we are planning, and then we will turn it over to the public comment section where we will take your comments. I will say, we are open to questions and we will answer them in the best we can but I do want to caveat that we are very early. If this is a marathon, we are at the starter gun. And we are very early so we may not have the answers to your questions but if we do, we will definitely share. So, that this time I would like to turn it over to Mark.

MR. LAHARE:

Thank you, Ricky. Can everyone hear me okay?

(Affirmative response.)

MR. LAHARE:

All right. Good evening ladies and gentlemen. We appreciate everyone coming out tonight. My name is Mark Lahare. I am the National Environmental Policy Act Coordinator for the Mississippi River Levee Project here in the New Orleans district.

Tonight, we are here to discuss the preparation of the second supplemental environmental statement for the Mississippi River Levee feature of the Mississippi River & Tributaries Project.

The purpose of the second supplemental environmental impact statement is to address work on the Mississippi River Levee feature that has not been previously addressed under the original 1976 Environmental Impact Statement or the 1998 Supplemental Environmental Impact Statement. A draft copy of the supplement will be made available for public review and comment in early January 2020.

The National Environmental Policy Act or NEPA is the basic national charter for environmental protection. One of the primary requirements of NEPA is that it directs federal agencies to rigorously evaluate the environmental impacts and any alternatives to any major federal action that could significantly affect the quality of human environment prior to making decisions.

Some of the tools for which this is accomplished are environmental assessments or Environmental Impact Statements. The overall goal of NEPA is to foster good decision making by federal agencies. And this is done through a collaborative process by working with and gathering input from federal, state, and local resource agencies, stakeholders, federally recognized tribes, non-governmental organizations, interested parties and private citizens such as yourselves.

So, when a federal agency proposes to undertake a major federal action, one of the first requirements under NEPA is to publish a notice of intent in the federal register. The notice of intent for the proposed project was published on Friday, July 13, 2018. The notice of intent is primarily meant to provide background historical information to the project; a brief overview of the action being proposed; any known significant issues or concerns associated with the project; and most importantly and the reason we are here tonight, to initiate the scoping process. Just a side note, a web-link to a copy of the notice of intent is available on our project website if you wish to download and review it.

So, the purpose of tonight's meeting is to assist the Corp in identifying any significant resources, issues and concerns that you feel should be addressed in the Supplemental Environmental Impact Statement. Your input here tonight is a key asset to that process. This scoping meeting is meant to provide you with an opportunity to voice your concerns, opinions, and comments on the proposed project.

So, some of the areas of consideration that may aid you and provide you input here tonight are, things such as pertinent studies, for example, what environmental or social economic studies do you think may be needed. Also, are there any existing studies or relative information to the project that you feel should be incorporated into the report? Other topics such as significant resources, issues and concerns would be: What are some of the major issues and concerns that should be analyzed in a report and similarly, what do you feel are the significant resources in the project area that warrant further consideration? So, as you are thinking about those topics tonight, please also consider how those may play a part in determining what types of alternative should be evaluated in the report.

As you can see behind me, these are some of the resources within the project area that we have identified as being significant. Some are taken from prior reports and previous studies but it is important to note that this list is in no way final. If you know of other resources, we ask that you please voice those here tonight. So, tonight we want to hear from you.

At the end of the overall presentation, we will have a formal comment period to receive oral comments on the proposed subject. Let me stress that all comments are important and it is vital that each of you provide your views and concerns relative to this project.

Alternatively, if you wish to provide written comments, you may mail them to one of the individuals on the contact cards in your handout, email them to the address listed on the contact card in your handout or you can detach the last two pages titled "Public Comment Form" and you can present them to any Corp personnel here tonight. We just request that all comments associated with the scoping process be dated no later than October 15, 2018.

Finally, before we move into the formal comment period of the meeting, I'd like to ask our Senior Project Manager, Mr. Nick Sims, to come up and discuss some of the specifics about the Mississippi River Levee feature here in the New Orleans District. Thank You.

MR. SIMS:

All right. Thank you, Mark. Good evening. My name is Nick Sims. I'm the Senior Project Manager for the Mississippi River Levee Construction Project here in New Orleans.

As Mark said, he just went over the NEPA scoping process for the Mississippi River Levee Construction Project. That is the main purpose of this meeting. We want to hear from you. Your input is critical to the update to the Supplemental Impact Statement.

What I'm going to go over is a little project background on the project and highlight some of the actual construction methods that we are going to use. Give you an idea of what types of impacts we might see with those construction methods.

Now, I'll reiterate it. Ricky said it, Mark said it. Nothing is set in stone at this point. Nothing is finalized. We do want to hear from you. You are an important piece of this process.

So, first, I'll go into a little background and the Colonel touched on a majority of this but the Mississippi River Levee Construction Project is a subset of the overarching, what I'll call mega-project known as the Mississippi River & Tributaries Project. Now, this is one of the most comprehensive and successful civil works projects in the nation.

After the flood of 1927, the Flood Control Act of 1928, authorized the project to provide flood control and navigation to the lower Mississippi Valley. I mentioned it is one of most successful projects. You can see the numbers here on the slide. Over one trillion in flood damages prevented. In the 2011 flood, over two hundred and thirty four billion in damages prevented. Almost a seventy to one return on the investment. You would hard pressed to get those types of numbers on other projects. So, again, a very successful project and the reason it's so successful is because it acts an integrated system. And that system consists of channel stabilization, tributary improvements, flood ways and levees which again, is the main purpose of this meeting today, The Mississippi River Levee Construction Project.

So, The Mississippi River Levee Construction Project looks to address height deficiencies and seepage concerns along the main stem Mississippi River levees coming from Cape Girardeau, Missouri down to Head of Passes, Louisiana. That is roughly 1600 miles up the Mississippi and when you take into account the east and Westbank, you are looking at roughly 2200 miles of levee.

The goal of the project, again, is to address seepage concerns and pass what's known as the "Project Design Flood". In its simplest terms, we are trying to build up these levees to keep the Mississippi River within their banks. The project is approximately 77% complete at this time and we still have about 500 miles of deficient levees. Now, as it stands, the project, Colonel mentioned, the levees are in good shape. The project can pass record floods which we have seen in 2011 and to a lesser extent 2016, but until the project is completed, we cannot pass that "Project Design Flood". So, that is the reason we need to do this additional work. That is the reason we are here today to do this supplement to the Environmental Impact Statement.

I mentioned the "Project Design Flood". This table here kind of just shows you some flows that we have seen in different events. Look down here in New Orleans. In 2011, 1.2 million CSF, 1.23, the "Project Design Flood" is 1.25. So, again, the levees are in good shape. They can pass record floods but we do need to finish the project so we can pass that "Project Design Flood" if it ever comes.

So, this is a map of the levees within the New Orleans District. The red that you see here are the levees that are deficient. The blue dots, it's probably hard for you to see, but, those are the seepage concerns that we are currently tracking. So, these levee deficiencies and these seepage concerns, the work that will be done is what will be put into this Environment Impact Statement. We will go into more detail about the actual fixes that we will have for each of these projects.

You look at this map, it might look a little alarming. I know it shows a lot of the levee in red but that's really not the case. Again, the Colonel said it. The levees are in good shape. We have passed record floods. We have been doing work on this project for years now.

The work that was covered under previous environmental documents was really to address the most critically deficient areas. That work has either been completed or is ongoing. These areas that you see here, the majority of them, it's one to two foot deficiencies, a lot are even less than a foot. There are some that are more but for the most part, the most critically deficient areas have been addressed. But again, we have to address everything to complete the project, to pass that "Project Design Flood".

So, you see the areas that are deficient. I told you we have to go work on them. How will we do that work? Well, for height deficiencies, there's only two ways to address that: Levee enlargements or flood walls. Here you see the levee enlargement. It is pretty self-explanatory. You are building up, adding material to the levee to bring it to that congressionally authorized height to pass the "Project Design Flood".

The impacts that you are looking at with this type of work, you will expand the footprint. If you go up, obviously, you have to go out. So, the footprint will expand with this type of work and you need the dirt or the barrow to that enlargement. So, where you get the dirt from, you could have some impacts with that.

The second way to address a height deficiency is a flood wall. Again, self-explanatory. But this is more of in urban area. The picture you see here is at Dumaine Street in the French Quarter. Where you can't go up and out because of houses or other buildings, you can go up with flood wall. The impacts associated with this, there less than what you would see with an enlargement but you do have other impacts. Noise, things associated with an urban environment but for the most part its much less than what you would see with the levee enlargement. So, that is how you address the height deficiencies.

Next, we will look at the seepage concerns. Just a quick run down. The river, when it comes up, is putting pressure there on the levees and you can have seepage. The water will come through under the levee, come up at levee toe, could possible move some material and you could be looking at a levee failure. So, to address that there's really three ways that we look at: Seepage berms, relief wells, or sheet pile cutoff.

The first one we are going to look at is seepage berm. Very similar to the height, to the levee enlargement that I mentioned except for you are going out with a berm. The goal here with here is you are trying to put some weight down there on the toe to push that seepage away from the toe, get it away so you don't see that movement in material. As far as the impacts associated with this type of work, very similar to the enlargement. You are going out so you're expanding the footprint and you have to get the barrow from a source. So, again, you might have associated with that.

The second type of seepage concerns are relief wells. As the name implies, you are relieving the pressure of seepage. Essentially, you are drilling down, drilling a well and that allows for controlled flow of the seepage as it comes through. The actual drilling of the well itself, the impacts, they are particularly within the existing footprint, but that water has to go somewhere. If the existing drainage cannot handle the water that comes out, then we might have to expand the footprint to look at that.

And the third way to address seepage is a sheet pile cutoff. Essentially, it's a flood wall in reverse. You are going down at the levee toe and cutting off that seepage. You see here from the picture, impacts associated with this. Again, similar to the flood wall, you are within the existing footprint so you are not really expanding that. But you could have, you might need minimal barrow to put behind the sheet pile for stability so you could have some impasse associated with that.

So, a brief history. Again, the Colonel touched on this. The original EIS for this project was completed in 1976. It was then updated in 1998. The majority of that work, as I mentioned earlier, was to address the most critical deficiencies. You see the number of items here. In New Orleans, twelve items. Less than some of the other districts but that number is a little misleading. One of those items was a levee lift that we did the entire reach of Jefferson Parish that we are just finishing up right now. There was a critical deficiency. We got out there and did the work. There is work ongoing still but that was really the focus of these previous documents. Again, to address those critical deficiencies.

And the need for the update now is again, those 500 miles that we are seeing of deficient levee and the seepage concerns. That's what we will look at and that is what we will outline in this upcoming NEPA document.

The schedule for the Supplemental Environmental Impact Statement, Mark mentioned Notice of Intent was published on 13 July. We had a cooperating agency kick off meeting about two weeks ago. Public scoping meetings, had one in Memphis and Vicksburg earlier in the week. Last night we were in Baton Rouge and today we are here in New Orleans. The public scoping period will end on October 15th and we look to have a draft document in January of 2020 and the final document in July of 2020.

So, that's the background and a little explanation of the type of work that we are going to be doing. But again, the focus of this meeting is to hear from you. So, I'll turn it back over to Ricky but that's what -- we want your comments. We want to hear what you have to say. We want you to be a part of this process.

MR. BOYETTE:

Thanks, Nick. Again, to reiterate, the most important thing that we can do tonight is to get your comments, your feedback. We want to develop what we would consider a well informed and appropriate processing document. There may be things that we already do know but there may be that one thing that we do not know or we are not looking at and that is what we need from you guys.

So, at this time, I'd be happy to turn it over to you if anybody has any questions or comments they would like to present. I will ask if anybody does want to comment, please use the microphone. Only because it will help with clarity in our dictation/transcript.

MR. ROTA:

Thank you. My name is Matt Rota. I'm with the Gulf Restoration Network. And first of all, you know, we are going to be submitting more detailed comments as we go on but there are some questions.

First of all, the announcement was very light on information. Like not even like what was happening here. So, some of my comments might be out of the scope but I don't necessarily think they should be. You know, our relationship here with the levees is complex here in New Orleans. Right? We need them because they are protecting us. If we didn't have them, New Orleans wouldn't be here but also levees are one of the drivers for the coastal land laws crisis we are seeing today.

So, it's something very important. So, there are a few things that I wanted to touch on to make sure I would like to see in this, I think it's a real good opportunity, to maybe look beyond just sheet piling and protection from seepage and things like that. But first and foremost, I do want to make sure that no wetlands are impacted whenever barrow is being seeped for lifts or for lengthening the toe and all that. Even during the hydrous New Orleans Alternative NEPA process, the Corp ended up not using wetlands for barrow and I think that is important practice. That should continue with project as well.

Also, I want to make sure no additional wetlands are enclosed by levees if any additional levees or alterations to levees are planned because as we know, the wetlands are one of our lines of defense and enclosing wetlands basically ends up killing them very often. Further, we think this an opportunity to look at the old river control structure. It is, you know, from many accounts, held together by spit and baling wire, probably a little bit more than that but it is something to be looked at. There is, look at the shoaling around there and also, looking that the 70/30 split of what water is going down the Mississippi River. What water is going down the Atchafalaya and when that is happening and also what quantity of releases are happening. Because the Atchafalaya Basin, not like a lot of the coast, is actually accreting a lot in sediment.

Sedimentation is a big problem for the

crawfishermen down there and for the echo system that's down there. And so, opening the older control structure a little slower and allowing the water to come down but not as much sediment. So, I think this a great opportunity for sediment management.

Speaking of sediment management, also dredging is a huge concern and shoaling is a huge concern both for navigation. We need to make sure that the channel is deep enough for navigation interests and also so that sediment is used beneficially. And so, I think that this is an excellent opportunity to enshrine the idea of a beneficial use of sediment.

Right now the Corp goes through a cost benefit analysis and very often says it is not a benefit to use the stuff that we are dredging or we use dredges that just pick up the sediment and send it further down the river. And this is an opportunity to really look at how we are dredging the river and making sure that we are beneficially using all that sediment and not just pushing it down the river or putting it in places where is not necessarily needed.

We assume that there is going to be

some wetland mitigation during this process and we want to make sure that any wetland mitigation that needs to happen is minimized and then -- so the wetland impacts are minimized and then also that we make sure that mitigation happens near where the impact is to restore the wetland impact. So, a kind of a prime example of this would be an Atchafalaya Basin. Right now we are seeing projects that are being mitigated. You know, cypress tupelo swamp damage is being mitigated in bottomland hardwood that is no where near the impasse and isn't replacing the function. So, we want to make sure that all functions, especially in the Atchafalaya Basin, are restored and replaced. And again, it is absolutely vital for the Basin and for the Mississippi River and Tributaries Project.

Let's see. Another thing is, with mitigation, is making sure that mitigation is concurrent with the project. Projects time and time again, this is where we don't think the Corp did do a good job with the Mississippi or the New Orleans levee projects, the hydrous project where mitigation got put off well after all the construction and mitigation should be concurrent with construction to make sure that we are not losing temporal loss of those wetland services. So, we think it should be concurrent and not put off until the end.

And also, when you put things off to the end, often the money is not there and so, things get shirked. So, we want to make sure that we are replacing our, replacing the wetlands that we need to impact.

One other big thing in the, big elephant in the room is climate change. You know, it is authorized for a one hundred year flood which hundred year floods are happening every, you know, ten, fifteen years now it seems like. And so, making sure, taking a look at is the hundred year flood the right process we should be using and what is a true one hundred year flood. I know this has been thrown out to the Corp a bunch of times but, you know, if you want to take a look at the other extreme, the Netherlands plan for ten thousand year floods. I know that they are a nation that they can dedicate all of their resources to that but still that is a huge, huge difference and we should be looking at, looking at real impacts and what a one hundred flood, at least, really looks like with climate change.

Also, we want to make sure that the Corp does an environmental justice impact. I don't think that was one of the impacts that was listed up there. It might have been but I can't remember. But added as a resource is environmental justice. We, time and time again, we see projects impacting disparately communities of color, low-income communities and we want to make sure that environmental impacts are not unjustly put upon our most venerable people in our nation.

And then just kind of, you know, we are scoping, we are kind of spit-balling here. Is this an opportunity for the Corp to look at different arrangements for the river? What would happen if we abandon some of our levees? What would happen if we decommission some of our lower levees? Southwest Pass is silting in all the time. There has been a lot of talk about putting another navigation canal. I know it's probably a non-starter but I think this is a good opportunity to look at, since you need to be looking at a no build alternative. But what does an no build alternative look like with an existing project? And maybe exploring what happens if certain levees are decommissioned and new levees are put in to minimize a sedimentation, minimize dredging and also allowing for better navigation.

So, I think I've talked enough and I will be submitting more comments before the end.

MR. SIMS:

Well, thank you. I'll try to address some of your comments. The first thing to remember is this document will deal strictly with the Mississippi River Levee Construction. So, a lot of the things that you mentioned, shoaling of the river, old river, that will not be the focus and that will not be looked at with this document.

Now, the Corp is looking at that other, doing other avenues but you won't see any of that here in this particular document. Environmental Justice, certainly that will be a part of this. You see that in there. Wetlands, the goal during construction, is avoid and minimize -- minimize and avoid. So, certainly, the intent is not to go in and take barrow from existing wetlands. I can't tell you if there won't be any in there but that is the goal to stay away from them. We will certainly try that.

I'm drawing a blank on some of your other questions but you made a lot of good points.

MR. LAHARE:

Climate.

MR. SIMS:

Climate change will not be looked at in this. Again, the focus of this document will be just the raising of the levees and addressing seepage control.

MR. LAHARE:

But climate has to do with how high the levee should go.

SPEAKER:

Nick, why don't address what Matt spoke about in climate change is the hundred year authorization and to my knowledge, that is not what the MRLs are for. Can you talk a little bit about that?

MR. SIMS:

Yeah, no, they are not, I'm kind of drawing a blank on this, Mark.

MR. LAHARE:

Yeah, so, it's not, and Kenneth, you might be able to help me out here too. So, Matt had spoken about MRLs and hundred year level of risk reduction. To my knowledge, that is not what the MR&T is designed for. It is actually Project Design Flow or flood and some of the numbers I've often heard, at least in the New Orleans area, are close to about an eight hundred year level of risk reduction. At least in the New Orleans area. Any thought on that? Okay. Okay.

A couple other comments you brought up, beneficial use and deepening the Mississippi River. We are all over that. In terms of deepening the river, we just had the chief's report approved deepening the river to fifty feet and so we are moving forward with that with budgeting and hopefully we will get the construction on that project here as soon as dollars are available partnering with DOTD and certainly we are going to maximize beneficial use through that program as well as Louisiana Coastal area. In fact, we are going to be doing Calcasieu, not on the Mississippi but it's just the intent of beneficial use. We are doing a Calcasieu saving. Just awarded that yesterday for more beneficial use off the Calcasieu River. And we are planning another phase off Tiger Pass to use material out of the lower Mississippi River in probably '19 assuming we partner with CPRA and Plaquemines Parish on that.

And one other point you brought up, consider different river alignments. Kind of the changing course concept. We are not actively involved in that but CPRA through, as you've tracked it, through the restore program is moving forward with that. I think it's somewhere about 9.6 million dollar. We will look at that and so, we are going to continue to partner with CPRA on that piece.

Concurrent mitigation. You referenced hydrous. I'll be happy to mention that through some of the BBA18 work, our supplemental work which is three big projects, East Baton Rouge combing west shore, we don't have that same arrangement so it is concurrent mitigation. You will be happy to know, even today, we went out on a streak to secure more mitigation for combing which we are actually ahead right now on mitigation. So, we hope that we can continue that track record on those projects.

MR. SIMS (?):

And for this particular project it is concurrent. We continue to buy credits and everything, so, yep, that is ongoing.

MR. ROTA:

Is there anyone else who would like to submit a comment or a question? No one? Going once.

I changed it, but by all means, if anything pops up or anything that raises, I know Matt's group will be submitting a more extensive lift but if anyone, if something comes up later after the meeting, feel free to email us or send it in by October 15th.

If we have no more comments or anything, I'm going to go ahead and close the meeting but we will be around until 9:00 at least to take on that's if you have anything else.

Thank you all for coming and I appreciate it and if you need anything from us, by all means, let us know. (EOH)

REPORTER'S PAGE

I, TAMMY LeBLANC JOSEPH, Certified Court Reporter, in and for the State of Louisiana, the Officer before whom this sworn testimony was taken, do here state:

That due to the spontaneous discourse of this proceeding, where necessary, dashes (--) have been used to indicate pauses, changes in thought, and/or talkovers; that same is the proper method for a Court Reporter's transcription of a proceeding, and that dashes (--) do not indicate that words or phrases have been left out of this transcript;

That any words and/or names which could not be verified through reference material have been denote with the phrase"(phonetically spelled)."

TAMMY LeBLANC JOSEPH
Certified Court Reporter
Louisiana Lic #91118.

C-E-R-T-I-F-I-C-A-T-E

This certification is valid only for a transcript accomplished by my original signature and original required stamp on this page.

I, TAMMY LeBLANC JOSEPH, CCR, in and for the State of Louisiana, as the officer before whom this testimony was taken, do hereby certify that the proceedings are as hereinbefore set forth in the forgoing pages; that this testimony was reported by me in the stenograph writing method, was prepared, transcribed by me or under my personal direction and supervision; that the transcript has been prepared in compliance with the transcript format guidelines required by statute or by rules of the board, as described on the website of the board; that I have acted in compliance with the prohibition on contractual relationships, as defined by LA Code of Civil Procedure, Art 1434, and in the rules and advisory opinions of the board; that I am not related to counsel or to the parties herein, nor am I otherwise interested in the outcome of this matter.

Tammy LeBlanc Joseph, CCR
State of Louisiana

Miami Tribe of Oklahoma

3410 P St. NW, Miami, OK 74354 ● P.O. Box 1326, Miami, OK 74355
Ph: (918) 541-1300 ● Fax: (918) 542-7260
www.miamination.com

August 7, 2018

U.S. Army Corps of Engineers
ATTN: CEMVN-PDC-UDC
167 North Main Street, Room B-202
Memphis, Tennessee 38103-1894

Re: Mississippi River & Tributaries, Mississippi River Levees & Supplemental EIS – Comments of the Miami Tribe of Oklahoma

Dear Sir or Madam:

Aya, kikwehsitoole – I show you respect. My name is Diane Hunter, and I am the Tribal Historic Preservation Officer for the Federally Recognized Miami Tribe of Oklahoma. In this capacity, I am the Miami Tribe's point of contact for all Section 106 issues.

The Miami Tribe offers no objection to the above-mentioned project at this time, as we are not currently aware of existing documentation directly linking a specific Miami cultural or historic site to the project area. However, as the portions of this project that impact Missouri and Illinois are within the aboriginal homelands of the Miami Tribe, if any human remains or Native American cultural items falling under the Native American Graves Protection and Repatriation Act (NAGPRA) or archaeological evidence is discovered during any phase of this project, the Miami Tribe requests immediate consultation with the entity of jurisdiction for the location of discovery. In such a case, please contact me at 918-541-8966 or by email at dhunter@miamination.com to initiate consultation.

The Miami Tribe accepts the invitation to serve as a consulting party to the proposed project. In my capacity as Tribal Historic Preservation Officer I am the point of contact for consultation.

Respectfully,

Diane Hunter

Diane Hunter
Tribal Historic Preservation Officer

From:	John Fox
To:	Thron, John M (Mike) CIV USARMY CEMVN (US)
Cc:	Jess Hendrix
Subject:	[Non-DoD Source] RE: Proposed Environmental Models
Date:	Friday, August 31, 2018 4:18:29 PM

Dear Mr. Thron,
The Osage Nation Historic Preservation Office has reviewed the attached environmental models. We have no concerns for the methods proposed by these models.
Thank you for consulting with the Osage Nation,

John Fox
Archaeologist, MS, RPA
627 Grandview Avenue, Pawhuska, OK 74056
Phone: 918-287-5274
jfox@osagenation-nsn.gov

From: Thron, John M (Mike) CIV USARMY CEMVN (US) [John.M.Thron@usace.army.mil]
Sent: Thursday, August 30, 2018 5:54 PM
To: Long, Larry; Summerlin, Joe; Hayden, Keith; EPA Region VI - AR (Boyd, Wanda); Andrea Hunter; Walther, David; kelly_morris@fws.gov; Jess Hendrix; John Fox
Cc: Sumerall, Daniel C CIV CEMVK CEMVD (US); Berkowitz, Jacob F CIV USARMY CEERD-EL (US); Killgore, K J Jr CIV CEERD CEERD (US); Fischer, Richard A ERDC-EL-MS
Subject: Proposed Environmental Models

Thanks for the participation and feedback at this morning's meeting. Attached are the proposed models we discussed today. Just let me or the ERDC personnel in the CC line know if you have specific questions on these. I would be happy to summarize habitat variables, etc. with each of these models if you would like. Also, the project website (Blockedhttp://www.mvk.usace.army.mil/MRLSEIS/) contains hyperlinks with information on the the MR&T project as a whole, the Mississippi River Levees feature, and various other background information. In know this is a lot of information so feel free to contact me at any time if you need anything or have additional questions.

Thanks,
Mike Thron
Upper Delta Environmental Compliance Section
Regional Planning and Environmental Division South, USACE
167 N. Main St., Rm-B202
Memphis, TN 38103
Office: (901) 544-0708
Email: john.m.thron@usace.army.mil

From:	Lieb, Pamela D CIV USARMY CEMVM (US)
To:	Thron, John M (Mike) CIV USARMY CEMVN (US)
Subject:	FW: Mississippi River & Tributaries, Mississippi River Levees @nd Supplemental EIS - Notice of Intent
Date:	Wednesday, September 05, 2018 8:13:23 AM

FYI

-----Original Message-----
From: Gibb, Heather [mailto:Heather.Gibb@dnr.mo.gov]
Sent: Friday, August 31, 2018 4:29 PM
To: Lieb, Pamela D CIV USARMY CEMVM (US) <Pamela.D.Lieb@usace.army.mil>
Subject: [Non-DoD Source] RE: Mississippi River & Tributaries, Mississippi River Levees @nd Supplemental EIS - Notice of Intent

Hello Pam,

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which requires identification and evaluation of cultural resources.

We have reviewed the information provided concerning the above referenced project. We have no additional comments at this time, but look forward to continued consultation.

Please be advised that, as this project develops, information documenting the possible effects on historic properties should be submitted to this office for further review.

If you have any questions, please write Heather Gibb at State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102 or call 573/751-7862. Please be sure to include the SHPO Log Number (046-MLT-18) on all future correspondence or inquiries relating to this project.

Heather Gibb
Review, Compliance, Records Coordinator
Missouri SHPO
PO Box 176
Jefferson City, MO 65102
573-751-7862

We'd like your feedback on the service you received from the Missouri Department of Natural Resources. Please consider taking a few minutes to complete the department's Customer Satisfaction Survey at Blockedhttps://www.surveymonkey.com/r/MoDNRsurvey. Thank you

-----Original Message-----
From: Lieb, Pamela D CIV USARMY CEMVM (US) <Pamela.D.Lieb@usace.army.mil>
Sent: Friday, August 31, 2018 1:14 PM
To: Gibb, Heather <Heather.Gibb@dnr.mo.gov>
Subject: RE: Mississippi River & Tributaries, Mississippi River Levees @nd Supplemental EIS - Notice of Intent

Hey Heather:

An email will be just fine.

Thanks!

-----Original Message-----
From: Gibb, Heather [mailto:Heather.Gibb@dnr.mo.gov]
Sent: Friday, August 31, 2018 1:01 PM
To: Lieb, Pamela D CIV USARMY CEMVM (US) <Pamela.D.Lieb@usace.army.mil>
Subject: [Non-DoD Source] RE: Mississippi River & Tributaries, Mississippi River Levees @nd Supplemental EIS - Notice of Intent

Hello Pam,

I wanted to check in on this project. Would you prefer a formal letter of comment or will an email stating that we look forward to continued consultation for the NOI work as comment? I just want to make sure we respond in the most appropriate manner for the USACOE. Until the draft SEIS II comes out, we will not have any very specific comments.

Best,

Heather

Heather Gibb

Review, Compliance, Records Coordinator

Missouri SHPO

PO Box 176

Jefferson City, MO 65102

573-751-7862

From: Lieb, Pamela D CIV USARMY CEMVM (US) [Pamela.D.Lieb@usace.army.mil]
Sent: Friday, July 13, 2018 8:47 AM
To: ethompson@astribe.com; Celestine.bryant@actribe.org; aqhpo@mail.com; Lguy93@hotmail.com; pcross@caddonation.org; bill-baker@cherokee.org; HPO@chickasaw.net; Ian Thompson; llangley@coushattatribela.org; bobermeyer@delawaretribe.org; russtown@nc-cherokee.com; rdushane@estoo.net; ashively@jenachoctaw.org; fhacket@kawnatino.com; henry.harjo@kialegeetribe.net; eric.sheets@ktik-nsn.gov; drgrignon@mitw.org; dhunter@miamination.com; Carleton, Ken; section106@mcn-nsn.gov; ahunter@osagenation-

nsn.gov; ewhitehorn@omtribe.org; jfroman@peoriatribe.com; cwhite@pci-nsn.gov; halona.clawson@ponca.com; Everett Bandy; smassey@sacandfoxnation-nsn.gov; Harjo.n@sno-nsn.gov; shawneetribe@shawnee-tribe.com; thpo@tttown.org; earlii@tunica.org; eoosahwee-voss@ukb-nsn.gov; kpenrod; kblount@mdah.ms.gov; Scott.Kaufman@arkansas.gov; Rachel.Leibowitz@illinois.gov; craig.potts@ky.gov; Prawl, Toni; patrick.mcintyre@tn.gov
Cc: Thron, John M (Mike) CIV USARMY CEMVN (US); Lambert, Edward P CIV USARMY CEMVN (US)
Subject: Mississippi River & Tributaries, Mississippi River Levees @nd Supplemental EIS - Notice of Intent

CLASSIFICATION: UNCLASSIFIED

Dear Tribal Partners and SHPOs,

The U.S. Army Corps of Engineers (USACE), Memphis District, Vicksburg District, and the New Orleans District, is announcing its intent to prepare Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (SEIS I) to the 1976 EIS, to cover construction of remaining authorized work on the Mississippi River mainline levees (MRL) feature. Over the past twenty years since the finalization of SEIS I, USACE has determined that various sections (reaches) of the mainline levee system are deficient in varying amounts, and that certain remedial measures need to be undertaken to control seepage and to raise and stabilize the deficient sections of the levee to protect the lower Mississippi River Valley against the Project Design Flood.

A Notice of Intent (NOI) is anticipated to be published in the Federal Register on this matter on FRIDAY July 13, 2018, opening the comment period lasting until October 1, 2018. For your convenience, a copy of the NOI is attached.

USACE invites full public participation to promote open communication on the issues surrounding the Proposed Action through what is referred to as the scoping process. All individuals, organizations, non-governmental organizations, affected Indian Tribes, and local, state, and Federal agencies that have an interest are urged to participate in the scoping process. Public scoping meeting(s) will be held at various locations within the Project Area during approximately late July or August of 2018 to present information and to receive comments. The date(s), time(s), and location(s) of the scoping meeting(s) will be publicly announced in advance by USACE on the Project website at: BlockedBlockedhttp://www.mvk.usace.army.mil/MRLSEIS/ <BlockedBlockedhttp://www.mvk.usace.army.mil/MRLSEIS/> , as well as through email distribution lists, mailed to public libraries, government agencies, and interested groups and individuals. Scoping meeting dates and locations will also be advertised in local newspapers. Interested parties unable to attend the scoping meetings can access additional information on SEIS II at the website listed above.

In order for public comments to be recorded for inclusion in the Administrative Record and be considered in the SEIS II development process, members of the public, interested persons and entities must submit their comments to USACE by mail, email, or verbally at the Scoping Meeting(s). Written comments submitted for consideration are due no later than October 1, 2018. Comments and questions about SEIS II should be submitted to USACE by email to: MRL-SEIS-2@usace.army.mil; or by regular mail to: U.S. Army Corps of Engineers, ATTN: CEMVN-PDC-UDC, 167 North Main Street, Room B-202, Memphis, Tennessee 38103-1894. For additional information, including but not limited to a copy of SEIS I and the 1976 EIS, please visit the project website.

The current SEIS II development schedule anticipates the release of the draft of SEIS II by USACE for public review and comment in 2020. After it is published, USACE will hold public comment meetings to present the results of studies and identification of a recommended plan, to receive comments, and to address questions concerning the draft SEIS II.

Respectfully,

Edward P. Lambert
Chief, Environmental Compliance Branch
Regional Planning and Environmental Division South U.S. Army Corps of Engineers

167 N. Main St., Room B-202, Memphis, TN 38103-1894
Office: (901)544-0707
Email: edward.p.lambert@usace.army.mil

And

Pamela Lieb
District Archaeologist
U.S. Army Corps of Engineers, Memphis District
167 N. Main, B-202 Clifford Davis/Odell Horton Federal Building Memphis, TN 38103-1894 Office Phone: 901-544-0710
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STEVE POOLE, MAINTENANCE SUPERINTENDENT
RICK BOYD, ENGINEERING TECHNICIAN

October 11, 2018

U.S. Army Corps of Engineers
Attn: CEMVN-PDC-UDC
c/o Mike Thron, NEPA Coordinator
167 North Main Street, Room B-202
Memphis, TN 38103-1894

Via e-mail: MRL-SEIS-2@usace.army.mil
John.M.Thron@usace.army.mil
Daniel.C.Sumerall@usace.army.mil

Re: Mississippi River & Tributaries Project, Mississippi River Levees
Supplemental Environmental Impact Statement II

Dear Mr. Thron:

I am Peter Nimrod, Chief Engineer for the Board of Mississippi Levee Commissioners, and I have the privilege of presenting this statement as part of the U.S. Army Corps of Engineers public scoping meeting in preparation of Supplement II to the Final Environmental Impact Statement (SEIS II) for the Mississippi River Mainline Levees of the MR&T Project. The Board of Mississippi Levee Commissioners was established in 1865 and is comprised of 7 elected commissioners representing the counties of Washington, Bolivar, Sharkey, Issaquena, and parts of Humphreys and Warren counties. The Mississippi Levee Board is responsible for 212 miles of levees and 350 miles of interior streams.

From 1865 until the 1927 Flood the Mississippi Levee Board was responsible for the design, construction and maintenance of the levee to protect the Lower Mississippi Delta. Following the devastating 1927 Flood, Congress passed the 1928 Flood Control Act which established the Mississippi River & Tributaries (MR&T) Project and set up the U.S. Army Corps of Engineers to design and construct levee enlargement projects. The Mississippi Levee Board is the local sponsor and we provide right-of-way for Corps projects and we maintain the completed levee projects.

Following the 1973 Flood, the Corps of Engineers evaluated the performance of the Mainline Mississippi River Levee system and they discovered that there were areas along the levee system that were deficient in grade and section. It was determined that there were 69.2 miles of deficient levee within the Mississippi Levee District.

"Where People Come First"

The Corps of Engineers hosted similar Scoping Meetings in 1997 for the Supplemental Environmental Impact Statement (SEIS) for the Mainline Mississippi River Levee Enlargement and Berms Project. This 1998 SEIS supplemented the original 1976 Environmental Impact Statement. The riverside batture land includes very important habitat for waterfowl, fisheries and wildlife. As part of this original 1998 SEIS the Corps adopted "avoid & minimize" criteria within their design parameters in an effort to eliminate and lessen impacts to the environment.

Since 1998 the Corps and the Mississippi Levee Board have completed enlarging 44.0 miles of the 69.2 miles of deficient levee and currently have another 8.8 miles of levee under contract. The Corps has completed the design for an item containing another 2.7 miles of deficient levee and the Mississippi Levee Board is currently obtaining right-of-way to construct this item in 2019. The Mississippi Levee Board has obtained right-of-entry for the Corps to survey and perform soil borings at 2 more items totaling 6.2 miles. Once all these items are constructed this leaves only 7.5 miles of deficient levee left to raise on our Mainline Mississippi River Levee within the Mississippi Levee District.

During the past 20 years the Corps of Engineers has done a wonderful job of avoiding and minimizing damage to the environment when they design and construct these levee enlargement and berm projects. When you raise a levee you must first widen out the base and since the riverside slope is steeper than the landside slope of the levee the Corps has utilized a riverside enlargement for the majority of our levee enlargement projects. The practice of using riverside enlargements lessens the footprint and greatly reduces the amount of borrow material needed to raise the levee.

When the Corps starts the design of a levee enlargement project it first looks at batture land in which the Levee Board holds a perpetual easement. If not enough borrow material exists within our easement, the Corps starts looking just outside our right-of-way at adjacent riverside property. Every attempt to minimize damage to the environment is made and post-project borrow area use for the landowner is considered.

These 44 miles of completed levee construction have included utilizing existing landside seepage berm material to raise the levee; utilizing a hydraulic dredge to build back berms using sand from the Mississippi River; using an unused set-back levee as borrow material; building numerous aquatic riverside borrow areas that are irregular shaped, varying depths and islands left in the middle which is perfect for fish habitat; building numerous riverside duck holes that are precision graded and installing water control structures so that water levels can be held, regulated and drained so that millet can be planted for ducks; building numerous riverside reforested borrow areas in which the pit is graded to drain and reforested with trees which provides terrestrial habitat; and finally the Corps is installing Relief Wells in certain areas instead of construction of an earthen landside seepage berm which greatly reduces the need for more borrow material from the borrow areas.

The Levee Enlargement & Berms Project needs to move towards completion because at this point our Mainline Mississippi River Levee will overtop during a Project Design Flood (PDF). If our levee overtops and fails, over a million acres are subject to flooding, hundreds of thousands of people will be displaced, homes, roads and farms will be damaged causing billions of dollars of damage in the Mississippi Delta alone.

The Backwater Levees within the MR&T Project are designed to be 2' below the Project Design Flood (PDF). Therefore in the future when we experience a PDF these Backwater Levees are designed to overtop and take pressure off the Mainline Mississippi River Levees. However, the Yazoo Backwater Levee located within the Mississippi Levee District is currently 7.8' below the PDF and it needs to be raised 5.8'. We request that the Corps of Engineers immediately begin designing the enlargement of the Yazoo Backwater Levee.

The Mississippi Levee Board has been pleased to partner with the U.S. Army Corps of Engineers over the past 20 years on the Mainline Mississippi River Levee Enlargement Project and we are proud of the Corps of Engineers designing and building projects that not only provide critical flood protection for the Mississippi Delta, but also provide environmental gains in all environmental categories.

The Mississippi Levee Board requests that the U.S. Army Corps of Engineers continue to expeditiously design and enlarge the remaining deficient Mainline Mississippi River Levee and the entire deficient Yazoo Backwater Levee using the same design criteria and the same avoid and minimize environmental considerations that they have utilized over the past 20 years. It is also important that the landowners giving up lands for the construction of these projects continue to have input into the design process and the location of borrow areas.

On behalf of the Mississippi Levee Board, we continue to value our partnership and association with the U.S. Army Corps of Engineers and we appreciate the opportunity to make this statement in support of the SEIS II and the completion of the remaining authorized work for the Mississippi River Levees of the Mississippi River & Tributaries Project.

BOARD OF MISSISSIPPI
LEVEE COMMISSIONERS

Peter Nimrod, P.E., P.L.S.
Chief Engineer

From:	Mills, Deanna P (KYTC)
To:	MRL-SEIS-2
Cc:	Peake, Danny R (KYTC); Ross, Steve (KYTC); Higdon, Tonya; Loyselle, Maridely; Whybark, Brad S (KYTC-D01); Kuntz, Chris C (KYTC-D01)
Subject:	[Non-DoD Source] Comment on MRL SEIS II
Date:	Monday, September 17, 2018 9:14:45 AM
Attachments:	image001.png

ATTN: CEMVN-PDC-UDC

Regarding: Kentucky Transportation comment on the Mississippi River Mainline Levee (MRL) Supplemental Environmental Impact Statement (SEIS II)

KYTC Liaison to the USACE contact information:

Deanna Mills, P.E.

Kentucky Transportation Cabinet – Division of Planning

200 Mero Street

Frankfort, KY 40622

(502) 782-5085

Deanna.Mills@ky.gov <mailto:Deanna.Mills@ky.gov>

To whom it may concern,

As the Kentucky Transportation Cabinet (KYTC) liaison to the Army Corps of Engineers, I am sending information to you regarding a large KYTC bridge project currently in planning and environmental stages. This project may be pertinent your MRL SEIS II. The original USACE notice <Blockedhttp://www.mvk.usace.army.mil/MRLSEIS/> of public hearing email was sent on August 23, 2018, and the comment period continues through October 15, 2018.

KYTC is in the planning stage of replacing the US 51 bridge over the Ohio River in Ballard County, Kentucky; between Cairo, Illinois and Wickliffe, Kentucky; commonly referred to as the Cairo Bridge. This bridge is located just north of the Mississippi River and Ohio River confluence. The KYTC 2018 Highway Plan <Blockedhttps://transportation.ky.gov/Program-Management/Pages/2018-Highway-Plan.aspx> currently lists three projects for preliminary engineering and environmental documentation beginning in 2020, with some construction funding scheduled as early as 2024. A US 51 Ohio River Bridge Alternative Selection Report <Blockedhttps://transportation.ky.gov/Planning/Planning%20Studies%20and%20Reports/US%2051%20Alternative%20Selection%20Final%20Report%20-Jan%202014.pdf> was completed in 2014 to look at rehabilitation or replacement recommendations.

Please feel free to contact me if additional information on the Cairo Bridge project is needed.

Thank you,

Deanna P. Mills, P.E.

Transportation Engineer Specialist

Division of Planning ~ Strategic Corridor

200 Mero Street, 5th Floor West

Frankfort, KY 40622

Phone: (502) 782-5085

Fax: (502) 564-2865

Deanna.Mills@ky.gov <mailto:Deanna.Mills@ky.gov>

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

SEP 26 2018

Mr. Mike Thron
U.S. Army Corps of Engineers
Vicksburg District
4155 Clay Street
Vicksburg, Mississippi 39183

Re: Scoping Comments for the Mississippi River and Tributaries Project; Mississippi River Mainline Levees and Channel Improvement Supplemental Environmental Impact Statement No. II (SEIS)

Dear Mr. Thron:

The U.S. Environmental Protection Agency has reviewed the available information provided by the U.S. Army Corps of Engineers (USACE) Vicksburg Office in accordance with our authority provided by Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act (NEPA). The EPA Region 4 Office will function as the cooperating agency point of contact in providing comments and technical recommendations from EPA Regions 5, 6, and 7 for the Mississippi River and Tributaries (MRL) SEIS No. II.

The purpose of the SEIS scoping comments is to help summarize some of the impacts associated with the USACE's Mississippi River flood control efforts. The Mississippi River and its tributaries represents the world's third largest watershed. The EPA appreciates the challenges associated with this expansive project. The EPA's comments and technical recommendation are provided in the enclosure to provide the USACE with early information to illustrate some solutions and to potentially enhance the NEPA collaborative process associated with this project. (See enclosure).

We appreciate your ongoing coordination with the EPA and we appreciate the opportunity to provide comments on the proposed SEIS. We look forward to working with your project delivery team. Should you have questions, feel free to coordinate with Mr. Larry Long, of my staff, at 404-562-9460 or at long.larry@epa.gov.

Sincerely,

Christopher A. Militscher
Chief, NEPA Program Office
Resource Conservation and Restoration Division

Enclosure

ENCLOSURE

Scoping Comments for the Mississippi River and Tributaries Project; Mississippi River Mainline Levees and Channel Improvement Supplemental Environmental Impact Statement No. II (SEIS)

The EPA appreciates the opportunity to serve as a cooperating agency with the U.S. Army Corps of Engineers (USACE) in developing a SEIS that addresses the complexity and scale of the proposed project. We also appreciate the multitude of state and federal regulatory agencies and programs that are encompassed in the Mississippi River Levee (MRL) project. The EPA looks forward to working with the USACE to provide technical expertise in the resolution for past and future mitigation issues. Our goal for this collaborative process is to help provide a higher level of sustainable flood control and environmental protection within the project study area.

Issue: Active vs Passive Flood Control
The Federal Emergency Management Agency (FEMA) recommends passive flood control devices for the protection of buildings and other structures. The issues of passive versus active flood control can become complicated and confusing when evaluating project alternatives.

Recommendation:
The USACE may wish to include as part of the alternatives section of the SEIS, a discussion on active and passive flood control measures. A resource-based economic feasibility analysis may provide a greater level of flood protection in areas where the cost of building levees would be cost prohibitive as determined by the USACE. The USACE may also wish to consider passive, non-structural and restoration-based alternatives for flood risk reduction, including new floodways, levee removal/notches or setbacks, especially in areas that require frequent maintenance.

Issue: Multi-agency Assessment Approach
For projects of this scale and complexity, it may be advantageous to provide a multi-agency assessment approach for the economic and engineering considerations, and include an in-depth discussion on the compatibility of environmental methods, models, data analyses used for decision-making of the alternatives. Part of this assessment approach would be define and consider the risk and uncertainty of performing certain analyses that could be associated with this project.

Recommendation: The EPA recommends that the USACE consider forming Independent External Peer Review (IEPR) panels to: 1) Create a decision matrix capable of determining the compatibility of the different models. 2) Assess differences in geology and hydrology between impact sites and proposed mitigation sites when determining the adequacy of proposed mitigation. 3) Determine how appropriate duck use days' (DUD) models are when applied outside the growing season. It may be important to address separately if a project's impacts reduce DUD. The EPA recommends that they should not be used strictly for wetland mitigation for the rest of that year, and are not a decision endpoint. 4) Establish a decisional process that addresses multi-state mitigation methods for wetlands and other waters of the U.S., 5) Evaluate differences in growing season variations due to the large geographic project scale, and, 6) Evaluate past mitigation projects from previous project phases and future mitigation needs for the current project alternatives with consideration of the regulatory requirements of several States in order to potentially maximize the mitigation for wetland losses due to temporal, functional and direct impacts.

October 11, 2018

U.S. Army Corps of Engineers
ATTN: CEMBN-PDC-UDC
167 North Main Street
Room B-202
Mempis, TN 38103-1894
Via e-mail: MRL-SEIS-2@usace.army.mil

RE: **C20180095,** Coastal Zone Consistency
U.S. Army Corps of Engineers
Direct Federal Action
Notice of Intent to Prepare Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement (MRL)
St. James, St. John the Baptist, St. Charles, Orleans, Jefferson, St. Bernard, and Plaquemines Parishes, Louisiana

Dear Ms. Hansen:

The Louisiana Department of Natural Resources, Office of Coastal Management (OCM) has reviewed the referenced Notice of Intent, and attended the September 12, 2018, Public Scoping Meeting in Baton Rouge, LA. The following comments are submitted for your consideration for the Supplemental Environmental Impact Statement (SEIS).

Flood control and protection are critical to Louisiana, as is the commerce that utilize the Mississippi River and its tributaries. Well-maintained navigation and flood control systems greatly benefit this state and are fully supported by OCM. Nevertheless, the control imposed upon the Mississippi River does result in direct, secondary and cumulative impacts to Louisiana's coastal resources, and the National Environmental Policy Act (NEPA) requires their full evaluation so that the Corps may be guided in their avoidance, minimization, and compensation.

Direct impacts can be expected from proposed MRL project features such as levee enlargements, stability berm construction, seepage control, and pumping station construction or expansion. For such impacts in the Louisiana coastal zone, mitigation will be necessary to compensate for the unavoidable loss of coastal wetlands.

The Corps must also consider secondary and cumulative impacts resultant from these activities. Louisiana's fragile coastal wetlands experience significant and rapid degradation rates. This land loss has several causes, but one of the most significant is the confinement of the Mississippi River to its channel. By preventing overbank flooding, the MRL project cuts Louisiana's coastal wetlands off from the sediment replenishment necessary to keep up with erosion and subsidence. The MRL project, along with navigation maintenance practices, has resulted in the central Gulf of Mexico coast becoming a sediment-starved system despite being the recipient of drainage from nearly half of the nation. Over many decades this has compromised the State's fragile coastal wetlands.

The loss of coastal wetlands affects not only the regional wildlife, waterfowl, and inshore and Gulf fisheries, but also reduces the buffer that protects onshore infrastructure such as roads, pipelines, utility lines, and communities and businesses, from relative sea level rise and hurricane-related storm surge.

OCM urges the Corps to fully evaluate the secondary and indirect environmental impacts resulting from confining the river to its channel and, as required by NEPA, to develop additional project measures to help offset and reverse the unavoidable adverse effects this necessary project has had on Louisiana's coastal wetlands.

Finally, please be reminded that, pursuant to the Coastal Zone Management Act of 1972, as amended, the construction of all MRL project features that may have reasonably foreseeable effects on Louisiana's coastal land use, water use, or natural resources, will require the submission of consistency determinations for review by OCM wherever that work occurs along the Mississippi River system.

The Office of Coastal Management appreciates the opportunity to comment at this stage of the environmental review process, and looks forward to reviewing the Draft SEIS when completed. If you have any questions concerning these comments please contact Jeff Harris of the Consistency Section at (225) 342-7949 or jeff.harris@la.gov .

Sincerely,

/S/ Charles Reulet
Administrator
Interagency Affairs/Field Services Division

CR/SK/jdh

Cc: Daniel Sumerall, COE-VD
Mike Thron, COE-MD
Nick Sims, COE-NOD
Mark Lahare, COE-NOD

JAMES KELLY, VICE-PRESIDENT REYNOLD MINSKY, PRESIDENT JASON TRICHELL, SUPT. OF OPER.

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E-MAIL fifthld2@bellsouth.net

October 15, 2018

U.S. Army Corps of Engineers
Attn: CEMVN-PDC-UDC
c/o Mike Thron, NEPA Coordinator
167 North Main Street, Room B-202
Memphis, TN 38103-1894

Via e-mail: MRL-SEIS-2@usace.army.mil
John.M.Thron@usace.army.mil
Daniel.C.Sumerall@usace.army.mil

Re: Mississippi River & Tributaries Project, Mississippi River Levees Supplemental Environmental Impact Statement II

Dear Mr. Thron:

This written statement is presented as part of the U.S. Army Corps of Engineers preparation of Supplement II to the Final Environmental Impact Statement (SEIS II) for the Mississippi River Mainline Levees of the MR&T Project. Following the devastating 1927 Flood, Congress passed the 1928 Flood Control Act which established the Mississippi River & Tributaries (MR&T) Project and set up the U.S. Army Corps of Engineers to design and construct levee enlargement projects. The local Levee Boards are the local sponsors and we provide right-of-way for Corps projects and we maintain the completed levee projects.

Following the 1973 Flood, the Corps of Engineers evaluated the performance of the Mainline Mississippi River Levee system and they discovered that there were areas along the levee system that were deficient in grade and section. The Corps of Engineers performed an Environmental Impact Statement (EIS) in 1976. In 1998 the Corps performed a Supplemental Environmental Impact Statement (SEIS) for the Mainline Mississippi River Levee Enlargement and Berms Project. The riverside batture land includes very important habitat for waterfowl, fisheries and wildlife. As part of this 1998 SEIS the Corps adopted "avoid & minimize" criteria within their design parameters in an effort to eliminate and lessen impacts to the environment.

Since 1998 the Corps of Engineers and the Levee Boards have partnered together and have been actively enlarging the deficient levees using various "avoid and minimize" design techniques. These levee enlargement projects not only provide critical flood protection, but also provide environmental gains in all environmental categories.

JAMES KELLY, VICE-PRESIDENT REYNOLD MINSKY, PRESIDENT JASON TRICHELL, SUPT. OF OPER.

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E-MAIL fifthld2@bellsouth.net

The Levee Enlargement & Berms Project needs to move towards completion because at this point our Mainline Mississippi River Levee will overtop during a Project Design Flood (PDF). If the levee overtops and fails, millions of acres are subject to flooding, millions of people will be displaced, homes, roads, farms, infrastructure and wildlife will be impacted causing billions of dollars of damage.

We request that the U.S. Army Corps of Engineers continue to expeditiously design and enlarge the remaining deficient Mainline Mississippi River Levee using the same design criteria and the same avoid and minimize environmental considerations that they have utilized over the past 20 years. It is also important that the landowners giving up lands for the construction of these projects continue to have input into the design process and the location of borrow areas.

We continue to value our partnership and association with the U.S. Army Corps of Engineers and we appreciate the opportunity to make this statement in support of the SEIS II and the completion of the remaining authorized work for the Mississippi River Levees of the Mississippi River & Tributaries Project.

If you have any questions, please contact me at 318-574-2206.

Yours truly,

Reynold S. Minsky
President
Fifth Louisiana Levee Board

RM/jt

Southeast Arkansas Levee District

Serving Chicot, Desha and Lincoln Counties, Arkansas, since 1917

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October 15, 2018

U. S. Army Corps of Engineers
Attn: CEMVN-PDC-UDC
c/o Mike Thron, NEPA Coordinator
167 North Main Street, Room B-202
Memphis, TN 38103-1894

Via e-mail MRL-SEIS-2@usace.army.mil
John.M.Thron@usace.army.mil
Daniel.C.Sumerall@usace.army.mil

Re: Mississippi River & Tributaries Project, Mississippi River Levees
Supplemental Environmental Impact Statement II

Dear Mr. Thron:

This written statement is presented as part of the U.S. Army Corps of Engineers preparation of Supplement to the Final Environmental Impact Statement (SEIS II) for the Mississippi river Mainline Levees of the MR&T Project. Following the devastating 1927 Flood, Congress passed the 1928 Flood Control Act which established the Mississippi River and Tributaries (MR&T) Project and set up the U. S. Army Corps of Engineers to design and construct levee enlargement projects. The local Levee Boards are the local sponsors and we provide right of way for Corps projects and we maintain the completed projects.

Following the 1973 Flood, the Corps of Engineers evaluated the performance of the Mainline Mississippi River Levee system and they discovered that there were areas along the levee system that were deficient in grade and section. The Corps of Engineers performed an Environmental Impact Statement (EIS) in 1976. In 1998 the Corps performed a Supplemental Environment Impact Statement (SEIS) for the Mainline Mississippi River Levee Enlargement and Berms Project. The riverside batture land includes very important habitat for waterfowl, fisheries and wildlife. As part of this 1998 SEIS the Corps adopted "avoid & minimize" criteria within their design parameters in an effort to eliminate and lessen impacts to the environment.

Since 1998 the Corps of Engineers and the Levee Boards have partnered together and have been actively enlarging the deficient levees using various "avoid and minimize" design techniques. These levee enlargement projects not only provide critical flood protection, but also provide environmental gains in all environmental categories.

The Levee Enlargement & Berms Project needs to move towards completion because at this point our Mainline Mississippi River Levee will overtop during a Project Design Flood (PDF). If the levee overtops and fails, millions of acres are subject to flooding, millions of people will be displaced, homes, roads, farms, infrastructure and wildlife will be impacted causing billions of dollars of damage.

We request that the U.S. Army Corps of Engineers continue to expeditiously design and enlarge the remaining deficient Mainline Mississippi River Levee using the same design criteria and the same avoid and minimize environmental considerations that they have utilized over the past 20 years. It is also important that the landowners giving up lands for the construction of these projects continue to have imput into the design process and the location of borrow areas.

We continue to value our partnership and association with the U. S. Army Corps of Engineers and we appreciate the opportunity to make this statement in support of the SEIS II and the completion of the remaining work for the Mississippi river Levees of the Mississippi River & Tributaries.

SOUTHEAST

ARKANSAS LEVEE DISTRICT

By____________________________________

David F.

Gillison, Jr.

Attorney

cc: Mr. Johnny Johnson, President

BOARD OF DIRECTORS
ST. FRANCIS LEVEE DISTRICT
PHONE (870) 735-1062 P.O. BOX 399 FAX (870) 735-1075
WEST MEMPHIS, ARKANSAS 72303
ESTABLISHED 1893

October 15, 2018

U.S. Army Corps of Engineers
Memphis District
Attn: CEMVN-PDC-UDC
c/o Mike Thron, NEPA Coordinator
167 North Main Street, Room B-202
Memphis, TN 38103-1894

Reference: Mississippi River & Tributaries Project, Mississippi River Levees Supplemental Environmental Impact Statement II

Mr. Thron and Corps Team:

This statement is presented as part of the U.S. Army Corps of Engineers (Corps) preparation of Supplement II to the Final Environmental Impact Statement (SEIS II) for the Mississippi River Mainline Levees of the MR&T Project.

Considering the information below and intent of the Congress and the Administration *we request that the Corps complete the subject SEIS II within 18 months*.

Following the devastating 1927 Flood, Congress passed the 1928 Flood Control Act which established the Mississippi River & Tributaries (MR&T) Project and set the Corps up to design and construct levee enlargement projects. The local Levee Boards are the local sponsors and provide right-of-way and maintenance for completed levee projects based on legally binding signed Levee Assurances.

Following the 1973 Flood, the Corps evaluated the performance of the Mainline Mississippi River Levee system and discovered that there were areas along the levee system that were deficient in grade and section. The Corps performed an Environmental Impact Statement (EIS) in 1976. In 1998 the Corps performed a Supplemental Environmental Impact Statement (SEIS) for the Mainline Mississippi River Levee Enlargement and Berms Project. The riverside batture land includes significant and important habitats for waterfowl, fisheries and wildlife. As part of the 1998 SEIS the Corps adopted "avoid & minimize" criteria within the design parameters in an effort to help eliminate and lessen impacts to the environment.

Since 1998 the Corps and the local Levee Boards have partnered together and have been actively enlarging the deficient levees using "avoid and minimize" design techniques. These levee enlargement projects provide critical flood control, flood protection and environmental gains in all environmental categories.

The Levee Enlargement & Berms Projects need to move to completion because our Mainline Mississippi River Levee is not currently built to the federally authorized project design and will be overpowered and/or overtopped during a Project Design Flood (PDF). If the levee overtops and/or fails because it is incomplete, millions of acres are subject to flooding, millions of people will be displaced, homes, Interstates and roads, airports, petroleum refineries, power generation facilities, farms, regionally and other nationally significant infrastructure and wildlife will be impacted resulting in tens of billions of dollars of damages.

We request that the Corps expeditiously design and enlarge the remaining deficient Mainline Mississippi River Levee using an engineering practitioners approach considering the relevant conditions of the local area to design criteria and avoid and minimize environmental considerations that have been used for 20 years. The local landowners that provide their land and property for the construction of these projects for the benefit of the federal flood control system along with the local sponsors must continue to have input into the design process and the location of borrow areas.

We value our 90-year partnership and association with the Corps and we appreciate the opportunity to make this statement in support of the SEIS II and the completion of the remaining federally authorized work for the Mississippi River Levees of the Mississippi River & Tributaries Project. The longer it takes to build the project to its authorized federal design … the longer our inner-coast of the US is exposed to extreme economic and life safety risks.

Thank you for what you do every day to help assure the protection and productivity of the local people along this great Alluvial Valley. Our nation's interest and future are at stake.

If you have questions or comments, please contact our office.

Sincerely,

Rob Rash, PE, PLS
CEO/Chief Engineer, St. Francis Levee District of AR

CC:

MG Kaiser (MVD), Col Clancy (MVN), Col Derosier (MVK), Col Ellicott (MVM), Col Sizemore (MVS)

Via e-mail: MRL-SEIS-2@usace.army.mil
John.M.Thron@usace.army.mil
Daniel.C.Sumerall@usace.army.mil

Mississippi Valley Flood Control Association

9049 Corporate Gardens Drive, Suite 101, Germantown, TN 38138
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DEDICATED TO FLOOD CONTROL • NAVIGATION • BANK STABILIZATION • DRAINAGE

October 15, 2018

U.S. Army Corps of Engineers, Memphis District
ATTN: Mr. Mike Thron, NEPA Coordinator
167 North Main Street, Room B-202
Memphis, TN 38103-1894

Reference: Mississippi River & Tributaries Project, Mississippi River Levees Supplemental Environmental Impact Statement II

Dear Mr. Thron and Corps Team:

This statement is presented as part of the U.S. Army Corps of Engineers (Corps) preparation of Supplement II to the Final Environmental Impact Statement (SEIS II) for the Mississippi River Mainline Levees of the MR&T Project.

Considering the information following and attached and the current direction and intent of the Congress and the Administration we request that the Corps complete the subject SEIS II within 18 months.

Since 1998 the Corps and the local Levee Boards have partnered to enlarge the deficient levees using “avoid and minimize” design techniques. These levee enlargement projects provide critical flood control, flood protection and environmental gains in all categories.

We request that the Corps expeditiously complete the design and enlargement of the remaining deficient Mainline Mississippi River Levee. We ask that the Corps use an engineering practitioners approach considering the relevant conditions of the local area and conditions for the design criteria and the avoid and minimize environmental considerations that have been used for 20 years. Expediency is imperative for the local landowners who provide their land for the construction of the projects that benefit the federal flood control system. The local land owners and local sponsors must continue to have input into the design process and the location of borrow areas. We cannot over emphasize that the local people are giving up their land for the comprehensive federal project.

The Levee Enlargement & Berms Projects need to move to completion because our Mainline Mississippi River Levee is not currently built to the federally authorized project design and will be overpowered and/or overtopped during a Project Design Flood (PDF). If the levee overtops and/or fails because it is not completed, millions of acres are subject to flooding, millions of people will be displaced, homes, interstates and roads, airports, petroleum refineries, power generation facilities, farms, regionally and other significant regional and national infrastructure along with wildlife and their essential habitat will be impacted, resulting in hundreds of billions of dollars of damages and an environmental catastrophe.

We value our 90-years of work and partnership with the Corps and we appreciate the opportunity to make this statement in support of the SEIS II and the completion of the remaining federally authorized work for the Mississippi River Levees of the Mississippi River & Tributaries Project. The longer it takes to build the project to its authorized federal design … the longer the inner-coast of the United States is exposed to extreme economic, life safety risks, and adverse environmental impacts.

Thank you for what you do every day to help provide the protection and productivity of the local people along the God-given Alluvial Valley known as the Mississippi River Watershed. Our nation's interests' and future productivity are at stake.

If you have questions or comments, please contact our office.

Sincerely,

Sam M. Hunter

Sam M. Hunter, DVM
Chairman, MVFCA

Enclosures:
Information Paper
Protect – Produce – Provide information

CC: MG Kaiser (MVD), Col Clancy (MVN), Col Derosier (MVK), Col Ellicott (MVM), Col Sizemore (MVS)

Via e-mail: MRL-SEIS-2@usace.army.mil; John.M.Thron@usace.army.mil; Daniel.C.Sumerall@usace.army.mil

Information Paper

Mississippi River & Tributaries Project, Mississippi River Levees
Supplemental Environmental Impact Statement II

The Nation can realize the extreme benefits of building the MR&T project to design by 2028, within 10 years, the 100th anniversary of the 1928 Flood Control Act that authorized the project known as the greatest "public works" undertaking in America. In order for this to happen the SEIS II would have to be completed in 18 months and we would need to secure the funding (~$7B) within 3 years to build to design.

When the SEIS II is completed in 18 months then the design of the deficient parts of the system and the concurrent building of the system would require 5 to 7 years at best while local sponsors secure right-of-way, borrow material and other land agreements. This requires focused energy to have the funding in place to efficiently and effectively pursue the work.

When Congress directs a date certain -- as they did for the Red River Waterway Navigation project currently known as the J. Bennett Johnston Waterway ($2B, Dec 1994) – it happens.

When the Corps directs a date certain – as it did for assuring a flood protection date for Greater New Orleans ($14B, Sep 2011) – it happens.

Targeted water infrastructure investments like the MR&T and the ones described don't just happen, leaders set the conditions for them and focused responsive professionals are able to proudly deliver them for the public good, national security, and global economic gain. We must assure that our Nation realizes the impressive benefits of more than 70 to 1 return on investment in the MR&T by building it to design by May 15, 2028. Let's do this before an overpowering of the system occurs.

A brief synopsis of the MR&T EIS/SEIS: Following the devastating 1927 Flood, Congress passed the 1928 Flood Control Act which established the Mississippi River & Tributaries (MR&T) Project and set the Corps up to design and construct levee enlargement projects. The local Levee Boards are the local sponsors and provide right-of-way and maintenance for completed levee projects based on legally binding signed Levee Assurances.

Following the 1973 Flood, the Corps evaluated the performance of the Mainline Mississippi River Levee system and discovered that there were areas along the levee system that were deficient in grade and section. The Corps performed an Environmental Impact Statement (EIS) in 1976. In 1998 the Corps performed a Supplemental Environmental Impact Statement (SEIS) for the Mainline Mississippi River Levee Enlargement and Berms Project. The riverside batture land includes significant and important habitat for waterfowl, fisheries and wildlife. As part of the 1998 SEIS the Corps adopted "avoid & minimize" criteria within the design parameters in an effort to help eliminate and lessen impacts to the environment.

YAZOO-MISSISSIPPI DELTA LEVEE DISTRICT

P.O. BOX 610, CLARKSDALE, MS 38614

ymdlb@bellsouth.net (662) 624-4397

October 15, 2018

U.S. Army Corps of Engineers
Attn: CEMVN-PDC-UDC
c/o Mike Thron, NEPA Coordinator
167 North Main Street, Room B-202
Memphis, TN 38103-1894

Via e-mail: MRL-SEIS-2@usace.army.mil
John.M.Thron@usace.army.mil
Daniel.C.Sumerall@usace.army.mil

Re: Mississippi River & Tributaries Project, Mississippi River Levees
Supplemental Environmental Impact Statement II

Dear Mr. Thron:

This written statement is presented as part of the U.S. Army Corps of Engineers preparation of Supplement II to the Final Environmental Impact Statement (SEIS II) for the Mississippi River Mainline Levees of the MR&T Project. Following the devastating 1927 Flood, Congress passed the 1928 Flood Control Act which established the Mississippi River & Tributaries (MR&T) Project and set up the U.S. Army Corps of Engineers to design and construct levee enlargement projects. The local Levee Boards are the local sponsors and we provide right-of-way for Corps projects and we maintain the completed levee projects.

Following the 1973 Flood, the Corps of Engineers evaluated the performance of the Mainline Mississippi River Levee system and they discovered that there were areas along the levee system that were deficient in grade and section. The Corps of Engineers performed an Environmental Impact Statement (EIS) in 1976. In 1998 the Corps performed a Supplemental Environmental Impact Statement (SEIS) for the Mainline Mississippi River Levee Enlargement and Berms

Project. The riverside batture land includes very important habitat for waterfowl, fisheries and wildlife. As part of this 1998 SEIS the Corps adopted "avoid & minimize" criteria within their design parameters in an effort to eliminate and lessen impacts to the environment.

Since 1998 the Corps of Engineers and the Levee Boards have partnered together and have been actively enlarging the deficient levees using various "avoid and minimize" design techniques. These levee enlargement projects not only provide critical flood protection, but also provide environmental gains in all environmental categories.

The Levee Enlargement & Berms Project needs to move towards completion because at this point our Mainline Mississippi River Levee will overtop during a Project Design Flood (PDF). If the levee overtops and fails, millions of acres are subject to flooding, millions of people will be displaced, homes, roads, farms, infrastructure and wildlife will be impacted causing billions of dollars of damage.

We request that the U.S. Army Corps of Engineers continue to expeditiously design and enlarge the remaining deficient Mainline Mississippi River Levee using the same design criteria and the same avoid and minimize environmental considerations that they have utilized over the past 20 years. It is also important that the landowners giving up lands for the construction of these projects continue to have input into the design process and the location of borrow areas.

We continue to value our partnership and association with the U.S. Army Corps of Engineers and we appreciate the opportunity to make this statement in support of the SEIS II and the completion of the remaining authorized work for the Mississippi River Levees of the Mississippi River & Tributaries Project.

BOARD OF LEVEE COMMISSIONERS FOR THE YAZOO-MISSISSIPPI DELTA LEVEE DISTRICT

Bruce Cook, P.E., P.S.
Chief Engineer

10/10/1918

National Park Service Comments for the Mississippi River Project – Mississippi River Mainline Levees and Channel Improvement (NPS Environmental Review Tracking Solution Item: ER-18/0330).

Submitted by Jill Jensen (801-741-1012, ext 115; jill_jensen@nps.gov), Archeologist, Intermountain Region, National Park Service:

The project area shares a footprint with a major water route of the Trail of Tears National Historic Trail. As federal administrators of this National Historic Trail the National Park Service (NPS) requests that USACE consults with NPS regarding the potential for affects under the National Trails System Act, NEPA and under NHPA.

N

Melissa Samet
National Wildlife Federation
Senior Water Resources Counsel
83 Valley Road, San Anselmo, CA 94960
sametm@nwf.org

October 15, 2018

Via email: *MRL-EIS-2@usace.army.mil*
Colonel Michael C. Derosier
Commander and District Engineer
Memphis District
U.S. Army Corps of Engineers
167 North Main Street, Room B-202
Memphis, TN 38103-1894

Re: Scoping Comments on Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement

Dear Col. Derosier:

The National Wildlife Federation appreciates the opportunity to submit comments on the scope of Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement of 1976, as amended and updated by the 1998 Supplement I.

The National Wildlife Federation (NWF) is the nation's largest conservation education and advocacy organization. NWF has almost six million members and supporters and conservation affiliate organizations in 51 states and territories. NWF has a long history of advocating for the protection, restoration, and ecologically sound management of the Mississippi River. NWF also has a long history of working to modernize federal water resources planning to protect the nation's rivers, wetlands, floodplains, and coasts and the fish and wildlife that depend on those vital resources.

General Comments

The National Wildlife Federation appreciates the decision to prepare Supplement II to the environmental impact statement for the above-referenced MR&T project. Supplement II is both necessary and required given the dramatic changes in the human and natural environment affected by the Mississippi River Mainline Levee system, the significant new scientific information related to the hydrological conditions in the Mississippi River, and the changes in law and policy since the last supplement was completed 20 years ago.

The National Wildlife Federation recognizes the importance of the Mainline Levee system and the need to address deficiencies in that system. However, we also recognize that meaningful, long-term flood damage reduction will also require addressing the underlying causes of increased flood risks and protecting and restoring the river's hydrologic processes and floodplain and delta wetlands to minimize future flood risks. Recommendations for ensuring that Supplement II can help achieve these goals are set forth below.

Given the significance of Supplement II to public safety and the environment, the National Wildlife Federation urges the U.S. Army Corps of Engineers (Corps) to have the National Academy of Sciences conduct the independent external peer review for Supplement II that is required by 33 U.S.C. § 2343. The panel should be charged with evaluating the long-term effectiveness of the alternative recommended by the Corps; whether the selected alternative will protect and restore the functions of the Mississippi River and its floodplain and coastal wetlands; and whether the selected alternative includes a detailed mitigation plan that is likely to produce ecologically successful mitigation.

To comply with longstanding environmental laws and the National Water Resources Planning Policy, the Corps should select an alternative that utilizes integrated river management to reduce flood risks while also protecting and restoring the ecologically vital Mississippi River.

Detailed Comments

The human and natural environment affect by the Mississippi River Mainline Levee system has seen dramatic changes since completion of the 1998 Supplement I. Since that time the scientific understanding of the river's hydrological conditions and the implications of those conditions has also increased dramatically, and important changes have been made to applicable laws and policies.

Supplement II must fully address these changes and new information in developing alternatives and in analyzing the direct, indirect, and cumulative impacts of those alternatives. The Corps should then select an alternative that utilizes integrated river management to reduce flood risks while also protecting and restoring the ecologically vital Mississippi River.

To help achieve these goals and comply with the National Environmental Policy Act (NEPA), the National Water Resources Planning Policy, and the civil works mitigation requirements, the National Wildlife Federation urges the Corps to follow the recommendations set forth below.

A. Utilize an Appropriate Project Purpose

It is critical that Supplement II utilize a substantively and legally appropriate project purpose, which determines the universe of alternatives that must be evaluated.[1]

All reasonable alternatives that accomplish the project purpose must be examined in an environmental impact statement (EIS), while alternatives that are not reasonably related to the project purpose do not

[1] *Citizens Against Burlington v. Busey*, 938 F.2d 190, 195 (D.C. Cir. 1991) (the project purpose and need "delimit[s] the universe of the action's reasonable alternatives.") *See also Wyoming v. U.S. Dep't of Agric.*, 661 F.3d 1209, 1244 (10th Cir. 2011) ("how the agency defines the purpose of the proposed action sets the contours for its exploration of available alternatives.").

have to be examined.[2] An overly narrow project purpose can defeat the very purpose of an EIS by eliminating consideration of highly reasonable, less environmentally damaging alternatives:

> "One obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing "reasonable alternatives" out of consideration (and even out of existence). . . . If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role. Nor can the agency satisfy the Act. 42 U.S.C. § 4332(2)(E)."[3]

A court "will reject an 'unreasonably narrow' definition of objectives that compels the selection of a particular alternative."[4] Agencies are also prohibited from so narrowly defining a project purpose that it "forecloses a reasonable consideration of alternatives"[5] or makes the final EIS "'a foreordained formality.'"[6]

The project purpose used in the 1998 Supplement I provides a clear example of an unreasonably narrow project purpose: "to raise and stabilize portions of the levee system to protect against the PDF."[7] This project purpose is overly narrow because it both forecloses a reasonable consideration of alternatives that do not focus solely on raising the levee system and compels selection of an alternative that does raise the levee system. Indeed, the 1998 Supplement I rejected the use of flowage easements precisely because it could not satisfy this project purpose.[8]

Supplement II should utilize a fundamentally different project purpose that, as required by law, considers "the views of Congress, expressed, to the extent that an agency can determine them, in the

[2] *Methow Valley Citizens Council v. Regional Forester*, 833 F.2d 810, 815-16 (9th Cir. 1987).

[3] *Simmons v. United States Army Corps of Eng'rs*, 120 F.3d 664, 666 (7th Cir. 1997); *City of Carmel-by-the-Sea v. United States Dep't of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997) ("an agency cannot define its objectives in unreasonably narrow terms"); *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 195-96 (D.C. Cir. 1991), *cert. denied*, 502 U.S. 994 (1991) ("an agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative from among the environmentally benign ones in the agency's power would accomplish the goals of the agency's action"); *City of New York v. United States Dep't of Transp.*, 715 F.2d 732, 743 (2d Cir. 1983), *cert. denied*, 456 U.S. 1005 (1984) ("an agency will not be permitted to narrow the objective of its action artificially and thereby circumvent the requirement that relevant alternatives be considered").

[4] *Theodore Roosevelt Conservation Partnership v. Salazar*, 661 F.3d 66. 73 (D.C. 2011).

[5] *Fuel Safe Washington v. Fed. Energy Regulatory Comm'n*, 389 F.3d 1313, 1324 (10th Cir. 2004) (quoting *Davis v. Mineta*, 302 F.3d 1104, 1119 (10th Cir. 2002); *Citizens' Comm. To Save Our Canyons v. U.S. Forest Serv.*, 297 F.3d 1012, 1030 (10th Cir. 2002); *Simmons v. United States Army Corps of Eng'rs*, 120 F.3d 664, 666 (7th Cir. 1997); *City of New York v. United States Dep't of Transp.*, 715 F.2d 732, 743 (2d Cir. 1983), *cert. denied*, 456 U.S. 1005 (1984) ((holding that "an agency may not narrow the objective of its action artificially and thereby circumvent the requirement that relevant alternatives be considered); *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991), *cert. denied* 502 U.S. 994 (1991).

[6] *City of Bridgeton v. FAA*, 212 F.3d 448, 458 (8th Cir. 2000) (quoting *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991), *cert. denied* 502 U.S. 994 (1991); citing *Simmons v. U.S. Army Corps of Eng'rs*, 120 F.3d 664, 666 (7th Cir. 1997)).

[7] 1998 Supplement I at 1-6.

[8] 1998 Supplement I at 34 and SEIS-v ("Nonstructural alternatives such as acquisition of flowage easements can be utilized only if they further a project purpose or there is some legal obligation for them. Flowage easements were considered as a substitute for provision of PDF protection through levee raising. Such an alternative would not accomplish the congressionally mandated project purpose to provide a prescribed level of flood protection.").

agency's statutory authorization to act, **as well as in other Congressional directives**."[9] Notably, Congress has established a multitude of directives that explicitly require and/or promote: (1) the protection and restoration of the nation's waters and fish and wildlife resources; and (2) the use of natural infrastructure and nonstructural measures as a tool for achieving those goals.[10] For example:

(1) In 2018, Congress required the Corps to "consider the use of both traditional and natural infrastructure alternatives, alone or in conjunction with each other, if those alternatives are practicable" in flood and storm damage risk reduction studies. America's Water Infrastructure Act of 2018 § 1149(c).[11] Natural infrastructure alternatives include, but are by no means limited to, actions to protect and restore floodplain wetlands.
(2) In 2016, Congress directed the Corps to "consider, as appropriate" natural and nature-based measures in flood and storm risk reduction and ecosystem restoration studies. 33 USC 2289a.
(3) In 2007, Congress directed that all water resources projects protect and restore the environment, including by protecting and restoring the functions of natural systems. 42 USC 1962–3.
(4) In 1974, Congress directed the Corps to consider nonstructural alternatives when planning flood damage reduction projects. 33 USC 701b-11. Nonstructural alternatives avoid damage to natural systems, including floodplain wetlands.
(5) In 1973, Congress passed the Endangered Species Act to conserve endangered and threatened species and "the ecosystems upon which endangered species and threatened species depend." The Endangered Species Act also declares a Congressional policy "that Federal agencies shall cooperate with State and local agencies to resolve water resource issues in concert with conservation of endangered species." Endangered Species Act, 16 USC 1531.
(6) In 1972, Congress passed the Clean Water Act "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Clean Water Act § 101, 33 USC § 1251. The Clean Water Act also directed the development of the 404(b)(1) Guidelines which establish clear policies and procedures for protecting wetlands and other special aquatic sites.
(7) In 1970, Congress directed the "Federal Government to use all practicable means" to "fulfill the responsibilities of each generation as trustee of the environment for succeeding generations." National Environmental Policy Act, 42 U.S.C. § 4331(b).
(8) In 1958 Congress directed that "wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development" and that water resources development is to prevent loss and damage to fish and wildlife and improve the health of fish and wildlife resources. Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661, 662.

To account for these many directives focused on protecting and restoring natural systems, including floodplain wetlands, and to ensure that the alternatives analysis does not inappropriately limit the analysis of alternatives, the National Wildlife Federation urges adoption of the following statement of project purpose:

[9] *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991) (emphasis added).
[10] Post-project authorization directives, which include those outlined above, should be incorporated into the project purpose. According to Supplement I, "Project authority is the Flood Control Act of 1928, as amended, including, but not limited to, the Flood Control Acts of 1936, 1938, 1941, 1946, 1950, 1954, 1962, 1965, and 1968 and the Water Resources Development Act of 1986." Supplement I, Project Report at 1.
[11] This bill, which was passed with overwhelming support in both the House and Senate, was awaiting the President's signature as of the date of these comments.

> The purpose of the proposed action is to reduce flood risks to Mississippi River communities while protecting and restoring the ecological health of the Mississippi River and its floodplain and delta wetlands.

B. Rigorously Evaluate All Reasonable Alternatives, Including Integrated River Management

To satisfy the requirements of NEPA, Supplement II must "[r]igorously explore and objectively evaluate all reasonable alternatives."[12] "[T]he existence of reasonable but unexamined alternatives renders an EIS inadequate."[13] "Reasonable alternatives include those that are practical or feasible from a technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant."[14] Merely evaluating alternative approaches to levee and seepage control construction cannot satisfy the requirement to evaluate all reasonable alternatives because each alternative would have the same end result – raising the levees.[15]

Notably, Supplement II must evaluate alternatives that would protect and restore the natural functions of the Mississippi River, and must ultimately select an alternative that achieves these objectives. This is required by the National Water Resources Planning Policy established by Congress in 2007, which requires that "all water resources projects" are to protect the environment by "protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems."[16]

The National Wildlife Federation urges the Corps to develop and adopt an alternative that utilizes a combination of low impact flood damage reduction measures, ecosystem restoration actions, and improved navigation management to reduce flood risks and restore the environment. Key activities that should be examined in depth for inclusion in this integrated river management alternative include at least the following:

[12] 40 C.F.R. § 1502.14.

[13] *Ctr. for Biological Diversity v. United States Dep't of the Interior*, 623 F.3d 633, 642 (9th Cir. 2010); *Westlands Water Dist. v. U.S. Dep't of Interior*, 376 F.3d 853, 868 (9th Cir. 2004); *Morongo Band of Mission Indians v. Fed. Aviation Admin*., 161 F.3d 569, 575 (9th Cir. 1998); *Oregon Natural Desert Ass'n v. Bureau of Land Management*, 531 F.3d 1114, 1121 (9th Cir. 2008).

[14] *Forty Most asked Questions Concerning CEQ's NEPA Regulations*, 46 Fed. Reg. 18,026 (March 23, 1981).

[15] *State of California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982) (holding that an inadequate range of alternatives was considered where the end result of all eight alternatives evaluated was development of a substantial portion of wilderness).

[16] 42 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). Enhancement of the environment has been an important federal objective for water resources programs for decades. Corps regulations in place since 1980 state that: "Laws, executive orders, and national policies promulgated in the past decade require that the quality of the environment be protected and, where possible, enhanced as the nation grows. . . . Enhancement of the environment is an objective of Federal water resource programs to be considered in the planning, design, construction, and operation and maintenance of projects. Opportunities for enhancement of the environment are sought through each of the above phases of project development. Specific considerations may include, but are not limited to, **actions to preserve or enhance critical habitat for fish and wildlife; maintain or enhance water quality; improve streamflow**; preservation and restoration of certain cultural resources, **and the preservation or creation of wetlands."** 33 C.F.R. § 236.4. (emphasis added).

(1) Obtaining all levee construction material from non-wetland locations. This should be a fundamental component of every alternative evaluated in Supplement II and should be included in the final alternative recommended in Supplement II.

As the Corps is aware, Supplement I approved the utilization of wetlands as construction material for levee enlargements and seepage control structures (through the placement of borrow pits in wetlands). Use of wetlands for construction material was strongly opposed by the conservation community, the public, and other federal agencies during the 1998 Supplement I process.

The value of the nation's wetlands—and the unacceptability of destroying wetlands so that wetland soils can be used for construction—is even more evident today. The nation's wetlands are far too valuable for flood damage reduction, fish and wildlife habitat, clean water, ecosystem services, recreation, and the economy to be used in this manner.

For example, wetlands account for more than 90% of the $330 billion to $1.3 trillion estimated present value of the ecosystem goods and services provided by Mississippi Delta.[17] Coastal wetlands reduced storm surge in some New Orleans neighborhoods by two to three feet during Hurricane Katrina, and levees with wetland buffers had a much greater chance of surviving Katrina's fury than levees without wetland buffers. Wetlands prevented $625 million in flood damages in the 12 coastal states affected by Hurricane Sandy and reduced damages by 20% to 30% in the four states with the greatest wetland coverage.[18] During Tropical Storm Irene, a network of wetlands and protected floodplain saved Middlebury Vermont $1.8 million in flood damages. Wetlands in California provide nearly $10 billion each year in flood damage reduction, groundwater recharge, and water purification benefits.

Wetlands are some of the most biologically productive natural ecosystems in the world, and support an incredibly diverse and extensive array of fish and wildlife. America's wetlands support millions of migratory birds and waterfowl. Up to one-half of all North American bird species rely on wetlands. Although wetlands account for just about five percent of land area in the lower 48 states, those wetlands are the only habitat for more than one third of the nation's threatened and endangered species and support an additional 20 percent of the nation's threatened and endangered at some time in their life. These same wetlands are home to 31 percent of the nation's plant species.[19]

Wetlands are also a critical economic driver. For example, 90 percent of fish caught by America's recreational anglers are wetland dependent, as are hundreds of species of birds, waterfowl, and wildlife. The U.S Fish and Wildlife Service estimates that in 2011, anglers spent "$41.8 billion on trips, equipment, licenses, and other items to support their fishing activities." That same year, nearly 71.8 million people "fed, photographed, and observed wildlife," spending $55 billion on those activities. In all, nearly 90.1 million Americans participated in

[17] Earth Economics, *Gaining Ground, Wetlands, Hurricanes and the Economy: The Value of Restoring the Mississippi River Delta*, at 11.
[18] Narayan, S., Beck, M.B., Wilson, P., et al., The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA. Scientific Reports 7, Article number 9463 (2017), doi:10.1038/s41598-017-09269-z (available at https://www.nature.com/articles/s41598-017-09269-z).
[19] Environmental Protection Agency, Economic Benefits of Wetlands, EPA843-F-06-004 (May, 2006) (factsheet).

some form of fishing, hunting or wildlife-associated recreation in 2011, contributing $145 billion to the national economy. "This equates to 1% of gross domestic product; meaning one out of every one hundred dollars of all goods and services produced in the U.S." [20]

There is no legitimate justification for digging up wetlands to use the soil for construction purposes, and Supplement II should ensure that no wetlands are destroyed for this purpose by explicitly prohibiting the use of wetlands (including the location of borrow pits in wetlands) as a source of construction material. Adverse impacts to wetlands from other activities must be avoided to the maximum extent possible, as required by law.

(2) Realigning segments of the levee system farther away from the river. Levee setbacks give the river more room to spread out during flood events. Such setbacks have been used extensively along the Mississippi River. Indeed, at the Corps acknowledged in the 1998 Supplement I:

> "Numerous levee setbacks have been required through the years because of the evermoving Mississippi River. Since 1915, levee setbacks have continually increased acreages to lands between the Mississippi River mainline levees. To date, the approximate cumulative total is 50,000 acres of land added between the levees. A 1996 study of levees in the Vicksburg District indicated that 17 major levee setbacks since 1915 have resulted in 43,000 acres being added to the riverside flood plain."[21]

(3) Modifying management of the MR&T floodways to reduce flood risks. Supplement II should examine whether the Corps should recommend to Congress a different ratio than the current 70/30 split between the Mississippi and Atchafalaya rivers or whether other modifications to managing the Atchafalaya floodway system can be made to reduce flood risks. Supplement II should also evaluate whether other floodways could be used more regularly to reduce flood risk and create fish and wildlife habitat. NEPA requires review of alternatives that are currently outside the authority of the Corps to implement.

(4) Utilizing sediment diversions to both reduce flood risks and advance coastal wetland restoration. Supplement II should examine whether new sediment and freshwater diversions could be implemented in the future, and whether existing and planned structures could be better utilized to reduce flood risks and advance coastal wetland restoration. Supplement II should also examine other methods to transport sediment from the stretch below the Old River Control Structure to use in rebuilding coastal wetlands.

Sediment and freshwater diversions have long been identified as keystone restoration project types for building new land and maintaining existing wetlands in Louisiana. Integrated into the levee system, these gated structures can be opened and closed to allow water, sediment and nutrients from the river to flow into open water and degraded wetlands, mimicking the natural system that existed before levees were built. As much as possible, management of sediment diversions should mimic the natural flood cycles of the Mississippi River, so that the ecosystem, vegetation and species can self-organize around pulses of freshwater, sediment, and nutrients.

[20] U.S. Fish and Wildlife Service, 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: National Overview, Issued August 2012. This study is the source for all quotes and data in this paragraph.
[21] 1998 Supplement I, Project Report at 10.

(5) Modifying and/or removing targeted river training structures to reduce flood risks. Supplement II should carefully examine modification and/or removal of targeted river training structures to reduce flood risks (*see* Section C of these comments for a discussion of these flood risks). The Corps has acknowledged that modification and/or removal of at least some structures will be required for mitigation purposes for the Regulating Works Project, and that such actions will not create problems for navigation.

C. Fully Analyze the Causes of Increased Flood Risks and Levee Deficiencies to Assist in Developing Meaningful, Long-Term Solutions

The National Wildlife Federation recognizes the importance of the Mainline Levee system and the need to address deficiencies in that system. However, we also recognize that meaningful, long-term flood damage reduction will also require addressing the underlying causes of increased flood risks and ensuring that any recommended alternative will protect and restore the river's floodplain and delta wetlands and hydrologic processes to minimize future flood risks.

The short-term nature of relying solely on levee enlargement and seepage control measures is exemplified by the extensive deficiencies that have arisen since finalization of the 1998 Supplement I. The 1998 Supplement I identified 128 needed construction items that included **263 miles of levee enlargements** and **132 miles of seepage control features**. Construction was estimated to cost $911 million fully funded, and with appropriate funding could have been completed in 2020.[22] However, in February 2017, the Mississippi River Commission reported that the Mississippi River Mainline Levees now require **370 miles of levee enlargements** (at 138 levees and floodwalls) and **395 miles of seepage control features** (at 97 levees).[23] Construction is estimated to cost $3.1 billion, with $2.0 billion of that work deemed to be critical.

According to the map of the proposed work items provided by the Memphis District, most of the proposed new construction is in areas **<u>not</u>** identified in the 1998 Supplement I. For example, an extensive amount of the proposed new construction would take place in the New Orleans District, which the 1998 Supplement I identified as requiring just over 14 miles of upgrades.[24]

1998 Supplement I			
Corps District	**Work Items**	**Levee Enlargements**	**Seepage Control**
Memphis	31	31.8	74.3
Vicksburg	85	216.8	57.4
New Orleans	12	14.2	0.1
Total	**128**	**262.8**	**131.8**

Additional materials provided to NWF by the Corps state that approximately 150 miles of Mainline Mississippi River Levee in the New Orleans District are currently deficient, with deficiencies ranging from a few inches to 6.5 feet. These 150 miles are currently broken out into 77 Work Items. Each work item will also include a seepage analysis to determine whether seepage control measures are required.

[22] 1998 Supplement I, Project Report at summary page, 1, 41.
[23] Mississippi River Commission, Fact Sheet, Mississippi River & Tributaries Project Authorized Work Remaining Necessary to Convey the Project Design Flood FEBRUARY 2017, available at http://www.mvd.usace.army.mil/Portals/52/docs/MRC/MRT_Work_Remaining.pdf.
[24] 1998 Supplement I, Project Report at summary page and 41.

Clearly, then, the situation on the river has changed significantly in the past 20 years (or the 1998 Supplement II did not adequately evaluate the conditions on the ground). These changes include increased flood levels, channel aggradation, channel narrowing, subsidence, and sea level rise. Unless these problems are addressed, the Mainline Levee system will continue to degrade and the risk to the public will continue to increase.

To develop meaningful, long-term solutions that address these problems, Supplement II should fully evaluate the key factors that have affected the integrity and sufficiency of the Mainline Levee system, including those outlined below.

(1) Supplement II should fully evaluate the role of channelization, channel aggradation, and river operations on flood levels and the integrity of the Mainline Levee system.

For example, a 2018 study concludes that "artificial channelization of the lower Mississippi River, and its effects on the river's gradient, channel area and flow velocity" have "significantly increased the discharge of a given flood event relative to pre-engineering conditions."[25] This study shows that flooding on the lower Mississippi has increased by 20 percent over that past 500 years, with "75 per cent of this increase attributed to river engineering" and concludes that "the interaction of human alterations to the Mississippi River system with dynamical modes of climate variability has elevated the current flood hazard to levels that are unprecedented within the past five centuries."[26] This study further concludes:

> "Our main finding—that river engineering has elevated flood hazard on the lower Mississippi to levels that are unprecedented within the past five centuries—adds to a growing list of externalized costs associated with conventional flood mitigation and navigation projects, including a reduction in a river's ability to convey flood flows, the acceleration of coastal land loss and hypoxia. Despite the societal benefits that these major infrastructure projects convey, the costs associated with maintaining current levels of flood protection and navigability will continue to grow at the expense of communities and industries situated in the river's floodplain and its delta. For those interested in improving seasonal and longer-term forecasts of flood hazard or management strategies that reconnect the river with its floodplain, the Mississippi River's discharge of freshwater—and by extension the flux of sediment, nutrients and pollutants—to its outlet should be viewed as highly sensitive both to anthropogenic modifications to the basin and to variability of the global climate system."[27]

Another 2018 study, that utilizes Corps data, demonstrates "significant changes in cross-sectional area, river stage, and river surface slope in specific discharge regimes along the first 140 km downstream of the LMR's diversion to the Atchafalaya River at the Old River Control Structure (ORCS)" since 1992.[28]

[25] Munoz, S.E, Goisan L, Therrell M.D, Remo J.W.F, et al, Climatic control of Mississippi River flood hazard amplified by river engineering, Nature, Vol. 556, 95, 97 April 5, 2018 Letter doi:10.1038/nature26145.
[26] Id. at 95.
[27] Id. at 98 (internal footnotes omitted).
[28] Sanjeev Joshi & Xu Y. Jun (2018) *Recent changes in channel morphology of a highly engineered alluvial river – the Lower Mississippi River*, Physical Geography, 39:2, 140-165, DOI: 10.1080/02723646.2017.1340027

"This study used the hydrographic survey measurements conducted in 1992, 2004, and 2013 as well as daily river discharge and stage records over the past three decades to assess long-term channel morphological changes at seven locations along a 327-km reach of the Lower Mississippi River (LMR), one of the most regulated alluvial rivers in the world. We found significant changes in cross-sectional area, river stage, and river surface slope in specific discharge regimes along the first 140 km downstream of the LMR's diversion to the Atchafalaya River at the Old River Control Structure (ORCS), covering Tarbert Landing, Red River Landing, Bayou Sara, and Baton Rouge. Specifically, the first 20–25 km reach (reach 1) and the reach further downstream from 80 to 140 km (reach 3) showed continuous decreases in cross-sectional area and increases in river stage and river slope under all flow conditions. However, the 55–60 km reach in between (from 20–25 km to 80 km below ORCS) (reach 2) experienced exactly opposite trends, i.e. increase in cross-sectional area and decrease in river stages. Furthermore, the remaining 187 km reach (from 140 to 327 km; reach 4) had insignificant changes in its cross-sectional area, river stage, and river surface slope. We link these changes to channel bed adjustment pertaining to sediment deposition and erosion partially and propose that reaches 1 and 3 have probably experienced sediment deposition, reach 2 has probably experienced bed erosion, and reach 4 is probably approaching dynamic equilibrium over the past three to four decades. Therefore, substantial amount of sediment, potentially useful for land-building purposes, appears to be trapped along the first 140 km LMR reach below ORCS, while sediment flow seems higher along the next 187-km reach. These findings suggest that large alluvial rivers with intensive human interventions go through noticeable spatial and temporal changes in their corresponding bed adjustment processes. Such information can have relevant implications for riverine sediment management, channel engineering, and coastal land restoration in the world's sinking deltas fed by regulated alluvial rivers."[29]

Copies of both of these 2018 studies are provided at Attachment A to these comments.

(2) Supplement II should fully evaluate the extensive body of peer reviewed science which shows that river training structures have significantly increased flood levels in the Middle Mississippi River, including in locations targeted for construction as identified in the project map.

As the Corps is aware,[30] extensive peer-reviewed science demonstrates that river training structures have increased flood levels by up to 15 feet in some locations and 6 to 10 feet in broad stretches of the Middle Mississippi River where these structures are prevalent.[31] The

[29] Id.

[30] The National Wildlife Federation recognizes that the Corps disagrees with these findings. However, the Corps' conclusion that river training structures do not affect flood heights has been conclusively disproved by research led by Nicholas Pinter, Ph.D., currently the Shlemon Chair in Applied Geology at the University of California Davis. Dr. Pinter has specifically rebutted the arguments used by the Corps to reject these findings in a series of exchanges published in the Journal of Hydraulic Engineering and in sworn affidavits submitted to the District Court for the Southern District of Illinois. These materials are provided at Attachment B to these comments.

[31] *See, e.g.,* Pinter, N., A.A. Jemberie, J.W.F. Remo, R.A. Heine, and B.A. Ickes, 2010. Empirical modeling of hydrologic response to river engineering, Mississippi and Lower Missouri Rivers. River Research and Applications, 26: 546-571; Remo, J.W.F., N. Pinter, and R.A. Heine, 2009. The use of retro- and scenario- modeling to assess effects of 100+ years river engineering and land cover change on Middle and Lower Mississippi River flood stages.

impacts of river training structures are cumulative; the more structures placed in the river, the higher the flood stages. Flood stages increase more than 4 inches for each 3,281 feet of wing dike built within 20 river miles downstream:

> "[O]ur analyses demonstrate that wing dikes constructed downstream of a location were associated with increases in flood height ("stage"), consistent with backwater effects upstream of these structures. Backwater effects are the rise in surface elevation of flowing water upstream from, and as a result of, an obstruction to water flow. These backwater effects were clearly distinguishable from the effects of upstream dikes, which triggered simultaneous incision and conveyance loss at sites downstream. On the Upper Mississippi River, for example, stages increased more than four inches for each 3,281 feet of wing dike built within 20 RM (river miles) downstream. These values represent parameter estimates and associated uncertainties for relationships significant at the 95 percent confidence level in each reach-scale model. The 95-percent level indicates at least a 95% level of certainty in correlation or other statistical benchmark presented, and is considered by scientists to represent a statistically verified standard. Our study demonstrated that the presence of river training structures can cause large increases in flood stage. For example, at Dubuque, Iowa, roughly 8.7 linear miles of downstream wing dikes were constructed between 1892 and 1928, and were associated with a nearly five-foot increase in stage. In the area affected by the 2008 Upper Mississippi flood, more than six feet of the flood crest is linked to navigational and flood-control engineering."[32]

Additional science shows that the Middle Mississippi River has been so constricted by river training structures and levees that it is now exhibiting "the flashy response" to flooding "typical of a much smaller river,"[33] with extremely troubling implications for public safety. In recent comments submitted on the Corps' Regulating Works Project Grand Tower Amended Environmental Assessment, Robert E. Criss, Ph.D., a professor in the Department of Earth and Planetary Sciences at Washington University in St. Louis, concludes:

> "The consequences of current management strategy on floodwater levels are clearly shown by data from multiple gauging stations on the Middle Mississippi River (Figures). The Chester and Thebes stations were selected as they are the closest stations to the project area that have long, readily available historical records (USGS, 2016). **These figures conclusively document that floodwater levels have been greatly magnified along the Middle Mississippi River, in the timeframe when most of the in-channel navigational structures were constructed. If these structures are not the cause, then we are left with no explanation for this profound, predictable effect.** That USACE proposes more in-channel construction activities only two months after another "200-

Journal of Hydrology, 376: 403-416; Numerous other studies and analyses provided to the Corps through public comments on the scope of the SEIS and on the Draft SEIS.

[32] Reply Declaration of Nicholas Pinter, Ph.D. in Support of Plaintiffs' Motion for Preliminary Injunction, NWF et al v. Corps of Engineers, Case No. 14-00590-DRH-DGW, (S.D. ILL), 2014; Declaration of Nicholas Pinter, Ph.D. in Support of Plaintiffs' Motion for Preliminary Injunction, Case No. 14-00590-DRH-DGW, (S.D. ILL), 2014. See Attachment B to these comments for copies of these declarations.

[33] Robert E. Criss, Mingming Luo, *River Management and Flooding: The Lesson of December 2015–January 2016, Central USA*, Journal of Earth Science, Vol. 27, No. 1, p. 117–122, February 2016 ISSN 1674-487X (DOI: 10.1007/s12583-016-0639-y).

> year" flood (as defined by USACE, 2004, 2016) occurred in this area proves that their structures and opinions are not beneficial, but harmful."[34]

Dr. Criss adds that measurements at the Mississippi River at St. Louis and the Missouri River at Herman "document similar damaging and incontestable trends for other river reaches managed in the same manner."[35]

A 2016 Journal of Earth Science study co-authored by Dr. Criss ("Criss and Luo 2016") highlights the cumulative impact of the Corps' excessive channelization of the Middle Mississippi River.[36] As noted above, that study concludes that the Middle Mississippi River has been so constricted by river training structures and levees that it is now exhibiting "the flashy response" to flooding "typical of a much smaller river":[37]

> "Ehlmann and Criss (2006) proved that the lower Missouri and middle Mississippi Rivers are becoming more chaotic and unpredictable in their time of flooding, height of flooding, and magnitude of their daily changes in stage. This chaotic behavior is primarily the result of extreme channelization of the river, and its isolation from its floodplain by levees (e.g., Criss and Shock, 2001; GAO, 1995; Belt, 1975). The channels of the lower Missouri and middle Mississippi Rivers are only half as wide as they were historically, along a combined reach exceeding 1 500 km, as clearly shown by comparison of modern and historical maps (e.g., Funk and Robinson, 1974)."

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[34] Comments on Draft Environmental Assessment by Robert E Criss, Washington University, March 3, 2016 (emphasis added).

[35] Id.

[36] The National Wildlife Federation recognizes that the Corps has disputed the findings of this study. However, the Corps' critique of this study as provided in Appendix A to the May 2017 Regulating Works Project Final Environmental Impact Statement is fundamentally flawed. That critique does not address the content of the study, and instead focuses on a single locality (Chester) that was scarcely mentioned in the study. The discussion of this single locality (Chester) inappropriately compares the recent winter flood with prior, warm weather floods, and rising limb data with falling limb data. In addition, the critique, does not—and cannot—explain away critical findings in Criss and Luo 2016, including the findings related to: (1) The record high stages set during this recent flood just downstream at Cape Girardeau and Thebes, which as Criss and Luo point out would have been far higher but for the catastrophic failure of the Len Small levee; (2) Why the recent peak stage at Chester was nearly 3 feet higher than it was on April 30, 1973, which at that time was the highest water level ever recorded at that site; (3) The unusual winter timing of this recent flood and its short duration, both of which would not have caused a flood of this magnitude without constriction of the river; and (4) Why the site showing the greatest increase in stage over previous floods occurred adjacent to the Valley Park levee, built by the Corps in 2005. Moreover, contrary to the assertions in the critique, the Criss and Luo 2016 synopsis of weather conditions clearly acknowledges antecedent ground saturation, and all data used by Criss and Luo are identical to values reported by the cited federal agencies at the time of writing. Each of those values remains identical to the values reported today with the single exception that the 1982 stage at Pacific was revised subsequently by the National Weather Service. However, this change has no effect on the Criss and Luo 2016 conclusions.

[37] Robert E. Criss, Mingming Luo, *River Management and Flooding: The Lesson of December 2015–January 2016, Central USA*, Journal of Earth Science, Vol. 27, No. 1, p. 117–122, February 2016 ISSN 1674-487X (DOI: 10.1007/s12583-016-0639-y). A copy of this study is provided at Attachment C to these comments.

"The aftermath of storm Goliath [which led to the December 2015 floods] provides another example in an accelerating succession of record floods, whose tragic effects have been greatly magnified by man. The heavy rainfall was probably related to El Nino, and possibly intensified by global warming. . . . The Mississippi River flood at St. Louis was the third highest ever, yet it occurred at the wrong time of year, and its brief, 11-day duration was truly anomalous. Basically, this great but highly channelized and leveed river exhibited the flashy response of a small river, and indeed resembled the response of Meramec River, whose watershed is smaller by 160×. Yet, only a few percent of the watershed above St. Louis received truly heavy rainfall during this event; the river rose sharply because the water simply had nowhere else to go."

"Further downstream, new record stages on the middle Mississippi River were set. Those record stages would have been even higher, probably by as much as 0.25 m, had levees not failed and been overtopped. The sudden drop of the water level near the flood crest at Thebes clearly demonstrates how levees magnify floodwater levels. In this vein, it is very significant that the water levels on the lower Meramec River were highest, relative to prior floods, proximal to a new levee and other recent developments."

"Forthcoming calls for more river management, including higher levees and other structures, must be rejected. Additional "remediations" to this overbuilt system will only aggravate flooding in the middle Mississippi Valley (see Walker, 2016)."

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"In contrast, Goliath's extraordinary rainfall impacted only a tiny fraction of the huge, 1.8 million km2 Mississippi River Basin above St. Louis, yet flooding occurred which was truly remarkable for the high water level, time of year, and brief duration."

"This continental-scale river exhibited the flashy response typical of a much smaller river such as the Meramec. This unnatural response is clearly consistent with the dramatic channelization of the middle Mississippi River and its isolation from its floodplain by levees, as clearly pointed out by Charles Belt more than 40 years ago. It is time for this effect to be accepted and for flood risk and river management to be reassessed."[38]

(3) Supplement II should fully evaluate the role of levee construction and levee enlargements on increased flood levels, along with the potential of the proposed work items to also increase flood levels.

It is of course well recognized that new and/or higher levees increase flood heights. Indeed, the Corps recognized this in the 1998 Supplement I, when it concluded that two private levees were key factors in higher water surface elevations during the Mississippi River flood of 1995:

"The 1993 and 1995 floods on the upper Mississippi River revealed significant upward changes in stage-discharge relationships on the upper Mississippi River. The higher than expected water surface elevations experienced during the flood of 1995 on the reach of

[38] Id.

the Mississippi River above Cairo, Illinois, indicated that significant changes in the flood plain have occurred from the conditions used to develop the 1956 PDF flowline. Therefore, the MR&T Project design flowline from Cairo to Cape Girardeau was revised in 1996. The revision was based on available data and analyses of river hydraulic and hydrologic parameters. Two private levees (Powers Island levee and the Miller City levee) located in the Upper Mississippi River Commerce to Birds Pt. reach are factors in the changed flood plain conditions. Earlier, these private levees have tended to fail during floods, permitting partial conveyance of flow through the flood plain. In recent years, these levees have demonstrated greater resistance to failure, resulting in higher than expected flowlines against the project levee."[39]

(4) Supplement II should fully evaluate the role of sea level rise and subsidence on the deficiencies in the Mainline Levee system.

As the Corps is aware, subsidence is a critical problem exacerbated by a lack of land building sediments reaching the river's lower reaches combined with sea level rise. A recent study concludes that the Mississippi River downstream of New Orleans—where most of the New Orleans District work items would occur—is subsiding at a higher rate than the already high average rate of subsidence across coastal Louisiana:

> "While spatial variability between our discrete monitoring sites is high, the map shows that the expected average subsidence rate is relatively uniform across coastal Louisiana, with a mean rate of 9 mm yr−1 and a standard error of the mean of 1 mm yr−1. . . . The map predicts slightly higher than average subsidence rates in the eastern Chenier Plain, the Atchafalaya and Wax Lake Deltas, and along the Mississippi River downstream of New Orleans."[40]

(5) Supplement II should fully evaluate the implications of climate change, and climate change-induced sea level rise and more extreme weather events.

An extensive body of science demonstrates that the earth's climate is changing and that this change is causing significant increases in sea level rise and more frequent and extreme weather events. Supplement II should fully analyze and account for this information and changed conditions that have significant implications for the long-term effectiveness of flood damage reduction measures and the long term health and viability of coastal and riverine wetlands and the fish and wildlife that rely on those resources.

For example, climate change is implicated in significant changes in precipitation in the Mississippi River basin. In March 2005, the U.S. Geological Survey reported upward trends in rainfall and stream flow for the Mississippi River.[41] In 2009, the U.S. Global Change Research Program issued a report showing that the Midwest experienced a 31% increase in very heavy

[39] 1998 Supplement I, Project Report at 10.

[40] Nienhuis, J.H., Törnqvist, T.E., Jankowski, K.L., et al, *A New Subsidence Map for Coastal Louisiana*, GSA Today, v. 27, doi: 10.1130/GSATG337GW.1.,(available at https://www.geosociety.org/gsatoday/groundwork/G337GW/GSATG337GW.pdf). A copy of this study is provided at Attachment D to these comments.

[41] USGS Fact Sheet 2005-3020, Trends in the Water Budget of the Mississippi River Basin, 1949-1997.

precipitation events (defined as the heaviest 1% of all daily events) between 1958 and 2007.[42] That study also reports that during the past 50 years, "the greatest increases in heavy precipitation occurred in the Northeast and the Midwest." [43] Models predict that heavy downfalls will continue to increase:

> Climate models project continued increases in the heaviest downpours during this century, while the lightest precipitation is projected to decrease. Heavy downpours that are now 1-in-20-year occurrences are projected to occur about every 4 to 15 years by the end of this century, depending on location, and the intensity of heavy downpours is also expected to increase. The 1-in-20-year heavy downpour is expected to be between 10 and 25 percent heavier by the end of the century than it is now. . . . Changes in these kinds of extreme weather and climate events are among the most serious challenges to our nation in coping with a changing climate.[44]

In March 2012, Midwest regional assessments were issued that provide important technical input into the National Climate Assessment.[45] In 2013, Regional Climate Trends and Scenarios were issued for the Midwest U.S. showing that for the Midwest region, annual and summer trends for precipitation in the 20th century are upward and statistically significant; the frequency and intensity of extreme precipitation in the region has increased, as indicated by multiple metrics; and models predict increases in the number of wet days (defined as precipitation exceeding 1 inch) for the entire Midwest region, with increases of up to 60%.[46]

(6) Supplement II should fully evaluate whether the current flowline is appropriate.

Supplement II should utilize the findings from the analyses identified above and the numerous sources of new data and extensive new modeling capacity developed over the last 20 years to establish a more accurate and nuanced assessment of the dynamic baseline conditions and flowlines affecting the river reaches covered by the MR&T.

Relevant studies that are currently ongoing include the Mississippi River Hydrodynamic and Delta Management Study, which will address the Mississippi River from Vicksburg, Mississippi to the Gulf of Mexico. This study is highly relevant to Supplement II, as the Corps' website makes clear:

> "This study will identify and evaluate a combination of large-scale management and restoration features to address the long-term sustainability of the lower Mississippi

[42] Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009, at page 32 (available at http://nca2009.globalchange.gov/).
[43] *Id*.
[44] *Id*.
[45] The Midwest regional assessment can be accessed at http://glisa.msu.edu/great_lakes_climate/nca.php (visited January 22, 2014).
[46] Kunkel, K.E, L.E. Stevens, S.E. Stevens, L. Sun, E. Janssen, D. Wuebbles, S.D. Hilberg, M.S. Timlin, L. Stoecker, N.E. Westcott, and J.G. Dobson, 2013: Regional Climate Trends and Scenarios for the U.S. National Climate Assessment. Part 3. Climate of the Midwest U.S., NOAA Technical Report NESDIS 142-3, 95 pp. (available at http://scenarios.globalchange.gov/regions/midwest).

River Deltaic Plain, and will balance the interests of ecosystem restoration, flood risk reduction and navigation."[47]

Assessment of the new flowline should also utilize the recently released new *Guidelines for determining flood flow frequency—Bulletin 17C.*[48] This long-awaited Bulletin, which was released by the U.S. Geological Survey on March 29, 2018, updates guidelines that were last updated in 1982. "Federal agencies are requested to use these Guidelines in all planning activities involving water and related land resources."[49]

The National Wildlife Federation notes that the PDF flowline was updated for the 1998 Supplement I,[50] but is not clear from the materials provided by the Memphis District whether an update has been carried out in advance of this scoping process.[51] Updating the flowline would appear to be an essential component for developing an adequate Supplement II.

(7) Supplement II should fully evaluate the role that sediment and freshwater diversions could play in minimizing future deficiencies in the Mainline Levee system.

Important efforts are underway to build and re-operate Mississippi River diversion projects to move more sediment into the Mississippi River delta to rebuild the delta's wetlands. For example, the Mid-Barataria Sediment Diversion, which is one of the most studied and modeled projects in Louisiana's history, will bring sediments and nutrients into the Barataria Basin building land and spurring growth of wetland plants. Supplement II should carefully evaluate the role of sediment diversions in increasing the resiliency of the MR&T and in reducing flood risks for the region.

Diversions have been recognized as critical projects for the future of Louisiana's coastal in every Louisiana Coastal plan issued over the past 40 years precisely because the Mississippi River is the region's greatest force for building land.[52] Most of the areas of Louisiana's coast that have

[47] USACE, New Orleans District Website (available at http://www.mvn.usace.army.mil/Missions/Environmental/Louisiana-Coastal-Area/Mississippi-River-Hydrodynamic-and-Delta-Managemen/) (visited October 15, 2018).

[48] England, J.F., Jr., Cohn, T.A., Faber, B.A., Stedinger, J.R., Thomas, W.O., Jr., Veilleux, A.G., Kiang, J.E., and Mason, R.R., Jr., 2018, Guidelines for determining flood flow frequency—Bulletin 17C: U.S. Geological Survey Techniques and Methods, book 4, chap. B5, 148 p., https://doi.org/10.3133/tm4B5.

[49] https://pubs.er.usgs.gov/publication/tm4B5

[50] 1998 Supplement I, Project Report at 10 ("The 1993 and 1995 floods on the upper Mississippi River revealed significant upward changes in stage-discharge relationships on the upper Mississippi River. The higher than expected water surface elevations experienced during the flood of 1995 on the reach of the Mississippi River above Cairo,· Illinois; indicated that significant changes in the flood plain have occurred from the conditions used to develop the 1956 PDF flowline. Therefore, the MR&T Project design flowline from Cairo to Cape Girardeau was revised in 1996. The revision was based on available data and analyses of river hydraulic and hydrologic parameters. Two private levees (Powers Island levee and the Miller City levee) located in the Upper Mississippi River Commerce to Birds Pt. reach are factors in the changed flood plain conditions. Earlier, these private levees have tended to fail during floods, permitting partial conveyance of flow through the flood plain. In recent years, these levees have demonstrated greater resistance to failure, resulting in higher than expected flowlines against the project levee.")

[51] *See* 83 Fed. Reg. 32642, 32643 (July 13, 2018) ("October of 2017, USACE completed an engineering risk assessment and programmatic review of the MRL based on the 1973 Refined MR&T Flowline Study.").

[52] http://mississippiriverdelta.org/coastal-restoration-and-louisiana-more-than-40-years-of-planning/

been maintaining or even gaining land instead of losing it are doing so because of regular sediment input from the Mississippi River.[53] For example, the Wax Lake Delta, located in Atchafalaya Bay, has been impacted by storm surge over the years, but this delta quickly recovers and continues to grow and push out into the Atchafalaya Bay because of the steady supply of sediment. As a result, it is one of the few areas of the Louisiana coast that is gaining land.[54]

(8) Supplement II should fully evaluate whether the proposed deepening of the lower Mississippi River navigation channel could create additional stressors on the Mainline Levee system.

The Corps is currently considering a proposal to deepen the navigation channel in portions of the lower Mississippi River. Among other impacts, this proposed deepening could increase hurricane-induced storm surge height and distance of storm surge propagation upstream. This would significantly intensify pressure on river levees, particularly those in Louisiana's Plaquemines Parish. During Hurricanes Katrina and Isaac, storm surge increased river stage at the Corps' Carrollton gage in New Orleans by at least 10-ft and 6-ft, respectively.

These analysis should be used to properly assess current and potential future conditions; analyze direct, indirect, and cumulative impacts; and critically, to develop meaningful and long-term solutions to reducing flood damages while improving the health of the environment.

D. Comprehensively Evaluate the Full Suite of Direct, Indirect, and Cumulative Impacts

In addition to the investigations outlined in Section C of these comments, Supplement II also must examine the direct, indirect, and cumulative environmental impacts of all reasonable alternatives, the conservation potential of those alternatives, and the means to mitigate adverse environmental impacts that cannot be avoided.[55] These assessments are critical for determining whether less environmentally damaging alternatives are available.

Supplement II should ensure a full assessment of the direct, indirect, and cumulative impacts on at least the resources outlined below.

(1) Impacts on hydrology, including the impacts on flood heights, channel morphology, and sedimentation. Depending on the alternatives considered, the project could have significant adverse impacts to these process or could help return these processes to more natural conditions with significant positive benefits. In light of the vital importance of sediment transport for coastal Louisiana restoration, Supplement II should carefully evaluate and quantify the impacts on sediment transport downstream, including any resulting impacts on

[53] Gagliano, S.M., P. Culley, D.W. Earle, Jr., P. King, c. Latiolais, P. Light, A. Rowland, R. Shlemon and J.L. van Beek. 1973. Environmental Atlas and Multiuse Management Plan for South-Central Louisiana. Center for Wetland Resources, Louisiana State University. Baton Rouge, LA; Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands. Conservation and Restoration Authority. 1998. Coast 2050: Toward a Sustainable Coastal Louisiana. Louisiana Department of Natural Resources. Baton Rouge, La. 161 p.
[54] Couvillion, B.R., Beck, Holly, Schoolmaster, Donald, and Fischer, Michelle, 2017, Land area change in coastal Louisiana 1932 to 2016: U.S. Geological Survey Scientific Investigations Map 3381, 16 p. pamphlet, https://doi.org/10.3133/ sim3381.
[55] 40 C.F.R. § 1502.16.

coastal wetland losses and/or coastal wetland restoration.

(2) Impacts on special aquatic habitats – including riverine, floodplain, and coastal wetlands. The Mississippi River and its floodplain have suffered astounding wetland losses. The loss of these vital habitats has cascading negative impacts on fish and wildlife, public safety, recreation, and economies that rely on healthy river and floodplain systems. Supplement II must carefully evaluate and quantify the potential for additional losses – or gains – of wetlands and other special aquatic sites. The cumulative impacts of historical losses to these key habitats must also be fully evaluated and accounted for in any final recommended alternative.

Notably, "[t]he single most important factor affecting wetlands has been the construction of levees to reduce the frequency and duration of flooding throughout much of the lower Mississippi River Valley."[56] This includes significant losses to bottomland hardwood wetlands, which are recognized as being "among the Nation's most important wetlands."[57] When the U.S. Fish and Wildlife Service was providing input for the 1998 Supplement I, it concluded that "any further loss of forested wetlands within the project area should be considered significant considering the cumulative losses."[58] Recognizing the true importance and value of wetlands, and the role of projects such as this one in causing the losses of these wetlands, is critical for making an informed decision that avoids additional wetland impacts.

As noted above, the National Wildlife Federation urges the Corps to prohibit the use of wetlands (including through placement of borrow pits in wetland areas) for construction material. Such use is anathema to sound water resources management and is contrary to the clear directives in law and policy to protect the nation's wetland resources and avoid and minimize damage to the nation's wetlands.

(3) Impacts on fish and wildlife. Supplement II must examine the impacts of the alternatives on the species that utilize the Mississippi River, including the impacts to fish, waterfowl, birds, mammals, reptiles, amphibians, and mussels. The Mississippi River is used by an astounding array of wildlife, including 360 species of birds, 260 species of fish, 145 species of amphibians and reptiles, 98 species of mussels, and 50 species of mammals.

Forty percent of North America's waterfowl migrate through the Mississippi River flyway. The impacts on the critical array of migratory species that utilize the Mississippi River and Mississippi River flyway must also be analyzed, including the cumulative impacts of climate change on these species. As discussed below, migratory wildlife are particularly vulnerable to the impacts of climate change.

[56] Report to Congress by the Secretary of the Interior, *Impact of Federal Programs on Wetlands,* Volume II, at 145 (1994).

[57] Report to Congress by the Secretary of the Interior, *Impact of Federal Programs on Wetlands*, Volume I, at 39 (1988). Indeed, bottomland hardwood wetlands are so important that they Congress has determined that in any Corps project proposed to Congress, losses of bottomland hardwoods must be mitigated in kind whenever possible. 33 U.S.C. § 2283(d)(2).

[58] November 30, 1995 letter from Allan J. Mueller to Colonel Gary W. Wright. A copy of this letter is found at Appendix 11 of the DSEIS for Supplement I.

An accurate assessment of fish and wildlife impacts will require an accurate assessment of impacts to the full range of habitats that these species rely on. A meaningful assessment would also include an evaluation of the impacts of each alternative on the ability of the fish and wildlife that utilize the river and flyway to withstand the adverse impacts of climate change (*i.e*., the species' resiliency to climate change).

(9) Impacts on endangered species. Supplement II should pay particular attention to the impacts on threatened and endangered species and any critical habitat.

(10) Impacts on water quality, including nutrient composition. The Mississippi River remains plagued by water quality problems, including excess nutrients that have both local and ecosystem wide impacts (including, for example, yearly development of the Gulf of Mexico dead zone). Supplement II must carefully evaluate and quantify the impacts of each alternative on water quality in the river, including the potential water quality impacts caused by loss of wetlands and increased sedimentation.

(11) Impacts on vegetation, including wetland vegetation and threatened, endangered and at risk plant species. Impacts to plant species, which of course are a critical component of the environment, must be evaluated in Supplement II. Moreover, without this analysis it is not possible to accurately assess impact to fish and wildlife or water quality.

(12) Cumulative impacts of climate change. Supplement II must assess the cumulative impacts of climate change, including climate-change induced increases in precipitation, extreme weather events, and sea level rise. Of critical concern are the additive and magnifying effect of climate change on increased flood risks, wetland losses, and fish and wildlife.

Climate change may significantly exacerbate the impacts on the many migratory species that utilize the Mississippi River, Mississippi River Flyway, and the project area. As recognized by the United Nations Environment Program and the Convention on the Conservation of Migratory Species of Wild Animals, migratory wildlife is particularly vulnerable to the impacts of climate change:

> "As a group, migratory wildlife appears to be particularly vulnerable to the impacts of Climate Change because it uses multiple habitats and sites and use a wide range of resources at different points of their migratory cycle. They are also subject to a wide range of physical conditions and often rely on predictable weather patterns, such as winds and ocean currents, which might change under the influence of Climate Change. Finally, they face a wide range of biological influences, such as predators, competitors and diseases that could be affected by Climate Change. While some of this is also true for more sedentary species, migrants have the potential to be affected by Climate Change not only on their breeding and non-breeding grounds but also while on migration."

> "Apart from such direct impacts, factors that affect the migratory journey itself may affect other parts of a species' life cycle. Changes in the timing of migration may affect breeding or hibernation, for example if a species has to take longer than normal on migration, due to changes in conditions *en route*, then it may arrive late, obtain poorer quality breeding resources (such as

territory) and be less productive as a result. If migration consumes more resources than normal, then individuals may have fewer resources to put into breeding . . . ."

* * *

"Key factors that are likely to affect all species, regardless of migratory tendency, are changes in prey distributions and changes or loss of habitat. Changes in prey may occur in terms of their distributions or in timing. The latter may occur though differential changes in developmental rates and can lead to a mismatch in timing between predators and prey ("phenological disjunction"). Changes in habitat quality (leading ultimately to habitat loss) may be important for migratory species that need a coherent network of sites to facilitate their migratory journeys. Habitat quality is especially important on staging or stop-over sites, as individuals need to consume large amounts of resource rapidly to continue their onward journey. Such high quality sites may [be] crucial to allow migrants to cross large ecological barriers, such as oceans or deserts."[59]

Migratory birds are at particular risk from climate change. Migratory birds are affected by changes in water regime, mismatches with food supply, sea level rise, and habitat shifts, changes in prey range, and increased storm frequency.[60]

(13) Impacts on restoration efforts. The Corps, other federal agencies, states, non-governmental organizations, and members of the public are engaged in significant efforts to restore the Mississippi River, Mississippi River floodplain, and Mississippi River delta. Supplement II should carefully assess the impacts of each alternative on these other vital efforts, including any implications for timely issuance of Section 408 permits for sediment diversion projects. Supplement II should also evaluate the ability of each alternative to comply with the National Water Policy which requires that all water resources projects protect and restore the functions of natural systems and mitigate any unavoidable damage to natural systems.[61]

(14) Impacts on ecosystem services provided by a healthy Mississippi River and floodplain. "Ecosystem services" are the goods and services produced by ecosystems that benefit humankind. These services include (but are by no means limited to) such things as carbon sequestration, wildlife habitat, nutrient retention, and erosion reduction. While these services have traditionally been undervalued because they often fall outside of conventional markets and pricing, society is increasingly recognizing the essential link between healthy ecosystems and human welfare and significant progress has been made in the science of ecosystem services evaluation. Supplement II should carefully assess the impacts of each alternative on ecosystem services [62]

[59] UNEP/CMS Secretariat, Bonn, Germany, *Migratory Species and Climate Change: Impacts of a Changing Environment on Wild Animals* (2006) at 40-41 (available at http://www.cms.int/publications/pdf/CMS_CimateChange.pdf).
[60] *Id*. at 42-43.
[61] 42 U.S.C 1962-3.
[62] *See, e.g.*, Earth Economics, *Gaining Ground, Wetlands, Hurricanes and the Economy: The Value of Restoring the Mississippi River Delta*.

(15) Impacts on recreational fishing and tourism industries that rely on a healthy Mississippi River and floodplain. Mississippi River tourism generates approximately $2 billion annually. Recreational opportunities, including recreational fishing, are vitally important to the public. The SEIS should fully evaluate the impacts of each alternative on these important activities.

(16) Disproportionate impacts on low income and minority communities (i.e., environmental justice). Supplement II must examine whether the proposed project would cause disproportionate impacts to low income and minority communities. Particular concerns include: exposing such communities to increased flood risks (including by raising levees in locations upstream); releasing or re-suspending contaminated sediments including in or near borrow pits; adversely affecting subsidence fishing including through increases toxic contamination of fish; the potential for re-exposure to toxic materials resulting from disturbance of borrow pits and disposal sites during floods and storms; significant noise, air pollution or other construction impacts; and the cumulative impacts of any such activities.

As noted above, Supplement II must assess the direct, indirect, and cumulative impacts on these resources and natural and human communities. Direct impacts are caused by the action and occur at the same time and place as the action. Indirect impacts are also caused by the action, but are later in time or farther removed from the location of the action.[63] Cumulative impacts are:

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[64]

The cumulative impacts analysis ensures that the agency will not "treat the identified environmental concern in a vacuum."[65] The cumulative impacts analysis must examine the cumulative effects of federal, state, and private projects and actions.[66] The cumulative impacts analysis must also evaluate the cumulative impacts of climate change.[67]

These direct, indirect, and cumulative impacts must be assessed at the site specific level. If the Corps intends Supplement II to be a programmatic EIS, the Corps must commit to preparing tiered site-specific

[63] 40 C.F.R. § 1508.8.
[64] 40 C.F.R. § 1508.7.
[65] *Grand Canyon Trust v. FAA*, 290 F.3d 339, 346 (D.C. Cir. 2002).
[66] The requirement to assess non-Federal actions is not "impossible to implement, unreasonable or oppressive: one does not need control over private land to be able to assess the impact that activities on private land may have" on the project area. *Resources Ltd., Inc. v. Robertson*, 35 F.3d 1300, 1306 (9th Cir. 1993).
[67] *See Center for Biological Diversity v. Nat'l Hwy Traffic Safety Administration*, 538 F.3d 1172, 1217 (9th Cir. 2008) (holding that analyzing the impacts of climate change is "precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct" and that NEPA requires analysis of the cumulative impact of greenhouse gas emissions when deciding not to set certain CAFE standards); *Center for Biological Diversity v. Kempthorne*, 588 F.3d 701, 711 (9th Cir. 2009) (NEPA analysis properly included analysis of the effects of climate change on polar bears, including "increased use of coastal environments, increased bear/human encounters, changes in polar bear body condition, decline in cub survival, and increased potential for stress and mortality, and energetic needs in hunting for seals, as well as traveling and swimming to denning sites and feeding areas.").

NEPA analyses for each work item.[68] "The critical inquiry in considering the adequacy of an EIS prepared for a large scale, multi-step project is not whether the project's site-specific impact should be evaluated in detail, but when such evaluation should occur."[69]

Supplement II must also conduct site-specific Clean Water Act Section 404 reviews, including to establish that the Corps is not locating a non-water dependent activity (for example, obtaining construction material) in wetlands without making the requisite showings. The Corps is prohibited from discharging dredged and fill materials unless it demonstrates compliance with Section 404.

Supplement II must provide "quantified or detailed information" on the impacts, including the cumulative impacts, so that the courts and the public can be assured that the Corps has taken the mandated hard look at the environmental consequences of the Project.[70] **If information that is essential for making a reasoned choice among alternatives is not available, the Corps must obtain that information unless the costs of doing so would be "exorbitant."[71]**

Importantly, as the Council on Environmental Quality has made clear, in situations like those in the Mississippi River where the environment has already been greatly modified by human activities, it is **not** sufficient to compare the impacts of the proposed alternative against the current conditions. Instead, the baseline must include a clear description of how the health of the resource has changed over time to determine whether additional stresses will push it over the edge.[72]

E. Fully Analyze Mitigation and Include a Detailed Mitigation Plan

To comply with NEPA, Supplement II must analyze mitigation measures with "sufficient detail to ensure that environmental consequences have been fairly evaluated."[73] To comply with the Water Resources Development Acts, Supplement II must meet the mitigation requirements established by 33 U.S.C. § 2283(d), including the requirement to develop a detailed mitigation plan.

Supplement II must discuss mitigation measures "in sufficient detail to ensure that environmental consequences have been fairly evaluated."[74] A "perfunctory description" of the mitigating measures is not sufficient.[75] As the Supreme Court has noted, this is because:

> omission of a reasonably complete discussion of possible mitigation measures would undermine the 'action-forcing' function of NEPA. Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of

[68] If the Corps opts to conduct tiered site-specific NEPA analyses, it must prepare a full scale site-specific Environmental Impact Statement, an Environmental Assessment and FONSI, or an Environmental Assessment and Mitigated FONSI for each Work Item before the Corps may proceed with construction. The Corps will also be required to conduct a Clean Water Act Section 404 review for each item of construction.

[69] *State of California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982)

[70] *Neighbors of Cuddy Mountain v. U. S. Forest Service*, 137 F.3d 1372, 1379 (9th Cir. 1998); *Natural Resources Defense Council v. Callaway*, 524 F.2d 79, 87 (2d Cir. 1975).

[71] 40 C.F.R. § 1502.22 (emphasis added).

[72] Council on Environmental Quality, Considering Cumulative Effects Under the National Environmental Policy Act at 41 (January 1997).

[73] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352 (1989).

[74] Id.

[75] *Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1380 (9th Cir.1998).

> the adverse effects. An adverse effect than can be fully remedied by, for example, an inconsequential public expenditure is certainly not as serious as a similar effect that can only be modestly ameliorated through the commitment of vast public and private resources.[76]

Supplement II also must discuss the effectiveness of the proposed mitigation:

> "An essential component of a reasonably complete mitigation discussion is an assessment of whether the proposed mitigation measures can be effective. The Supreme Court has required a mitigation discussion precisely for the purpose of evaluating whether anticipated environmental impacts can be avoided. A mitigation discussion without at least *some* evaluation of effectiveness is useless in making that determination."[77]

This should include a discussion of how the mitigation will effectively address temporal losses (i.e., it takes many years to restore a fully functioning, mature wetland and many decades to restore a fully functioning mature bottomland hardwood wetland forest). A bald assertion that mitigation will be successful is not sufficient. The effectiveness must instead be supported by "substantial evidence in the record."[78]

A discussion of the effectiveness is particularly critical because, despite progress in this area, wetland and stream mitigation often fails or does not fully replace lost ecological values. For example, the National Research Council has concluded:

> "Attempts to restore forested wetlands of the Southeast (e.g., bottomland hardwoods and cypress swamps) have encountered difficulties related to the time required to replace mature trees, the lack of material to transplant, the lack of knowledge of how and when to carry out seeding or transplantation, (Clewell and Lea, 1989) and altered hydrology (drainage for conversion to agriculture) of the wetland area. Natural forested wetlands may support hundreds of plant species, many of which thrive in the understory (91 percent of 409 species in one riverine forest were understory species). Old-growth forests are dominated by trees that gradually achieve a dominant role in the canopy and that are self-sustaining through their ability to reproduce in their own shade. It is not clear that such climax species can be successfully established in open sites, or whether their introduction must await development of seral (intermediate successional stage) plant communities. Clewell and Lea (1989) noted the need for intensive site preparation to reduce competition between weeds and transplanted tree seedlings. Their review was the first to mention insect herbivory and fire as potential problems. In many cases, restoration of suitable hydrologic conditions will be necessary. The short time period within which forest restoration attempts have been monitored precludes an evaluation of their functional equivalency with natural reference systems."[79]

[76] Id.
[77] *South Fork Band Council v. Dept. of Interior*, 588 F.3d 718, 727 (9th Cir. 2009) (internal citations omitted).
[78] *Wyoming Outdoor Council v. U.S. Army Corps of Eng'rs*, 351 F. Supp. 2d 1232, 1252 (D. Wyo. 2005).
[79] National Research Council, Restoration of Aquatic Ecosystems: Science, Technology, and Public Policy (1992) at 311-12.

Absent a meaningful discussion of the effectiveness of the proposed mitigation, Supplement II will not have taken the mandated "hard look" at the environmental impacts of the proposed action and alternatives to the action, and will fail to provide "a clear basis for choice among options by the decisionmaker."[80]

The Water Resources Development Acts require the Corps to mitigate the adverse impacts of the Project.[81] The Corps is required to mitigate all losses to fish and wildlife created by a project unless the Secretary determines that the adverse impacts to fish and wildlife would be "negligible." 33 U.S.C. § 2283(d)(1). To ensure that this happens, the Corps is prohibited from selecting a "project alternative in any report" unless that report includes a "specific plan to mitigate fish and wildlife losses." *Id*. Accordingly, the DSEIS must include a specific mitigation plan.

Corps mitigation plans must ensure that "impacts to bottomland hardwood forests are mitigated in-kind and harm to other habitat types are mitigated to not less than in-kind conditions, to the extent possible." 33 U.S.C. § 2283(d)(1). Mitigation plans "shall include, at a minimum:"

(1) The type, amount, and characteristics of the habitat being restored, a description of the physical actions to be taken to carry out the restoration, and the functions and values that will be achieved;
(2) The ecological success criteria, based on replacement of lost functions and values, that will be evaluated and used to determine mitigation success;
(3) A description of the lands and interest in lands to be acquired for mitigation, and the basis for determining that those lands will be available;
(4) A mitigation monitoring plan that includes the cost and duration of monitoring, and identifies the entities responsible for monitoring if it is practicable to do so (if the responsible entity is not identified in the monitoring plan it must be identified in the project partnership agreement that is required for all Corps projects). Corps mitigation must be monitored until the monitoring demonstrates that the ecological success criteria established in the mitigation plan have been met; and
(5) A contingency plan for taking corrective action in cases where monitoring shows that mitigation is not achieving ecological success as defined in the plan. 33 U.S.C. § 2283(d).

Corps mitigation plans must also comply with "the mitigation standards and policies established pursuant to the regulatory programs" administered by the Corps. 33 U.S.C. § 2283(d).

Corps mitigation must be monitored until the monitoring demonstrates that the ecological success criteria established in the mitigation plan have been met. The Corps is also required to consult yearly on each project with the appropriate Federal agencies and the states on the status of the mitigation efforts. The consultation must address the status of ecological success on the date of the consultation, the likelihood that the ecological success criteria will be met, the projected timeline for achieving that success, and any recommendations for improving the likelihood of success. 33 U.S.C. § 2283(d).

[80] 40 C.F.R. § 1502.14.
[81] The Water Resources Development Act of 2007 requires the Corps to implement mitigation, and comply with mitigation planning requirements, for any project for which the Corps "select[s] a project alternative in any report." 33 U.S.C. § 2283(d). Thus, mitigation will be required for the Project as a matter of law upon issuance of the final SEIS, and mitigation is required as a matter of law for components of the Regulating Works Project that are proceeding under environmental assessments.

In addition, mitigation lands for Corps civil works projects must be purchased before any construction begins. 33 U.S.C. § 2283(a). Any physical construction required for purposes of mitigation should also be undertaken prior to project construction but must, at the latest, be undertaken "concurrently with the physical construction of such project." *Id*.

Conclusion

The National Wildlife Federation appreciates the opportunity to provide these comments and looks forward to working with the Corps to ensure that Supplement II fully evaluates environmental impacts and complies with NEPA and the nation's other vitally important environmental laws. We urge the Corps to assess and address the underlying causes of increased flood risks and to develop and adopt an alternative that utilizes a combination of low impact flood damage reduction measures, ecosystem restoration actions, and improved navigation management to reduce flood risks and protect and restore the ecologically vital Mississippi River.

Sincerely,

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Attachment A

National Wildlife Federation Comments

Scoping Comments on Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement

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Climatic control of Mississippi River flood hazard amplified by river engineering

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Over the past century, many of the world's major rivers have been modified for the purposes of flood mitigation, power generation and commercial navigation[1]. Engineering modifications to the Mississippi River system have altered the river's sediment levels and channel morphology[2], but the influence of these modifications on flood hazard is debated[3–5]. Detecting and attributing changes in river discharge is challenging because instrumental streamflow records are often too short to evaluate the range of natural hydrological variability before the establishment of flood mitigation infrastructure. Here we show that multi-decadal trends of flood hazard on the lower Mississippi River are strongly modulated by dynamical modes of climate variability, particularly the El Niño–Southern Oscillation and the Atlantic Multidecadal Oscillation, but that the artificial channelization (confinement to a straightened channel) has greatly amplified flood magnitudes over the past century. Our results, based on a multi-proxy reconstruction of flood frequency and magnitude spanning the past 500 years, reveal that the magnitude of the 100-year flood (a flood with a 1 per cent chance of being exceeded in any year) has increased by 20 per cent over those five centuries, with about 75 per cent of this increase attributed to river engineering. We conclude that the interaction of human alterations to the Mississippi River system with dynamical modes of climate variability has elevated the current flood hazard to levels that are unprecedented within the past five centuries.

Flooding of the lower Mississippi River in the spring of 2011 was among the largest discharge events since systematic measurements began in the late nineteenth century, and it caused US$3.2 billion in agricultural losses and damages to infrastructure[6]. This and other recent flood events on the Mississippi River—including those in 2016 and 2017—have repeatedly, although controversially, been attributed to an aggressive campaign of river engineering designed and implemented over the past 150 years[3–5]. Federally mandated efforts to reduce the impacts of flooding began in the late nineteenth century and initially relied almost exclusively on the use of artificial levees, but this strategy was revised in the wake of a particularly devastating flood in the spring of 1927 that overwhelmed the levee system[7]. The current flood management system—the Mississippi River & Tributaries Project (MR&T)—includes a series of spillways that can be opened to relieve pressure on an enlarged levee system, as well as an artificially shortened and straightened main channel that is held in place by concrete retaining walls (revetments) and isolated from most of its natural floodplain[2,6,7]. Although these modifications are credited with protecting communities and croplands within the floodplain from inundation, artificial channelization has altered the relationship between discharge and river stage[3,4] and accelerated the rate of land loss in the Mississippi River delta[8], necessitating additional investments in flood mitigation infrastructure and coastal restoration[9].

Although fluvial processes are sensitive to flood mitigation infrastructure, climate variability can also shape the dynamics of continental drainage networks, particularly over decadal to centennial timescales that are difficult to detect using short observational records[10,11]. Precipitation and soil water storage over the Mississippi River basin are influenced by climate variability driven by sea-surface-temperature anomalies in both the Pacific and Atlantic Oceans[12,13]. Yet establishing the natural controls on discharge extremes of the lower Mississippi has proved challenging because gauging-station measurements record a limited range of variability, particularly before major investments were made in river engineering. As a result, analyses of historical streamflow records disagree over the role that dynamical modes of climate variability play in modulating the discharge[12,14,15]. To plan flood mitigation and other infrastructure projects, it is critical to understand the climate controls on the discharge of the lower Mississippi River, but the short length of the instrumental record limits our ability to evaluate the range of natural hydrological variability from observational data alone.

Recent advances in palaeoflood hydrology could extend the instrumental record back in time to diagnose the controls on the discharge of large alluvial rivers such as the lower Mississippi. Traditional approaches in palaeoflood hydrology, which include the use of slackwater deposits as flood event indices[16], are of limited use on the low-relief landscapes that characterize the Mississippi River alluvial plain. One new approach uses the sedimentary archives held in floodplain lakes, which act as sediment traps during overbank floods, to develop continuous, quantitative and event-scale records of past flood frequency and magnitude[17,18]. Parallel work in dendrochronology demonstrates that when trees are inundated by floodwaters they exhibit anatomical anomalies in that year's growth ring such that they provide a precise chronology of flood events that occurred during the growing season[19]. Together, these methodological advances provide an opportunity to evaluate interannual to multi-decadal scale trends in flood frequency and magnitude on a large alluvial river such as the lower Mississippi, before and during the era of river engineering.

Here we analyse records of individual overbank flood events derived from sedimentary and tree-ring archives from the lower Mississippi River's floodplain (Fig. 1). We collected sediment cores from the infilling thalwegs of three oxbow lakes, Lake Mary (MRY), False River Lake (FLR) and Lake Saint John (STJ), that formed by neck cut-offs of the lower Mississippi River in AD 1776, AD 1722 and roughly AD 1500, respectively[20] (Extended Data Figs 1–3). In these sedimentary archives, we identified individual flood events by using grain-size analysis, bulk geochemistry (from X-ray fluorescence scanning, XRF) and radiography; developed age–depth models constrained by multiple independent chronological controls (Extended Data Figs 4–6); and estimated flood magnitudes from a linear model that relates the coarse

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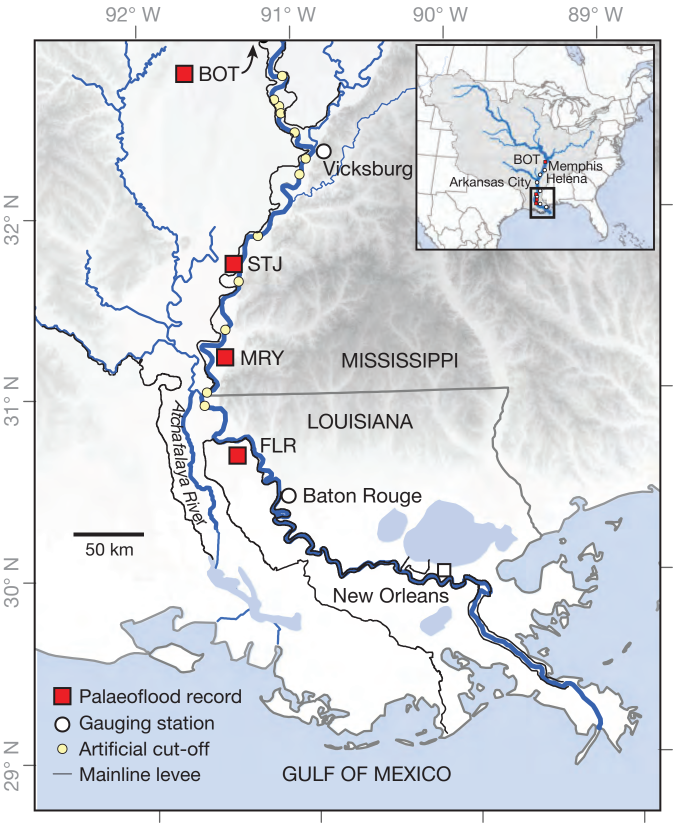

Figure 1 | The lower Mississippi River and the Mississippi River basin in North America. River engineering modifications (artificial cut-offs and levees) that contribute to channelization, the locations of palaeoflood records (FLR; MRY; STJ; and Big Oak Tree, BOT) and river gauging stations on the lower Mississippi used in this study (Memphis, Helena, Arkansas City, Vicksburg and Baton Rouge) are shown. Shaded relief shows relative topographic highs (dark shades) and lows (light shades) using the National Elevation Dataset[25].

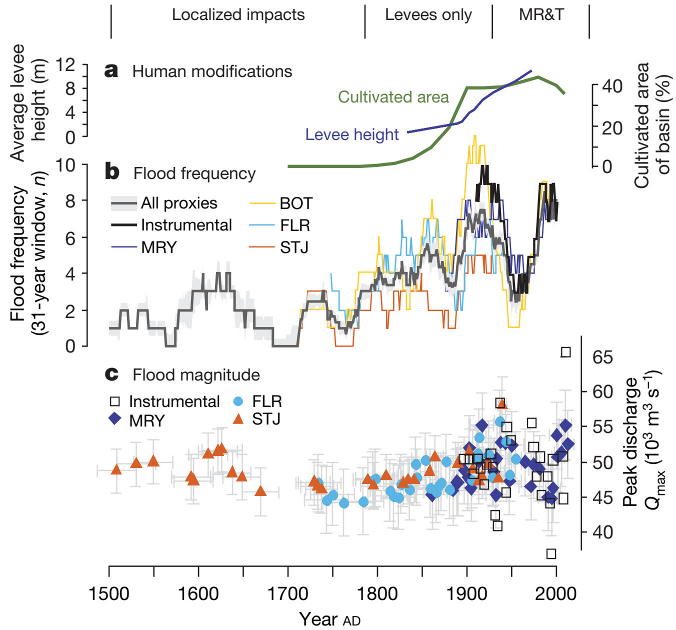

Figure 2 | Instrumental and reconstructed flood frequencies and magnitudes of the lower Mississippi River. a, Human impacts to the lower Mississippi River (MR&T refers to a major river engineering initiative): timing and intensity of agricultural land use[26] and river engineering. **b**, Flood frequencies (number of flood events in a 31-year moving window) derived from palaeoflood records, including mean and bootstrapped 2σ confidence intervals of all palaeoflood archives, and the instrumental frequency of all floods attaining major flood stage (>1.5 m above flood stage) at the Mississippi River gauging station at Baton Rouge (station number 07374000). **c**, Flood magnitudes derived from the sedimentary palaeoflood records, with 1σ uncertainties, and instrumental flood magnitudes for the Mississippi River gauging station at Vicksburg (station number 07289000).

grain-size component to the discharge of historical flood events[18] (Extended Data Fig. 7; see Methods for details). We also include tree-ring records from the floodplain of the lower Mississippi, collected and described by ref. 21; each tree-ring series was examined for anatomical evidence of flood injury to produce a record of overbank flood events that extends back to the late seventeenth century[21]. A composite time series for flood frequency describing the number of flood events in a moving 31-year window derived from sedimentary and tree-ring archives (Fig. 2b) is highly correlated with instrumental flood frequency ($r = 0.90$, $t = 19.12$, effective degrees of freedom $\nu_{eff} = 3.77$, $p < 0.001$) for the interval of overlap, while reconstructed flood magnitudes (Fig. 2c) track trends observed in gauging-station measurements (see Supplementary Information for additional validation), indicating that the palaeoflood archives provide robust reconstructions of hydrological extremes on the lower Mississippi River beyond the period of instrumental record.

Our multi-proxy palaeoflood dataset extends the record of extremes in the discharge of the lower Mississippi River back to the early sixteenth century and demonstrates that both the frequency and magnitude of flooding have increased over the past 150 years as land use and river engineering efforts have intensified (Fig. 2). Flood frequencies and magnitudes exhibit multi-decadal oscillations that increase in amplitude around the beginning of the twentieth century such that the highest rates of overbank flooding and the largest discharge events of the past 500 years have occurred within the past century. The amplification of flood magnitudes that has occurred over the past 150 years corresponds in time with the intensification of anthropogenic modifications to the lower Mississippi River and its basin, particularly the artificial channelization of the river with levees, revetments and cut-offs in the late nineteenth and early twentieth centuries[2,7]. Yet the continued presence of multi-decadal oscillations in flood frequency and magnitude throughout the entire period of record indicates that anthropogenic modifications to the Mississippi River system are acting in concert with other factors to alter flood hazard through time.

To evaluate the role of climate variability on flood hazard, we examined the relationships between flood frequency, the El Niño–Southern Oscillation (ENSO) and the Atlantic Multidecadal Oscillation (AMO), to find that sea-surface temperature anomalies in both the Pacific and Atlantic Oceans exert a strong influence on the occurrence of lower Mississippi River floods (Fig. 3). Over the past five centuries, correlations between composite flood frequency and the frequency of El Niño events ($r = 0.73$) and the AMO index ($r = -0.39$) derived from instrumental and palaeoclimate data sets are significant ($p < 0.001$; see Methods for details). The strength and direction of these relationships support the hypothesis that discharge extremes on the lower Mississippi River arise through the interaction of ENSO, which influences antecedent soil moisture, with the AMO, which controls the flux of moisture from the Gulf of Mexico inland[12,15]. Extreme precipitation events over the Mississippi River basin are associated with a stronger and more westerly position of the North Atlantic Subtropical High that is characteristic of the negative phase of the AMO[12,13], and these heavy precipitation events are more likely to generate discharge extremes if they fall on the saturated soils that tend to be left in the wake of El Niño events[15].

Despite the strong influence of climatic variability on lower Mississippi River flood occurrence, the amplification of flood magnitudes that we observe over the past 150 years is primarily the result of human modifications to the river and its basin (Fig. 4). The magnitude

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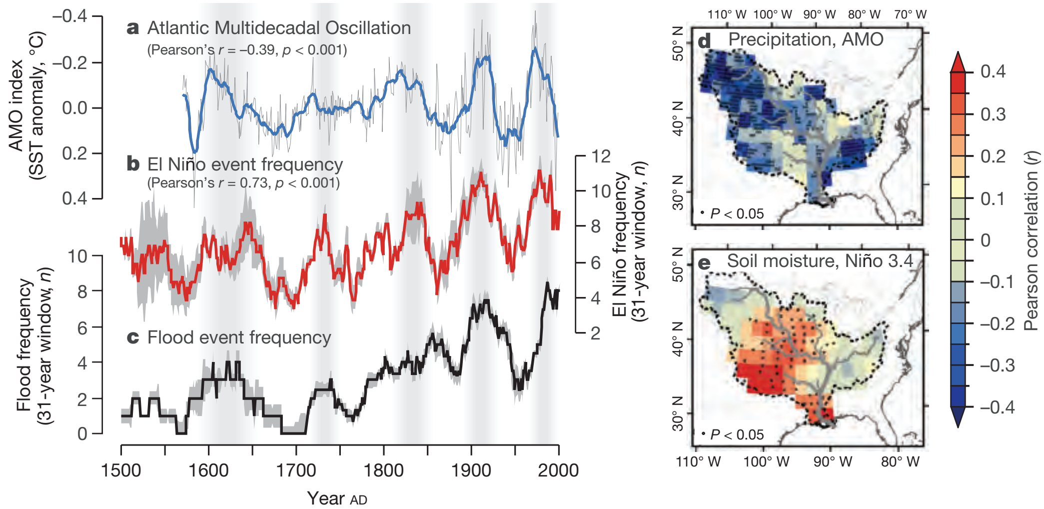

Figure 3 | Lower Mississippi River flood frequency and its relation to dominant modes of climate variability. a, AMO derived from instrumental[27] and palaeoclimate[28] datasets. **b**, Frequency of El Niño events (the warm phase of the ENSO) in a 31-year moving window derived from instrumental[27] and palaeoclimate[28–31] data sets (mean with 2σ bootstrapped confidence interval). SST, sea surface temperature. **c**, Frequency of lower Mississippi River floods derived from palaeoflood data (mean with bootstrapped 2σ confidence interval). **d**, Correlation field of monthly precipitation[32] with the AMO[27] (AD 1901–2014) smoothed with a common 121-month filter. **e**, Correlation field of monthly Palmer Drought Severity Index[33] with the Niño 3.4 index[27] (AD 1948–2011). Correlation fields are interpolated to a common 2° × 2° grid, and individual points with significant correlations at the $P < 0.05$ level are marked with a hollow circle.

of the 100-year flood (Q_{100}; a flood with a 1% chance of exceedance in any year) estimated from gauging-station measurements (AD 1897–2015) is (20 ± 7)% larger than Q_{100} for the period before major human impacts to the river and its basin (AD 1500–1800), as estimated from the palaeoflood data (see Methods for details). To identify the influence of human activities on this observed increase in Q_{100}, we use a linear model that relates peak discharge to the AMO index over the period before major human impacts to the river, AD 1500–1800 ($R^2 = 0.35$, degrees of freedom $\nu = 18$, $p < 0.01$) and use this model to predict flood magnitudes over the entire period of record. This 'climate-only' regression predicts that, in the absence of human modifications to the land surface, Q_{100} would have increased by only (5 ± 6)% over the same period, accounting for only about 25% of the observed increase in Q_{100} and implying that the remainder (about 75%) of this elevated flood hazard is the result of human modifications to the river and its basin.

The timing and nature of the amplification of flood magnitudes at the onset of the twentieth century strongly imply that it reflects the transformation of a freely meandering alluvial river to an artificially confined channel, because the confinement of flood flows to a levee-defined floodway can speed up the downstream propagation of a flood wave and increase peak discharge for a given flood[22]. The establishment of widespread agricultural activity in the Mississippi River basin occurred in the nineteenth century, before the divergence of the observed and 'climate-only' flood magnitudes, indicating a secondary and possibly lagged influence of agricultural expansion[23] on flood magnitudes relative to that of river engineering. In short, this analysis identifies artificial channelization of the lower Mississippi River, and its effects on the river's gradient, channel area and flow velocity[2,7], as having significantly increased the discharge of a given flood event relative to pre-engineering conditions.

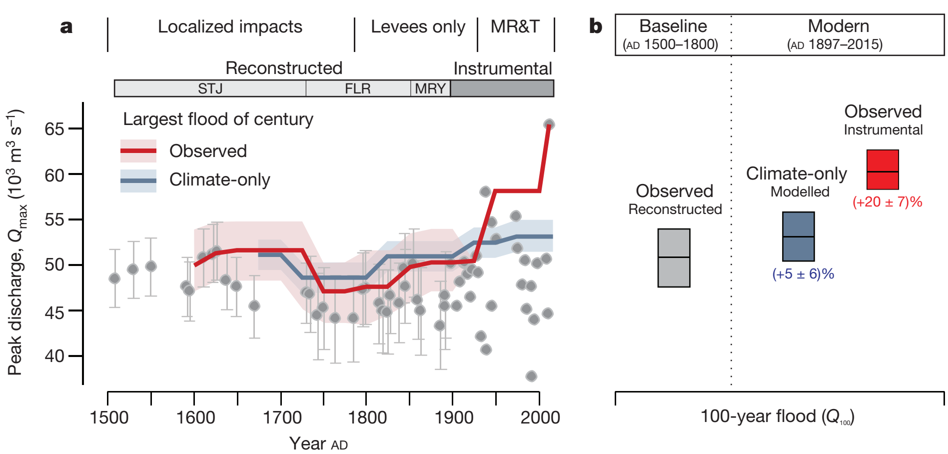

Figure 4 | Attribution of the observed increase in flood magnitudes over the past five centuries. a, Composite peak discharges from palaeoflood archives and the instrumental record from Vicksburg. The red line indicates observed trends in the largest flood of the century in a moving window; the blue line indicates trends under 'climate-only' conditions, estimated from a statistical model (see text for details). Both lines are shown with 1σ confidence intervals. Instrumental peak discharge estimates are reported without uncertainty and are therefore plotted without confidence intervals. **b**, Comparison of the 100-year flood observed during the baseline period (AD 1500–1800, before major human modifications to the Mississippi River and its basin; grey boxplot) with that estimated using a statistical model under 'climate-only' conditions (blue boxplot) and observed (red boxplot) during the modern period of instrumental record (AD 1897–2015). Boxplots show mean (centre line) and 1σ confidence intervals (box top and bottom) for Q_{100} estimates.

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Our main finding—that river engineering has elevated flood hazard on the lower Mississippi to levels that are unprecedented within the past five centuries—adds to a growing list of externalized costs associated with conventional flood mitigation and navigation projects, including a reduction in a river's ability to convey flood flows[3,4], the acceleration of coastal land loss[8] and hypoxia[24]. Despite the societal benefits that these major infrastructure projects convey[6], the costs associated with maintaining current levels of flood protection and navigability will continue to grow at the expense of communities and industries situated in the river's floodplain and its delta. For those interested in improving seasonal and longer-term forecasts of flood hazard or management strategies that reconnect the river with its floodplain, the Mississippi River's discharge of freshwater—and by extension the flux of sediment, nutrients and pollutants—to its outlet should be viewed as highly sensitive both to anthropogenic modifications to the basin and to variability of the global climate system.

Online Content Methods, along with any additional Extended Data display items and Source Data, are available in the online version of the paper; references unique to these sections appear only in the online paper.

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Supplementary Information is available in the online version of the paper.

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Author Contributions L.G. and J.P.D. initiated the project. S.E.M., L.G., M.D.T., J.W.F.R., Z.S. and J.P.D. conceived the ideas, designed the study and interpreted the results. M.D.T. provided dendrochronological data. J.W.F.R. provided historical discharge and geospatial data. Z.S. performed OSL dating. S.E.M., L.G., R.M.S., C.W. and M.O. collected sedimentary archives and/or performed laboratory analyses. S.E.M. wrote the manuscript with contributions from all authors.

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METHODS

Instrumental streamflow data. We obtained daily stage data for Mississippi River gauges at Vicksburg (station number 07289000) and Baton Rouge (07374000) from the United States Army Corps of Engineers (USACE) and the United States Geological Survey (USGS). Discharges for the Vicksburg, Memphis (07032000), Helena (07047970), Arkansas City (07146500) and Baton Rouge gauges were compiled from multiple sources. For the early instrumental record (pre-1927), peak discharges and measured discharges were compiled from historical documents[34,35]. In the few cases in which annual peak discharges were not recorded during this period, we used the measured discharges to create rating curves from which to determine the peak discharge for the annual peak stage. Discharge data after AD 1927 were acquired either from the USACE or from the USGS. The discharge record at Vicksburg is the longest and most continuous of the available discharge records, and its peak annual discharge is highly correlated ($r > 0.86$, $p < 0.01$) with that of other lower Mississippi River gauging stations in the study area (see Supplementary Information) and was thus used to reconstruct flood magnitudes from the sedimentary archives.

Sedimentary archives. We collected sediment cores from the infilling thalwegs of MRY, FLR and STJ with a rod-driven vibracore system in July 2012 and March 2016 (Extended Data Figs 1–3). For each core, we collected a replicate drive using a 7.5-cm-diameter polycarbonate piston corer to ensure recovery of an intact sediment/water interface. The targeted lakes were selected because the lateral position of the active channel near the lake's arm has remained relatively stable from the time of cut-off to the mid-twentieth century[20]. We cannot eliminate the possibility that minor lateral and/or vertical channel migration has occurred near these lakes since the time of cut-off, but we reduce the influence of this potential bias on our analysis by (i) using a low-pass filter on the grain-size data (see below) and (ii) validating the resulting flood frequency and magnitude data sets against the instrumental record (see Supplementary Information). At FLR and STJ, mainline levees of the MR&T have inhibited the deposition of fluvial sediment in the lake during overbank floods after about AD 1950 and 1937, respectively; MRY is not protected by artificial levees and it continues to be inundated during overbank floods. Oxbow lakes can continue to exchange water and sediment with the main channel when the river is below flood stage[36] to create high rates of fine-grained 'background sedimentation' that differs in texture and composition from the coarser material that is mobilized during high-magnitude flood events. Cores were collected along an arm of the oxbow lakes at locations proximal to the 'plug' that separates the active channel from the lake to maximize the contrast between background and flood event sediments. Core locations at each site were targeted based on bathymetric surveys before core collection.

Cores were transported back to the Woods Hole Oceanographic Institution (WHOI) where they were split, described and photographed. Archived core halves were subjected to high-resolution XRF (4,000 μm resolution) and radiography (200 μm resolution) in an ITRAX core scanner housed at WHOI. For grain-size analysis, sediment sub-samples at continuous 1-cm intervals were dispersed in water using a vortex mixer before 5 s sonication and analysis in a Beckman Coulter LS 13 320 laser diffraction particle-size analyser; randomly selected replicate samples showed a <1% volume difference in any detector. Complex, multi-modal grain-size distributions were modelled as mixtures of discrete, simple distributions and decomposed using end-member calculations into four representative populations, or end-members (EMs), that were considered geologically meaningful, using the EMMAgeo package run in RStudio. The score of each sample on the coarsest end-members (EM1), representing deposition of bedload during overbank floods[18], was normalized with a low-pass (41-cm) moving minimum filter to remove long-term trends in sediment composition caused by local geomorphic processes. We then identified potential flood deposits as normalized EM1 scores that exceeded a high-pass (11-cm) moving mean with a 0.1 EM1 score threshold, and we verified identified peaks against the XRF and radiography (Extended Data Figs 4–6).

To estimate flood magnitudes from the sediment records, we used the method of ref. 18 and developed linear models that describe the normalized EM1 scores as a function of historical flood event discharge at the Mississippi River gauging station at Vicksburg. Using this, we assigned each flood deposit to a historical flood event approximating 'major flood stage' as defined by the USGS at a nearby gauging station, in stratigraphic order, and within the 2σ age estimate for the deposit (Extended Data Fig. 7). The requirement for flood deposits to be assigned to historical floods in stratigraphic order eliminated ambiguity in cases in which more than one historical flood fell within a deposit's 2σ age estimate. There were no cases for which a flood deposit could not be assigned to a historical flood within the period of instrumental observations (AD 1897–2015), but there were three cases at FLR (AD 1944, 1929 and 1920) and two cases at STJ (AD 1920 and 1913) for which a major historic flood did not leave an identifiable flood deposit. These 'missing' flood deposits are rare and occurred during periods of high flood frequency, and they may reflect reduced sediment availability[37] during these events. The sedimentary record reconstructs peak annual discharge at the Vicksburg gauge, not at individual site locations.

We developed age–depth models using Bacon v.2.2[38], a Bayesian age–depth modelling program, informed by multiple independent dating techniques (see Supplementary Information), including: (i) ^{137}Cs and ^{210}Pb activity in desiccated and powdered bulk sediment samples in a Canberra GL2020RS well detector for low-energy germanium gamma radiation, for which we used the constant rate of supply model[39] to estimate the age of a sampled depth; (ii) radiocarbon (^{14}C) dating via accelerator mass spectrometry of a terrestrial plant macrofossil at the National Ocean Sciences Accelerator Mass Spectrometers facility at WHOI, calibrated using the IntCal13 curve embedded in Bacon; (iii) optically stimulated luminescence (OSL) dating with the fast component of silt-sized quartz[40] using a Risø DA-15 B/C luminescence reader at the University of Liverpool, UK; (iv) core tops as the date of collection and, when appropriate, the age of lake formation[20] as the core bottom. Sedimentation rate priors were increased to near-instantaneous rates through thick (>20 cm) flood deposits[17].

Tree-ring records. Tree-ring samples from 33 living and 2 dead oak (*Quercus lyrata* and *Q. macrocarpa*) trees were collected from Big Oak Tree State Park (BOT) in southeast Missouri[21]. One to four core samples were extracted from each tree at or below breast height (about 1.4 m) using a 5-mm-diameter Swedish increment borer. Cross-sections from dead trees were collected as close to the base of the tree as possible. All samples were absolutely cross-dated using the skeleton-plot method of dendrochronology. Tree-ring widths were measured on a stage micrometer to a nominal resolution of 0.001 mm. We crosschecked the accuracy of our visual dating using the computer program COFECHA. We visually determined flood-ring years by examining each tree-ring series for any evidence of flood injury consistent with the anomalous anatomical features caused by flooding as described by previous flood-ring studies[19]. Additional characteristics used in our identification included 'jumbled ranks' or 'additional ranks' of early wood vessels or zones of 'extended earlywood' and disorganized flame parenchyma as well as 'offset' early wood ranks[19]. We used the same criteria as ref. 21 to identify flood events (that is, a year in which more than 10% of sampled trees exhibited signs of flood injury) as this threshold encompasses all historic floods that attained major flood stage and occurred during the growing season[21].

Historical climate and palaeoclimate data. Historical (late nineteenth century to present) indices of ENSO and AMO[27] were extended back to the sixteenth century with annual palaeoclimate reconstructions of ENSO[28–31] and AMO[41]. To compare the ENSO series, we identified El Niño events in the historical Niño 3.4 index as periods of five consecutive overlapping 3-month windows at or above +0.5 °C, and as years with anomalies of more than +0.5 °C in the palaeoclimate series. We then derived El Niño event frequencies using a 31-year moving window on each record, and we computed the mean of the historical and all palaeoclimate El Niño frequencies and bootstrapped 2σ confidence intervals using the *boot* function in RStudio. For the composite AMO series, we used the detrended historical AMO index[27] back to AD 1871, and then transitioned to a palaeoclimate AMO reconstruction[41] to AD 1572. We sampled this composite AMO index at the median age probability of the 20 palaeofloods that occurred between AD 1500–1800, and used these data to develop a linear model (using the *lm* function in RStudio) that relates peak discharge from the AMO index; the El Niño frequency timeseries was not a significant predictor of flood magnitudes, presumably because Pacific sea-surface temperatures do not control the inland flux of Gulf of Mexico moisture that triggers high-magnitude discharge events[15], so only the AMO index was used to statistically estimate flood magnitudes under 'climate-only' conditions. The AMO is detrended to remove recent warming of North Atlantic sea surface temperatures, so the 'climate-only' estimates of Q_{100} do not consider the potential effects of recent greenhouse warming on flood magnitudes—although we note that the inverse relationship between AMO and Mississippi River flood magnitudes implies that warming of North Atlantic sea-surface temperatures would act to suppress flood magnitudes. When evaluating the significance of Pearson correlations between climate and hydrological time-series that exhibited high degrees of serial autocorrelation, we estimated the effective degrees of freedom with the following relation[42]:

$$\nu_{\mathrm{eff}} = N(1-\varphi_x\varphi_y)/(1+\varphi_x\varphi_y) \quad (1)$$

where N is the number of independent samples, and φ_x and φ_y are the lag-1 autocorrelation coefficients of time series x and y respectively.

Flood hazard attribution. The magnitude of Q_{100} was estimated both empirically and through statistical modelling. The sedimentary palaeoflood archives record major flood events over periods greater than 100 years, and are suitable for estimating recurrence intervals empirically through the relation:

$$t_{\mathrm{r}} = (n+1)/m \quad (2)$$

where t_r is the recurrence interval (the inverse of t_r is the probability that the event magnitude will be exceeded in any one year), n is the number of years in the window being considered, and m is the number of recorded occurrences of the event being considered. The same approach was used to estimate Q_{100} in the statistically modelled 'climate-only' peak annual discharges derived from palaeoclimate and historical climate records. The instrumental record at the Vicksburg gauge provides a measurement for peak annual discharge in every year, but is relatively short, so the modern Q_{100} was estimated statistically by fitting a log Pearson type III distribution to the data set following standard protocols outlined by the United States Interagency Advisory Committee of Water Data[43] for instrumental hydrological data sets. We compared the observed Q_{100} baseline (AD 1500–1800) with the observed and 'climate-only' Q_{100} estimates for the modern period (AD 1897–2015) and attributed the proportion of the observed change that was not explained by the 'climate-only' estimates to human alterations to the river channel and basin. The modern Q_{100} estimated empirically from sedimentary records and the modern Q_{100} estimated by fitting a generalized extreme value distribution to the instrumental data both fall within the 1σ confidence intervals of the modern Q_{100} estimated by fitting a log Pearson type III to the instrumental record (see Supplementary Information), indicating that our findings are robust to different estimations of flood hazard.

Data availability statement. The datasets generated by this study are available as Supplementary Data.

Code availability. The R code used to produce the figures in this paper is available from the corresponding author on reasonable request.

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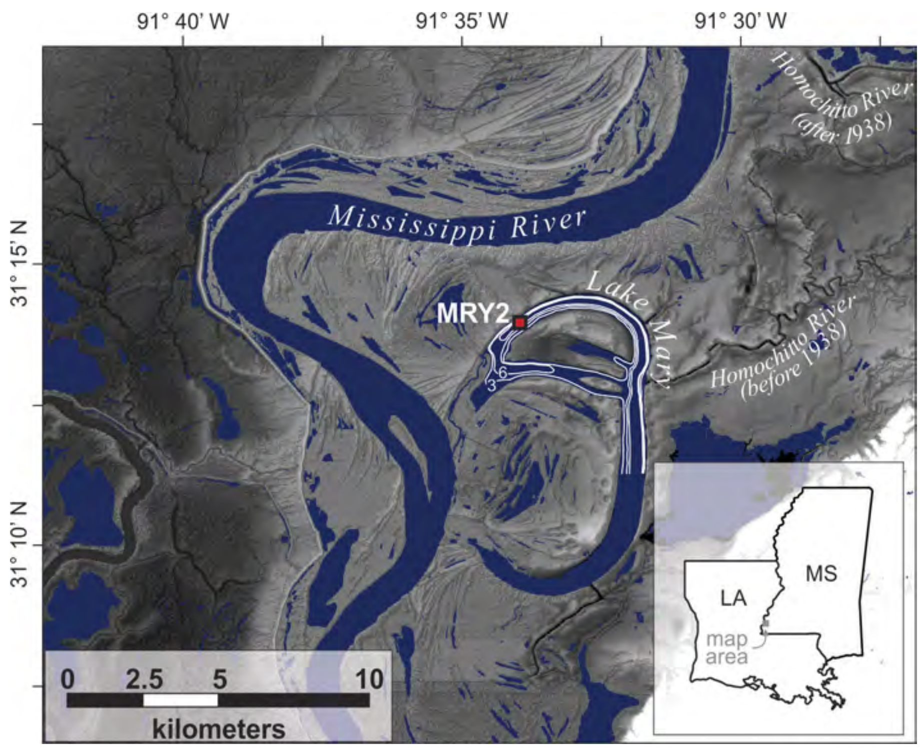
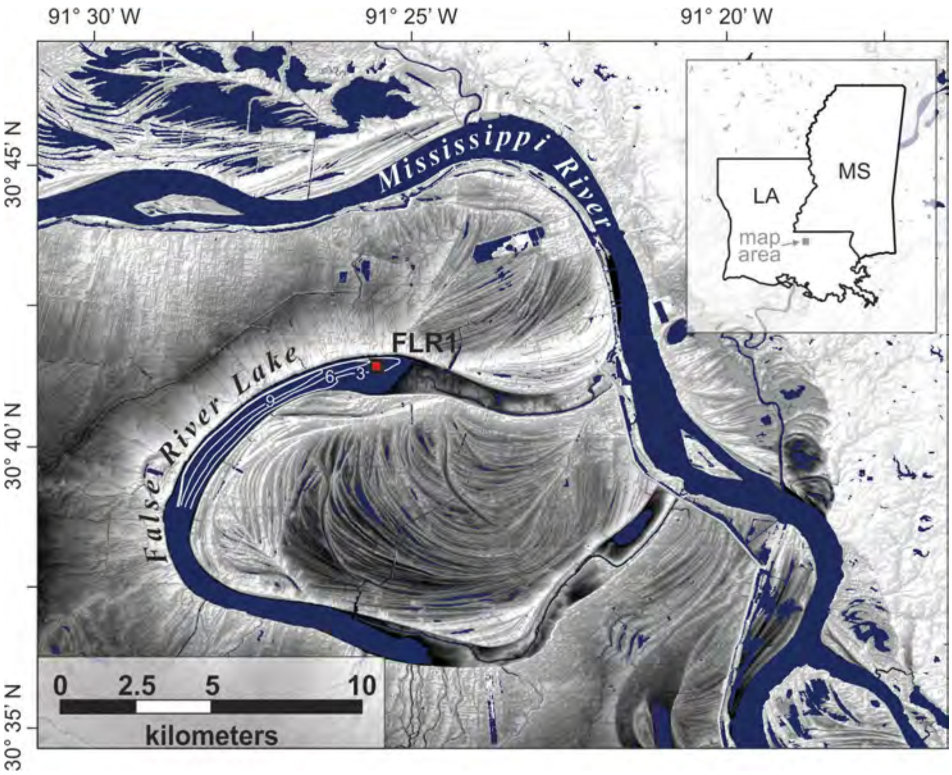
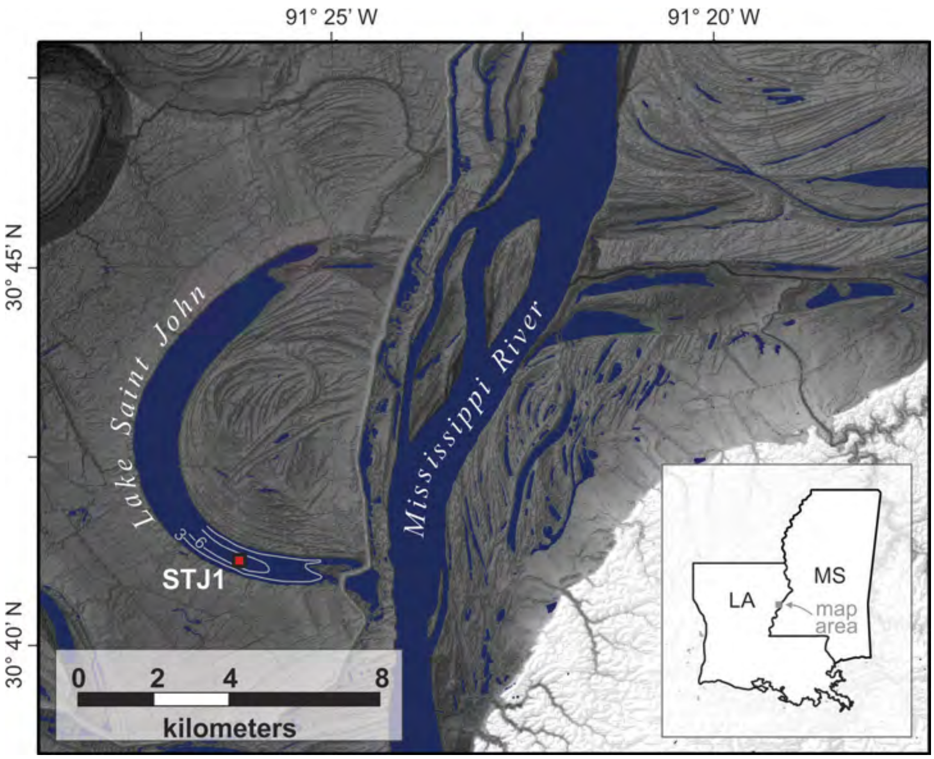


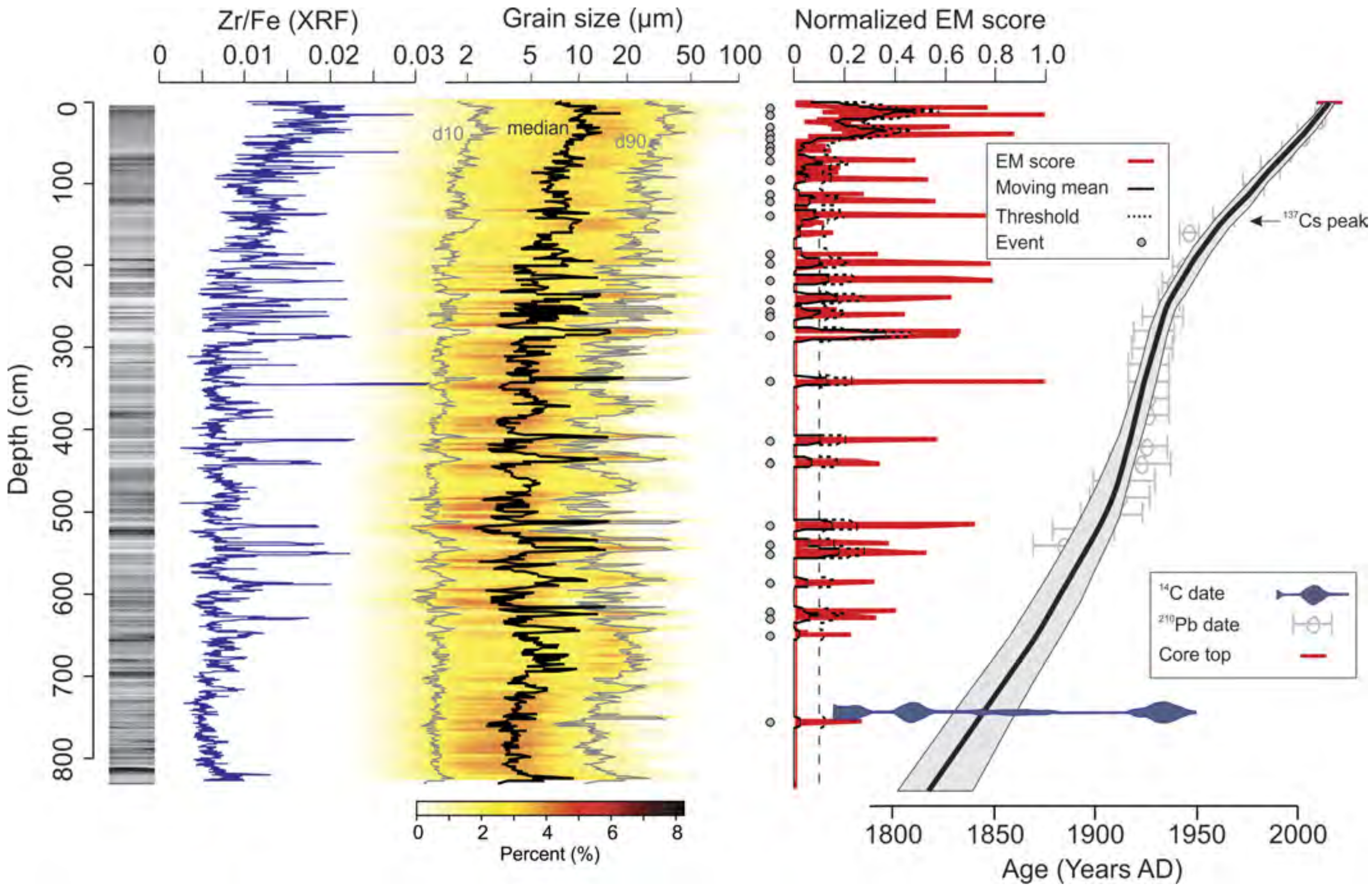
Extended Data Figure 1 | Location of Lake Mary, Mississippi (MRY) and sediment core (MRY2) used in this study. Lake Mary is an oxbow lake that formed via neck cut-off of the lower Mississippi River in AD 1776[20] and is situated inside the modern floodway such that it continues to be inundated during overbank floods. Bathymetric contours (white) given in metres. Shaded relief shows relative topographic lows (dark shades) and highs (light shades) according to the National Elevation Dataset[25].



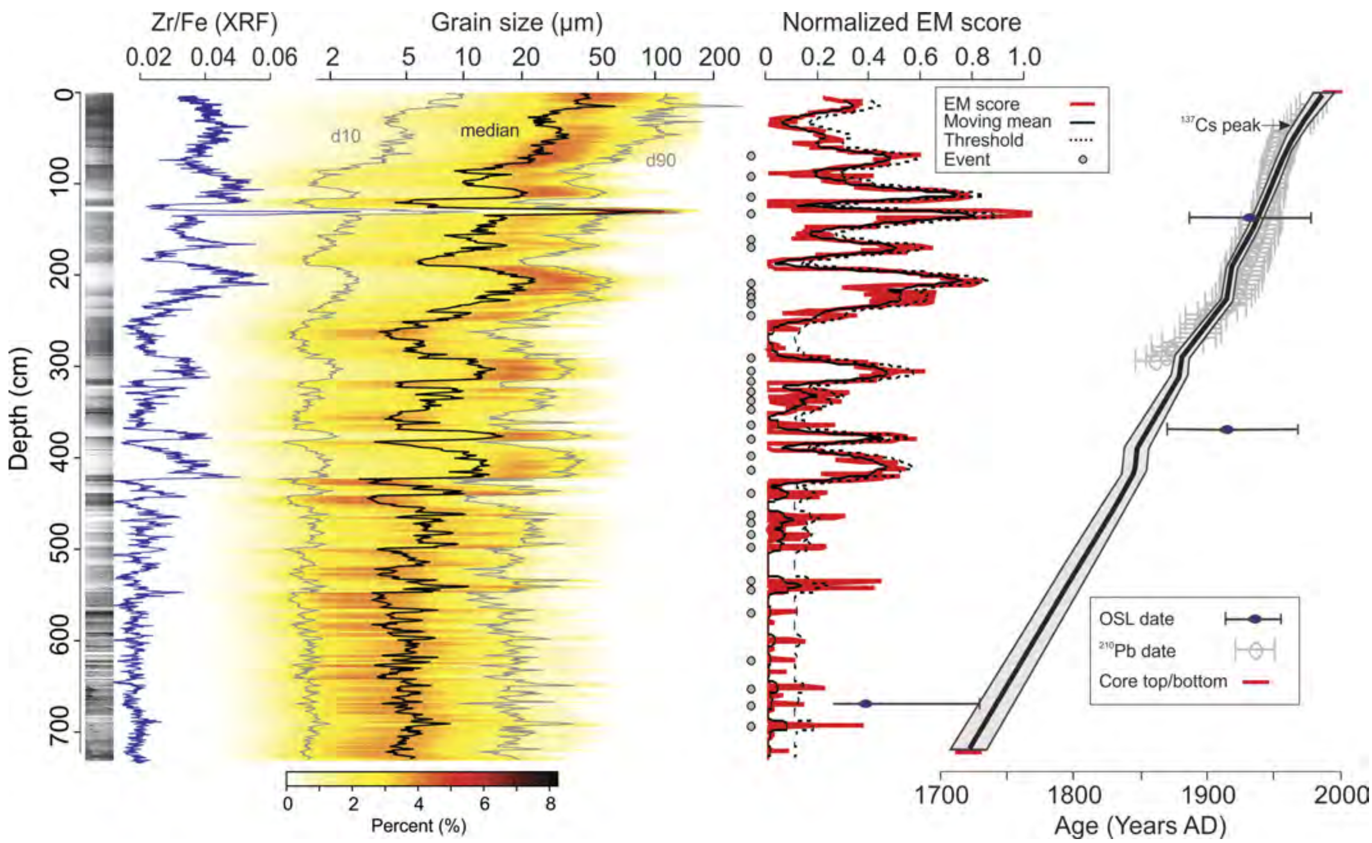
Extended Data Figure 2 | Location of False River Lake, Louisiana, and sediment core (FLR1) used in this study. False River Lake is an oxbow lake that formed via neck cut-off of the lower Mississippi River in AD 1722[20] and is situated outside the modern floodway. Bathymetric contours (white) given in metres. Shaded relief shows relative topographic lows (dark shades) and highs (light shades) according to the National Elevation Dataset[25].



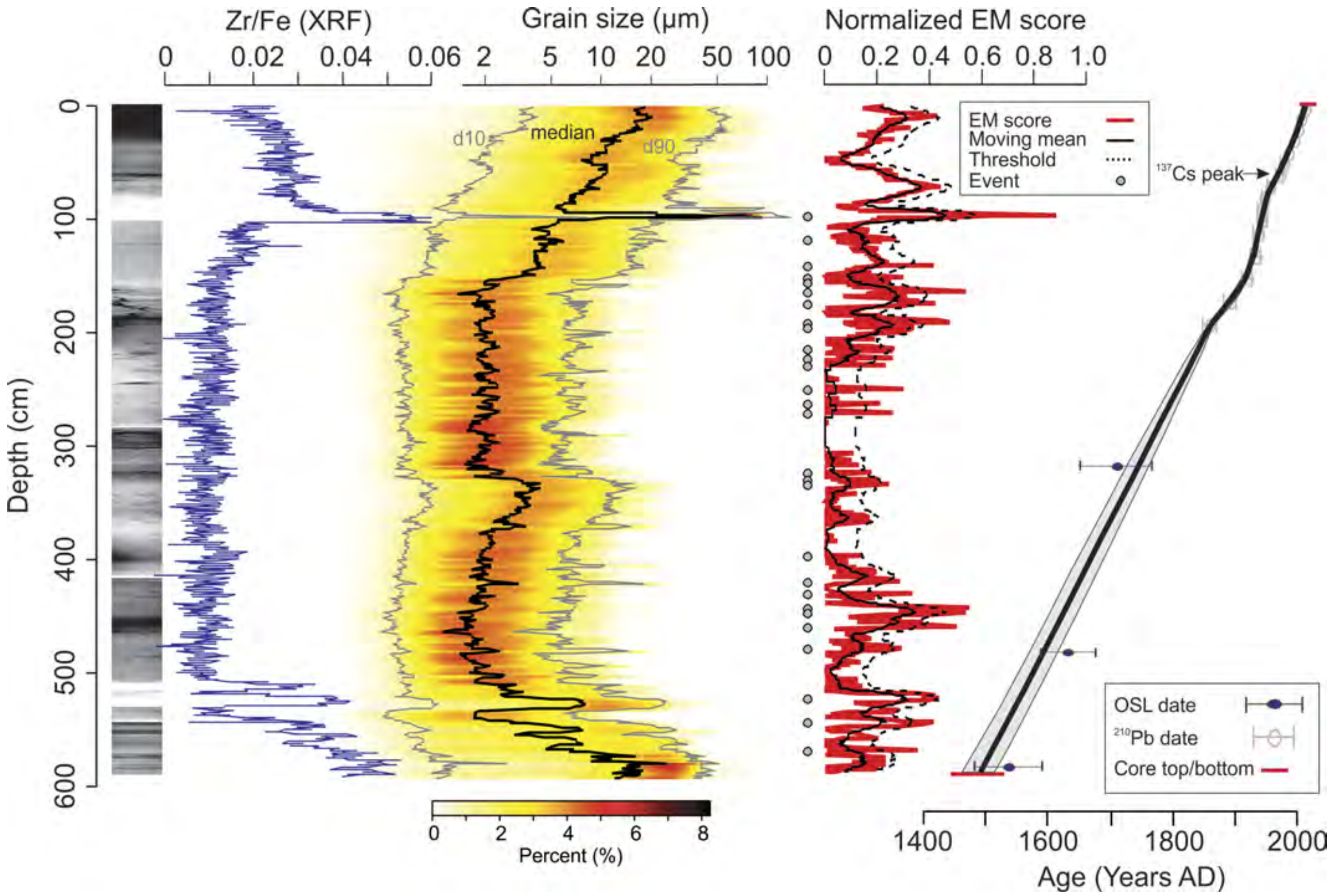
Extended Data Figure 3 | Location of Lake Saint John, Louisiana, and sediment core (STJ1) used in this study. Lake Saint John is an oxbow lake that formed via neck cut-off of the lower Mississippi River in about AD 1500[20] and is situated outside the modern floodway. Bathymetric contours (white) given in metres. Shaded relief shows relative topographic lows (dark shades) and highs (light shades) according to the National Elevation Dataset[25].



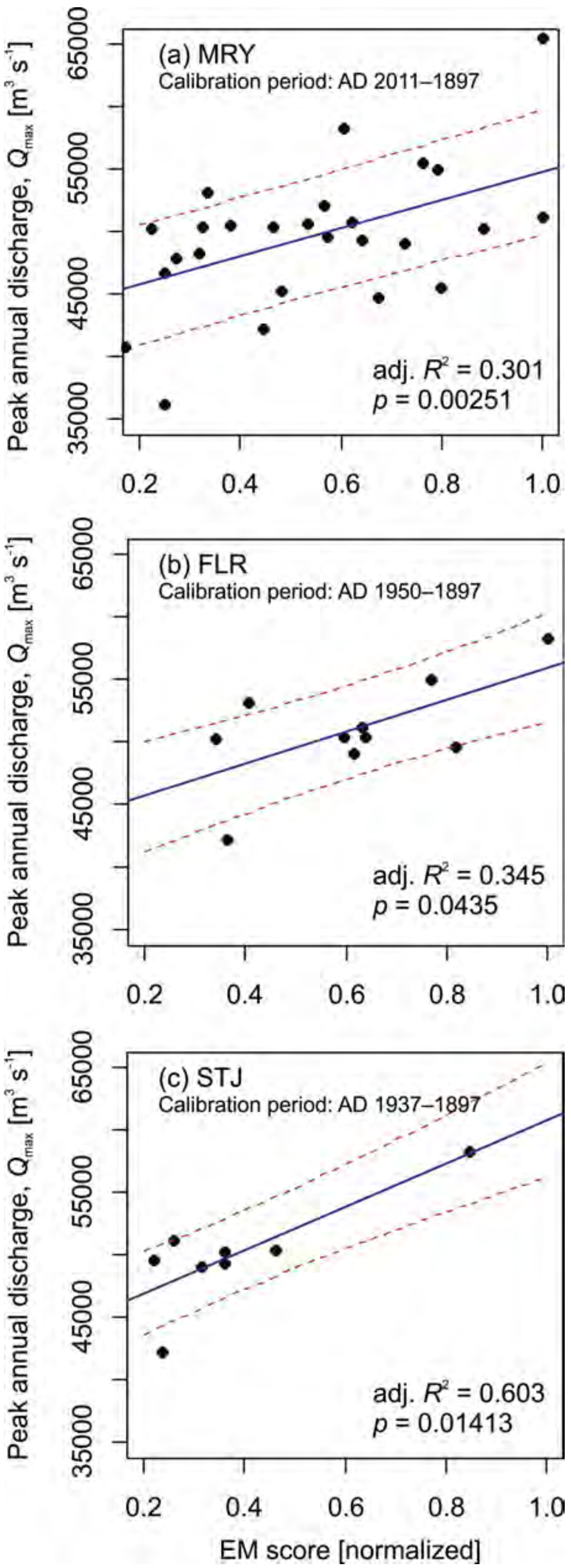
Extended Data Figure 4 | Radiography, bulk geochemistry, grain size and chronology of core MRY2. The age–depth model at right shows the median age probability (black line) and 1σ confidence intervals (grey shading), with 2σ confidence intervals on individual chronological controls.



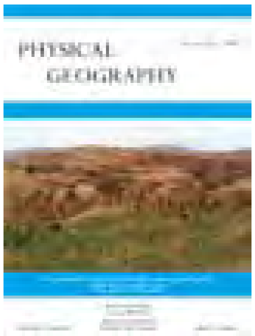
Extended Data Figure 5 | Radiography, bulk geochemistry, grain size and chronology of core FLR1. The age–depth model at right shows the median age probability (black line) and 1σ confidence intervals (grey shading), with 2σ confidence intervals on individual chronological controls.



Extended Data Figure 6 | Radiography, bulk geochemistry, grain size and chronology of core STJ1. The age–depth model at right shows the median age probability (black line) and 1σ confidence intervals (grey shading), with 2σ confidence intervals on individual chronological controls.



Extended Data Figure 7 | Relationships between peak annual discharge and normalized EM score for historical floods in sedimentary archives. Scatterplots and linear regressions with 1σ prediction intervals relating normalized EM score (a measure of grain size) to peak annual discharge of historical flood events for (**a**) MRY, (**b**) FLR and (**c**) STJ. Peak annual discharge estimates are from the Mississippi River gauging station at Vicksburg. Calibration periods vary owing to site-specific factors discussed in the Methods and Supplementary Information. adj., adjusted.



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Recent changes in channel morphology of a highly engineered alluvial river – the Lower Mississippi River

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ABSTRACT

Changes in channel morphology provide relevant insights into sediment transport and deposition in alluvial river systems. This study assessed three to four decades of morphological changes at seven locations along a 327-km reach of the Lower Mississippi River (LMR) to better understand channel adjustment processes of this large alluvial river. The assessment included analysis of three cross-sectional areas at each location during the period 1992–2013, as well as analysis of the changes in river stage and maximum surface slopes under four flow conditions over the last three to four decades . We found that the first 20–25 km LMR reach below its diversion to the Atchafalaya River and the reach from 80 to 140 km experienced significant riverbed aggradation, while the reach in between (i.e. from 20 to 80 km) experienced riverbed degradation. The lower 187-km reach (i.e. from 140 to 327 km) showed negligible sediment trapping. These findings may have relevant implications for management of river sediment diversions along the LMR and other large alluvial rivers in the world.

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River channel; specific river stage analysis; flow conditions; river surface slope change; Lower Mississippi River

Introduction

Alluvial rivers are well defined by constant interaction of flow, sediment transport, and channel morphology dynamics. Bathymetry of alluvial rivers can affect hydrodynamics, hence sediment transport and deposition, which, in turn, can change geomorphological properties of the river (Bridge, 1993; Merwade, 2009). Similarly, river stage, river surface slope, and discharge are three other important factors affecting riverbed dynamics over time. Therefore, changes in river stage and river surface slope over time within the same discharge regime can indicate riverbed adjustment, i.e. channel bed aggradation or channel erosion (Leopold & Wolman, 1957, 1970; Van Rijn, 1993). Previous studies have explored river bathymetry (Biedenharn, Thorne, & Watson, 2000; Harmar & Clifford, 2006; Harmar, Clifford, Thorne, & Biedenharn, 2005) and river stage and slope in specific discharge regimes separately (Biedenharn & Watson, 1997; Pinter, Ickes, Wlosinski, & Van der Ploeg, 2006; Wasklewicz, Grubaugh, Franklin, & Gruelich, 2004); however, there is still ambiguity over how these components interact to affect long term sediment transport and deposition in river systems. Such information can be especially useful for management of regulated rivers

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that are of great relevance to transportation, flood control, and sediment delivery to their deltaic plains.

The Lower Mississippi River (LMR), the lowermost 500-km reach of the Mississippi River, which starts from the Old River Control Structure (ORCS) and drains to the northern Gulf of Mexico, is one prominent example of rivers facing significant morphological changes pertaining to artificial interference along their channels. River engineering since the early 1900s, such as control and diversion structures, training dikes, spillways, levees, meander cutoffs, bank stabilization, and dredging, has led the LMR channel to be straightened and confined, with reductions to sediment supply and floodplain connectivity (Hudson, Middelkoop, & Stouthamer, 2008; Kesel, 2003; Meade & Moody, 2010; Mossa, 1996). These channel adjustments have played a significant role in the substantial land loss along the delta associated with the LMR, i.e. the Mississippi River Delta Plain (MRDP), from the last several decades (Couvillion et al., 2011; Craig, Turner, & Day, 1979; Gagliano, Meyer-Arendt, & Wicker, 1981; Meade & Moody, 2010). Several MRDP restoration projects focus on diverting LMR water carrying maximum amounts of sediment to coastal marshes for building lands (Coastal Protection and Restoration Authority of Louisiana [CPRA], 2012; Dean, Wells, Fernando, & Goodwin, 2013; Peyronnin et al., 2013). The United States Army Corps of Engineers (USACE) has constructed the West Bay sediment diversion and proposed two other sediment diversions in the lowermost river reach (~8–165 km upstream of Head of the Passes near the Gulf of Mexico) (CPRA, 2012). Sediment loads along the lowermost LMR reach have been destabilized by frequent channel dredging for navigation and large cargo transportation, and have maximum probable chances of disappearing into the deeper waters of the Gulf of Mexico. Therefore, there is an urgent need to determine potential sediment diversion sites along the upper and middle LMR reach (~65–450 km upstream of Head of the Passes). In-depth knowledge of the morphological changes pertaining to sediment transport and deposition mechanics along upper and middle LMR reaches can aid in identifying such sites.

In spite of their significance, the LMR morphological changes have only been well documented for the uppermost LMR reach (~365–500 km above Head of the Passes) (Harmar et al., 2005; Hudson & Kesel, 2000; Knox & Latrubesse, 2016) and remain poorly examined for the middle (165–365 km above Head of the Passes) and lower LMR (0–165 km above Head of the Passes) reaches. Harmar and Clifford (2006) investigated the whole length of the LMR channel (~1600-km long from Cairo, Illinois to Head of the Passes); however, their study focused only on channel shape. Also, these studies analyzed the LMR morphological changes using the river's bathymetry measurements over time and ignoring the spatiotemporal trends in river stages and their slopes in specific discharge regimes. Mossa (2013) used both bathymetric and river stage data to analyze hydrological changes in the Lower Old River, the river which connects the Mississippi, Atchafalaya, and Red Rivers. However, the bathymetric investigation in her study was not carried out at any site of the LMR and the river stage analysis only matched for two proximate sites in the uppermost LMR reach (Tarbert Landing and Red River Landing). Combined analysis of cross-sectional change and river stage and slope change at specific discharges can strengthen our understanding of morphological changes with respect to sediment transport and deposition along the LMR reach.

Previous studies have recognized several behavioral aspects of sediments and their grain-size fractions in the LMR, but less attention has been given to investigating sediment transport and deposition mechanics along the reach. Pereire, McCorquodale, Meselhe, Georgiou, and Allison (2009) and Nittrouer, Shaw, Lamb, and Mohrig (2012) estimated sediment transport rates at several sites in the upper and middle LMR, but without clear information about temporal sediment deposition and erosion mechanics along the reach. Allison et al. (2012) carried out a sediment budget investigation at four sites in the upper and middle LMR, but with a short-term data series (2008–2010). Rosen and Xu (2014) and Joshi and Xu (2015) analyzed long-term sediment and sand availability and flow-sediment and flow-sand relationships, respectively, but only for the uppermost location at Tarbert Landing (near ORCS). Furthermore, to the best of our knowledge, no peer-reviewed literature is available on how long-term changes in river bathymetry and in river stages and maximum river surface slopes pertaining to specific flow conditions can synchronously relate to morphological changes along the LMR reach downstream.

This study analyzes multi-decadal changes in river channel morphology and in river stages and maximum river surface slopes under equal flow conditions at seven locations in the upper and middle LMR reaches, from Tarbert Landing to Carrollton. Such an assessment can aid in understanding sediment routing downstream, differentiating between sediment erosion and deposition mechanics along the reach, and further distinguishing potential sediment diversion sites based on maximum sediment availability. The specific objectives of this study include: (1) assessing decadal changes in cross-sectional areas of river bed profiles at six locations covering the upper and middle LMR reaches, (2) analyzing long-term trends in average annual river stages pertaining to specific flow conditions ranging from low to high at the selected locations, and (3) investigating long-term river surface slope trends (for consecutive sites) pertaining to maximum annual river stages in each of the aforementioned flow conditions. The primary goal of the study is to determine the long-term riverbed adjustment (i.e. erosion and deposition) at each selected location to elucidate sediment transport and transformation patterns in this large, highly engineered alluvial river. Therefore, the information gained from this study may have implications for riverine sediment management, channel engineering, and coastal land restoration in the world's other sinking deltas fed by alluvial rivers.

Methods

Study site selection

The area of focus for this study is the LMR, which stretches from its diversion structure, the ORCS, over 500 km downstream to its outlet of the Gulf of Mexico (Figure 1). Over the last four decades (1973–2013), daily discharge (Q_d) below the ORCS at Tarbert Landing averaged 15,027 cubic meters per second (cms), varying from 3143 to 45,844 cms (Joshi & Xu, 2015). Average Q_d during high water months in the LMR is approximately three times more than average Q_d during low water months (Meade, 1995; Rosen & Xu, 2013). In terms of sediment transport, the LMR at Tarbert Landing discharged an average annual load of 127 megatonnes (MT) of total suspended solids during 1980–2010 (Rosen & Xu, 2014), while an average annual load of 27 MT of sand particles at this site has been reported for 1973–2013 (Joshi & Xu, 2015).

In this study, we selected seven locations along the LMR over a distance of 327 km for comprehensive assessment of bathymetric and river stage changes. These locations included: Tarbert Landing (TBL) at river kilometer (rk) 492.8, Red River Landing (RRL) at rk 486.5,

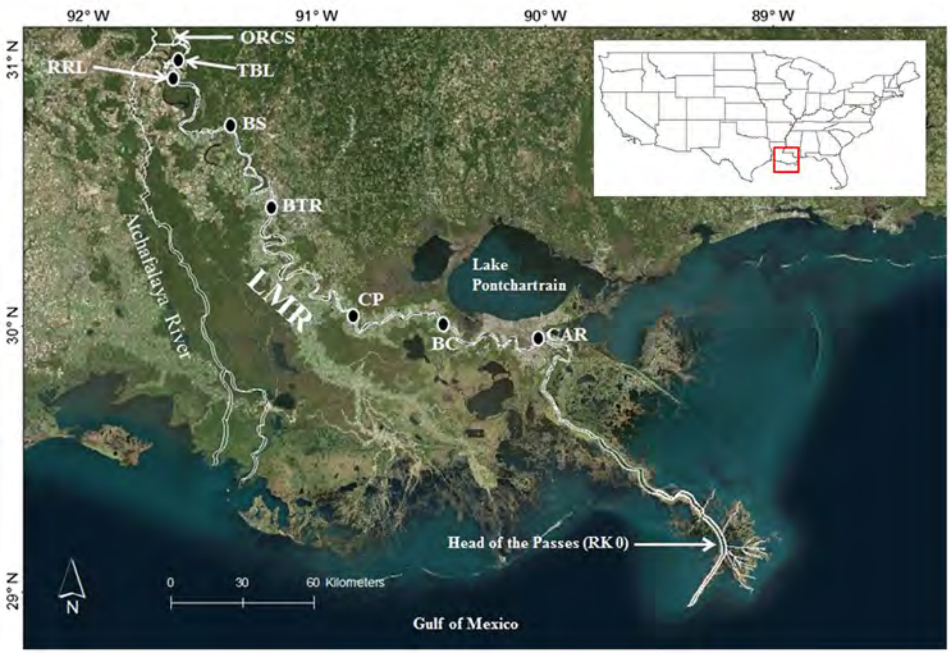


Figure 1. Locations of seven study sites along the Lower Mississippi River (LMR) from Tarbert Landing (near Old River Control Structure (ORCS)) to Carrollton (New Orleans). This figure was modified from the world imagery base map made publically available by Esri (Source: Digital Globe, Earthstar Grographics, CNES/Airbus DS, GeoEye, USDA-FSA, USGS, Getmapping, Aerogrip, IGN, IGP, and the GIS user community). Notes: All study sites have been systematically annotated from upstream to downstream along the LMR reach as: TBL – Tarbert Landing (at river kilometers (rk) 492.8); RRL – Red River Landing (at rk 486.5); BS – Bayou Sara (at rk 427); BTR – Baton Rouge (at rk 367.5); CP – College Point (at rk 253.3); BC – Bonnet Carre (at rk 204.2); and CAR – Carrollton (at rk 165.4). Head of the Passes at rk 0 represents the LMR's outlet to the Gulf of Mexico.

Bayou Sara (BS) at rk 427, Baton Rouge (BTR) at rk 367.5, College Point (CP) at rk 253.3, Bonnet Carre (BC) at rk 204.2, and Carrollton (CAR) at rk 165.4 (Figure 1). USACE has daily river stage measurements for at least 20 years at these locations from Red River Landing to Carrollton; however, only a few years of river stage measurements are available for locations below Carrollton. The 160-km reach below Carrollton is the lowermost end of the LMR, which has experienced frequent channel dredging and revetments for large cargo transportation, complicating sediment transport assessment. Hence, that reach was excluded in this study.

Data collection

For bathymetric analysis, we selected three cross-sectional (CS) measurements conducted by USACE in 1992, 2004, and 2013, each at six of the seven locations (except Red River Landing) described above. USACE used single-beam fathometer and multibeam side-scan sonar to measure cross sections while developing hydrographic survey maps for the Mississippi River (during these years) from Black Hawk, Louisiana (rk 521.4, just above the ORCS) to the river's Gulf Outlet at Head of Passes (rk 0). Each cross-section consisted of tagline riverbed elevation measurements in a distance of 30 m across the river. All elevations in the LMR during 2004 and 2013 were recorded with reference to the North American Vertical Datum of 1988 (NAVD 88), while elevations in 1992 were recorded with reference to the National Geodetic Vertical Datum of 1929 (NGVD 29). Therefore, we converted the 1992 survey data to NAVD 88 using corresponding reference conversion factors at each location provided by USACE. We excluded Red River Landing because of its close proximity to Tarbert Landing (~5 km) and used CSs at Tarbert Landing to represent bathymetric and areal changes near ORCS.

For river stage analysis in specific discharge conditions, we collected daily discharge records (Q_d) at Tarbert Landing and daily river stage records (RS_d) at Red River Landing, Bayou Sara, Baton Rouge, College Point, Bonnet Carre, and Carrollton for corresponding available periods (Red River Landing and Baton Rouge: 1987–2015; Tarbert Landing, Bayou Sara, and College Point: 1973–2015; Bonnet Carre: 1989–2015, and Carrollton: 1986–2015) from USACE. It is noted that during these four decades of Q_d and RS_d records (1973–2015), the LMR experienced high magnitude spring floods in 1973 and 2011, and a summer flood in 1993.

No long-term discharge measurements are available for the sites downstream of Tarbert Landing. Based on USACE's velocity observations across several river-stage ranges (from low to high) at Tarbert Landing (average surface velocity of 2.88 km/hr at a stage of 1.52 m, to 8.32 km/hr at a stage of 18.29 m) and Baton Rouge (average surface velocity of 1.92 km/hr at a stage of 0.61 m to 8.8 km/hr at a stage of 12.12 m), we deduced that the LMR flows from Tarbert Landing to Carrollton between 24 and 36 hrs. Therefore, we used discharge measurements at Tarbert Landing to analyze corresponding river stages for same days at all other locations downstream of Tarbert Landing.

Bathymetric and specific river stage analyzes

The cross-sectional area of a given transverse river bed profile was calculated as the sum of areas of all sub cross sections between two opposite top bank elevations of the profile (Figure 2). River bed elevations in the profile (depth) multiplied with the distance between their measurement points (breadth = 30 m, see Section "Data collection") gave the areas of all sub cross sections (Figure 2). Also, the two opposite top-bank elevations in each profile were defined by water surface lines marked by USACE (Figure 2). In each profile, a few points had variable elevations above mean sea level. Therefore, we subtracted all elevations from a single benchmark elevation higher than and nearest to the highest elevation of the profile during 1992, 2004, and 2013 to get a unified reference point for calculating all areas in the profile. Changes in areas of all corresponding cross-sections from 1992 to 2004 and 2004 to 2013 were determined to discern decadal trends of the river channel and bed sediment dynamics. Cross sections with decreased areas from 1992 to 2013 indicate bed sediment accumulation, while those with increased areas suggest bed erosion. For this analysis, we kept a prerequisite of ± 5% change in area as noticeable change. Thus, sites with a cross-sectional area decrease >5% were identified to have noticeable sediment accumulation, and the sites with an area increase >5% were identified as having noticeable bed erosion. Sites with changes in between 5% areal decrease and increase were identified as having no change. During the period 1992–2013, the LMR's stage at Red River Landing was lower than the flood stage provided by National Weather Service (14.6 m) for 1992, 1999, 2005, 2006, and 2012. The river stage was above 14.6 m for fewer than 50 days each year for 8 years during this period. Furthermore, the river stage was above 14.6 m for more than 50 but fewer than 75 days each year for 8 of the remaining 9 years. In 2011 only, the river stage stayed above

Figure 2. Screenshot from the LMR *Hydrographic Survey Book* of 2013 (USACE, 2013) showing schematics of three cross sections at Tarbert Landing.
Notes: "Water Lines" in red represent the black dashed water surface lines marked by USACE to denote the top bank elevations for both ends of the cross section. Elevations of the cross sections measured are shown next to the blue line. Elevations in the *Hydrographic Survey Book* are in feet and have been converted to meters for this study.

14.6 m for as much as 87 days. Based on these trends, we hypothesize that the annual flood cycle in LMR did not significantly affect the changes in cross sections.

We examined long-term trends in daily river stages of all locations below Tarbert Landing based on the following four selected flows at Tarbert Landing: 10,000 Q_d representing for $9000 \leq Q \leq 11{,}000$ cms (29th to 40th percentile of total flow in the LMR during 1973–2015), 15,000 Q_d for $14{,}000 \leq Q \leq 16{,}000$ cms (53rd to 60th percentile of the total flow), 20,000 for $19{,}000 \leq Q \leq 21{,}000$ cms (70th to 77th percentile of the total flow), and 25,000 cms for $24{,}000 \leq Q \leq 26{,}000$ cms (85th to 90th percentile of the total flow). These flows covered low-to-high percentages of the LMR discharge during 1973 to 2015 and 1986/1987/1989 to 2015, and their ranges were selected according to ±5–10% bin width criteria given by Turnipseed and Sauer (2010). The percentage occurrence of these flows were calculated for the two periods, 1973–2015 and 1986–2015, because river stage data for specific discharge analysis were available from 1973 at Bayou Sara and College Point and from 1986/1987/1989 at the other sites. Trends in RS_ds over time in the four Q_d types were analyzed by fitting a linear trendline between RS_d (y) (dependent variable) and date (x) (independent variable). Temporal autocorrelation was checked by the Durbin–Watson test (Durbin & Watson, 1950, 1951, 1971). An autoregressive model with 1-day lag in each dependent variable was applied for RS_ds with significant temporal autocorrelation (Farebrother, 1980; Krämer, 2011). Finally, RS_d trends were determined by following three ranges of p-values obtained from the RS_d-date regression model within each flow type at all locations, a criterion used in several studies (Little & Biedenharn, 2014; Pinter et al., 2006; Watson & Biedenharn, 2009):

(1) No significant trend if $p > 0.1$, which means RS_ds did not change with time.
(2) Significant trend if $p < 0.01$, which means RS_ds changed with time (RS_ds decreased if mean annual RS_d of starting year < mean annual RS_d of ending year and increased if mean annual RS_d of starting year > mean annual RS_d of ending year).
(3) Inconclusive trend if $0.01 < p < 0.1$, which means the RS_d trends with time could not be determined clearly.

RS_d trends were also analyzed by comparing the percentage difference between mean annual *RS*s of starting and ending years in each Q_d type at all locations below Tarbert Landing. For all Q_d types in all locations, mean annual *RS* had an increasing trend if the percentage difference was more than +5%, a decreasing trend if the difference was less than −5%, while an insignificant trend if the difference was between +5 and −5% (Error Range = ±5%). Finally, locations with sediment accumulation (increasing trend in *RS*) were distinguished from locations with sediment erosion (decreasing trend in *RS*).

Slopes of maximum annual river stages of all discharge types

River surface slope between two consecutive sites downstream of a river is the difference between maximum annual *RS* in both sites divided by the length of the reach between the sites (Biedenharn et al., 2000). For this study, we analyzed the change in slopes of maximum annual *RS*s between the LMR sites, i.e. from Red River Landing to Bayou Sara, Bayou Sara to Baton Rouge, Baton Rouge to College Point, College Point to Bonnet Carre, and Bonnet Carre to Carrollton, for all Q_d types. Trends in yearly slope in maximum annual *RS*s of the four Q_d types were checked by fitting a trendline between annual slope (y) (dependent variable) and year (x) (independent variable). Criteria used for determining trends in slope were exactly same as those of specific river stage analysis, i.e. the three ranges of p values obtained from the annual slope-year model had exactly the same interpertation as those obtained from the daily river stage-date model. Finally, locations downstream from Tarbert Landing were checked with sediment accumulation (decreasing trend in slope) or sediment erosion (increasing trend in slope).

Results

Channel morphological changes

The net and percentage changes in all cross sections (CS) from 1992 to 2004 and 2004 to 2013 at the six study locations along the LMR have been shown as cross-sectional plots in Figure 3 and documented in Table 1. Over these three decades, areas of the first and third cross sections (CS I and III) at Tarbert Landing observed a continuous decrease of 14 and 12%, respectively, from 1992 to 2013. However, CS II decreased by 10% during the first decade (1992–2004) and increased by a negligible 2% during the second decade (2004–2013), balancing up to a decrease of 8% during 1992–2013. At Bayou Sara, the next station downstream, areas of CSs I and II increased continuously by 8 and 7%, respectively, from 1992 to 2013. However, CS III at Bayou Sara had a negligible alternate change in area

Table 1. Comparison of net and percentage changes in cross-sectional areas (CSA) at six locations along the LMR (in the order of distance from upstream to downstream): Tarbert Landing (TBL), Bayou Sara (BS), Baton Rouge (BTR), College Point (CP), Bonnet Carre (BC) and Carrollton (CAR).

		CSA (m^2)			Net-change in CSA (m^2)			% change in CSA			
Station	CS [BE (m)]	1992	2004	2013	1992–2004	2004–2013	1992–2013	1992–2004	2004–2013	1992–2013	Overall change from 1992–2013
TBL	I (4)	5051	4969.2	4402.3	−381.8	−266.9	−648.7	−8 (−)	−6 (−)	−14 (−)	
	II (6)	6839.4	7190.6	7199.9	−748.7	109.2	−639.5	−10 (−)	2 (0)	−8 (−)	
	III (4)	5076.7	5305.3	4896.6	−328.6	−280.1	−608.7	−6 (−)	−6 (−)	−12 (−)	Decrease
BS	I (6)	10,028.6	10,498.6	10,718.1	470	219.5	689.5	6 (+)	2 (+)	8 (+)	
	II (4)	7447.1	7861.4	7923.9	414.2	62.6	476.8	6 (+)	1 (0)	7 (+)	
	III (6)	9968.4	10,446.6	10,001.3	478.2	−445.3	32.9	5 (+)	−4 (0)	1 (0)	Increase
BTR	I (8)	16,296.2	14,516.6	14,138.6	−1779.6	−378	−2157.6	−11 (−)	−3 (0)	−14 (−)	
	II (10)	17,022.1	17,322.9	16,210.5	300.8	−1112.4	−811.6	−2 (0)	−6 (−)	−8 (−)	
	III (10)	15,660.3	15,466.8	15,763.6	−193.5	296.8	103.3	1 (0)	2 (0)	3 (0)	Decrease
CP	I (10)	18,586.3	18,513.2	19,016.1	−73.2	502.9	429.7	0 (0)	3 (0)	3 (0)	
	II (8)	16,825.5	16,997.4	17,692.4	171.9	694.9	866.8	1 (0)	4 (0)	5 (+)	
	III (10)	18,506.7	18,102.5	18,852.4	−404.2	749.8	345.6	−2 (0)	4 (0)	2 (0)	Insignificant
BC	I (6)	16,528.9	16,112	16,368.1	−417	256.1	−160.9	−3 (0)	2 (0)	1 (0)	
	II (8)	17,707.2	16,322.2	17,795.5	−1384.9	1473.3	88.4	−8 (0)	9 (0)	1 (0)	
	III (4)	15,373.2	14,743.2	15,447.3	−630	704.1	74.1	−4 (0)	5 (0)	1 (0)	Insignificant
CAR	I (8)	19,802.9	19,428	19,674.9	−374.9	246.9	−128	−2 (0)	1 (0)	−1 (0)	Insignificant
	II (4)	17,079.5	16,896.6	17,289.8	−182.9	393.2	210.3	−1 (0)	2 (0)	1 (0)	
	III (8)	20,123	19,720.6	20,132.1	−402.3	411.5	9.2	−1 (0)	2 (0)	1 (0)	

Notes: BE represents bench elevation for each Cross-Section (CS). CSs with "+" sign within parenthesis of their corresponding % CSA change had a clear increase in area, those with "−" sign had a clear decrease in area, while, those with "0" sign had no conclusive change in area (since the areal changes fell within the aforementioned error range of ±5%).

Table 2. Percentage occurrence of four discharge regimes at Tarbert Landing in two periods, from 1986 to 2015 and 1973 to 2015.

Discharge Regimes (cms)	% occurrence (1986–2015)	% occurrence (1973–2015)
9000–11,000	71.4–60.65	70.96–60.31
14,000–16,000	47.4–40.83	46.98–41.21
19,000–21,000	29.61–23.4	30.1–23.65
24,000–26,000	14.21–9.81	15.03–10.59

Notes: These four discharge regimes were further used for specific river stage analysis. The percentage occurrence of discharge regimes was calculated for the given two periods to match the discharge data with corresponding years of river stage data at different locations (i.e. 1986–2015 at Red River Landing, Baton Rouge, Bonnet Carre and Carrollton and 1973–2013 at Bayou Sara and College Point).

during 1992–2013 (5% increase from 1992 to 2004 and 4% decrease from 2004 to 2013). At Baton Rouge, the next station downstream from Bayou Sara, areas of CS I and II decreased continuously by 14% and 8% respectively from 1992 to 2013. The change in area of CS III at Baton Rouge during 1992–2013 was also continuous, but negligible (1 and 2% increase during 1992–2004 and 2004–2013, respectively). The areal change (increase or decrease) in all but one CS at all stations further downstream from Baton Rouge was within the selected error range (±5%) both from 1992 to 2004 and from 2004 to 2013. The only CS with an areal change greater than the error range was CS II at Bonnet Carre from 1992 to 2004 (decrease of 8%) and from 2004 to 2013 (increase of 9%). However, these decadal changes balanced to a negligible areal change (1% decrease) at Bonnet Carre during 1992–2013. Of all study locations along the LMR, Tarbert Landing had the highest change (either increase or decrease) in total cross-sectional areas of selected cross sections during 1992–2013 (–34%), while the cross-sectional change at Carrollton was lowest (+1%).

Distribution of river stages in specific discharge regimes

The four selected discharge regimes represent a substantial range (from low to high) of daily discharge in the LMR over the last three to four decades. The lowest selected LMR discharge regime, between 9000 and 11,000 cms, accounted for approximately 71 to 61% of all discharge events during 1986–2015 and 71–60% during 1973–2015 (Table 2). Similarly, the highest selected regime, from 24,000 to 26,000 cms, accounted for about 14 to 10% of all discharge events during 1986–2015 and 15–11% of all events during 1973–2015 (Table 2). Other discharge ranges in between these lowest and highest selected flows varied between 47% (14,000 cms) and 23% (21,000 cms) during 1986–2015 and 47–24% during 1973–2015.

All maximum RS_ds and all but one minimum RS_ds within the four selected discharge ranges increased gradually from lowest (29th percentile) to highest (90th percentile) selected discharge ranges at each location (Figure 4). For only a single instance at Red River Landing, the minimum river stage in the 14,000–16,000 cms discharge regime (6.19 m) was lower than the minimum river stage in the 9000–11,000 cms discharge regime (6.90 m) (Figure 4). Also, all minimum and maximum river stages in the same discharge regimes decreased gradually from upstream (at Red River Landing) to downstream (at Carrollton), except that the minimum discharge at Bayou Sara in 14,000–16,000 cms (6.80 m) was higher than the minimum river stage at Red River Landing upstream under the similar flow regime (6.19 m) (Figure 4). Furthermore, the highest variability observed between intra-discharge maximum and minimum river stage along the LMR was for 14,000–16,000 cms flow range

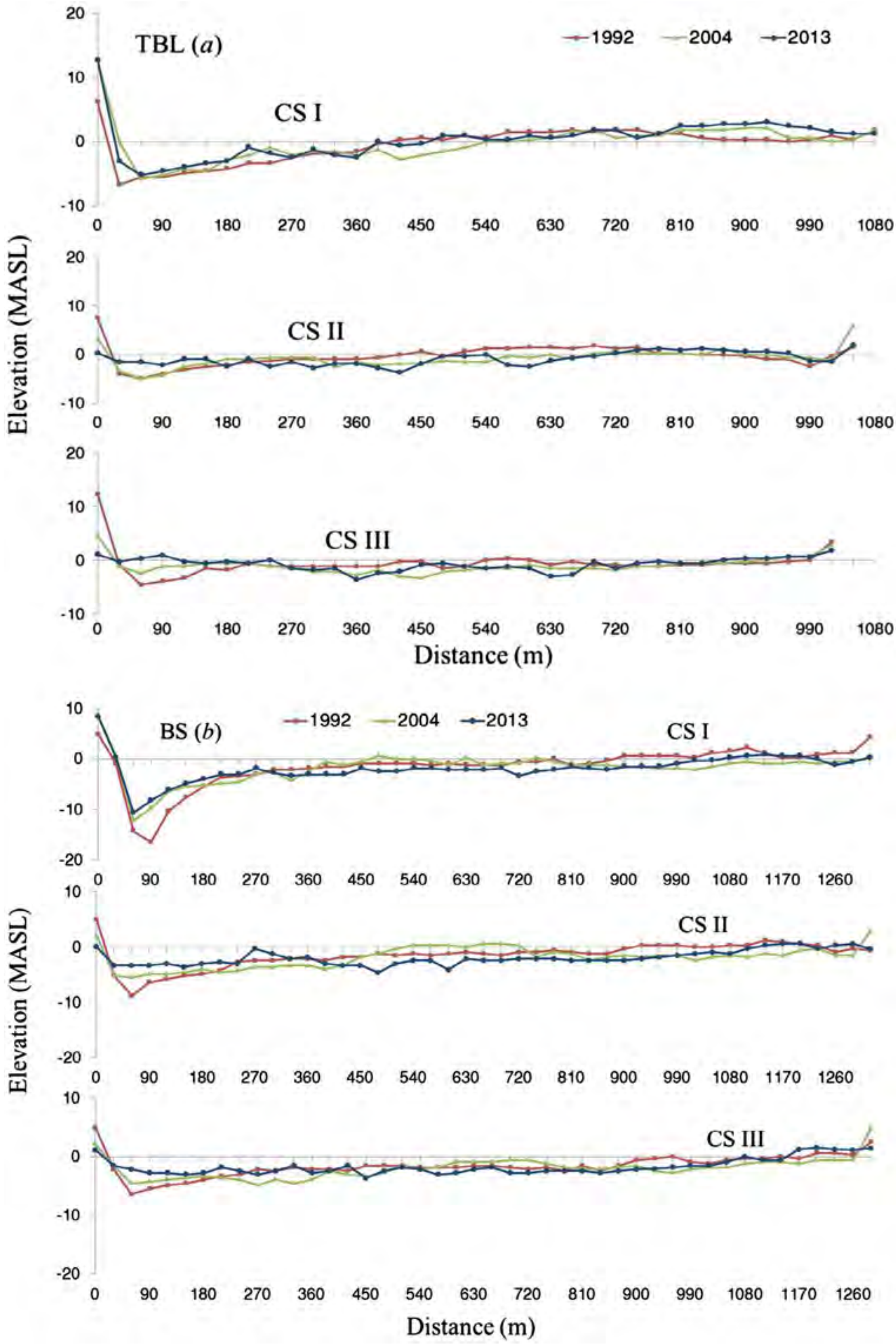
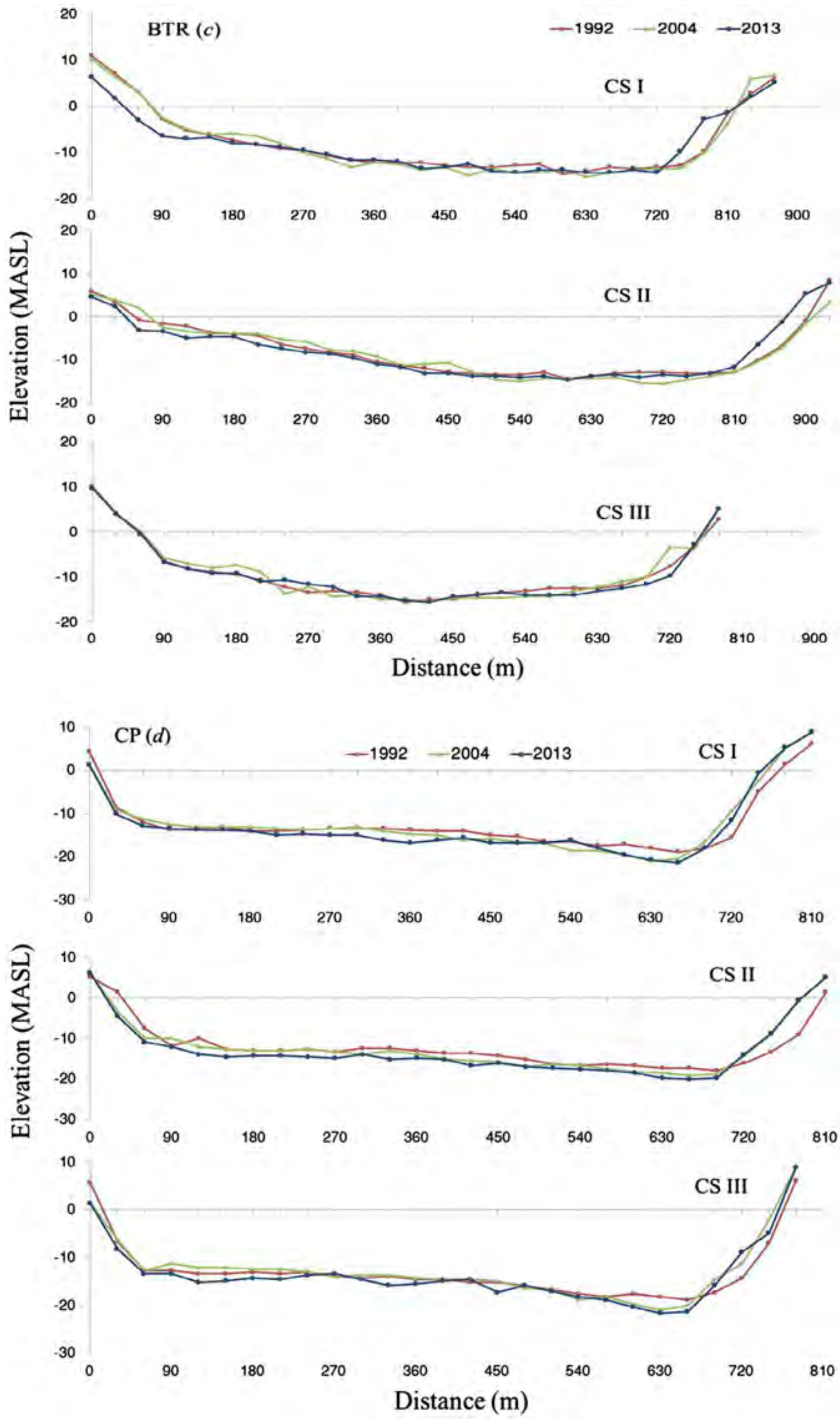


Figure 3. River channel cross sections (CS I, II, III) from six locations on the Lower Mississippi River in 1992, 2004, and 2013: (a) Tarbert Landing (TBL), (b) Bayou Sara (BS), (c) Baton Rouge (BTR), (d) College Point (CP), (e) Bonnet Carre (BC), and (f) Carrollton (CAR).



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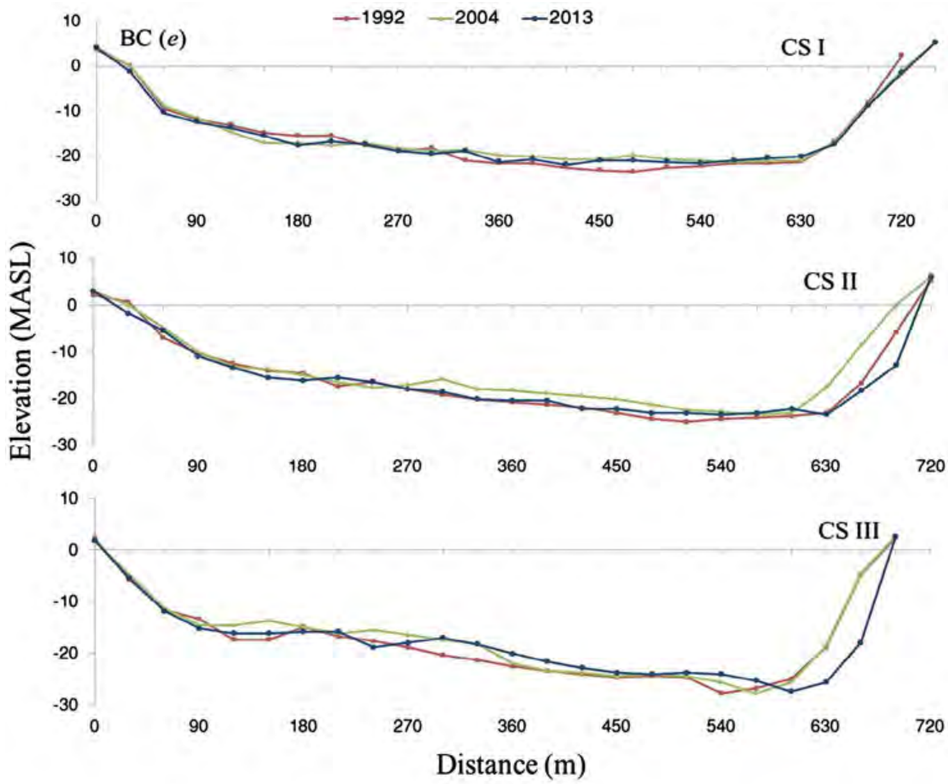

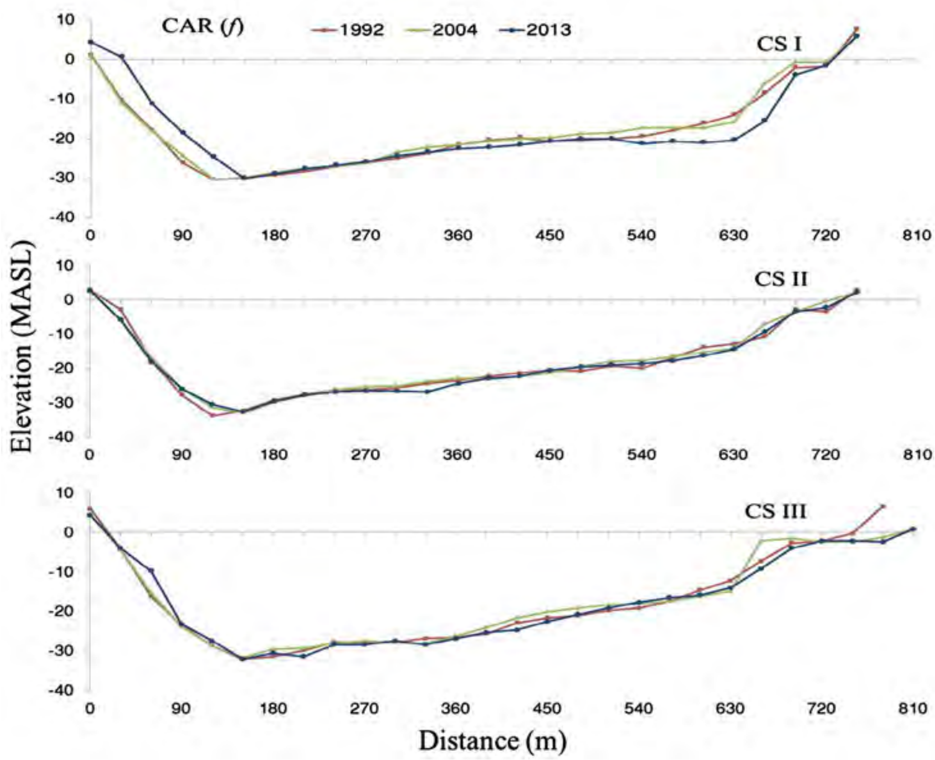

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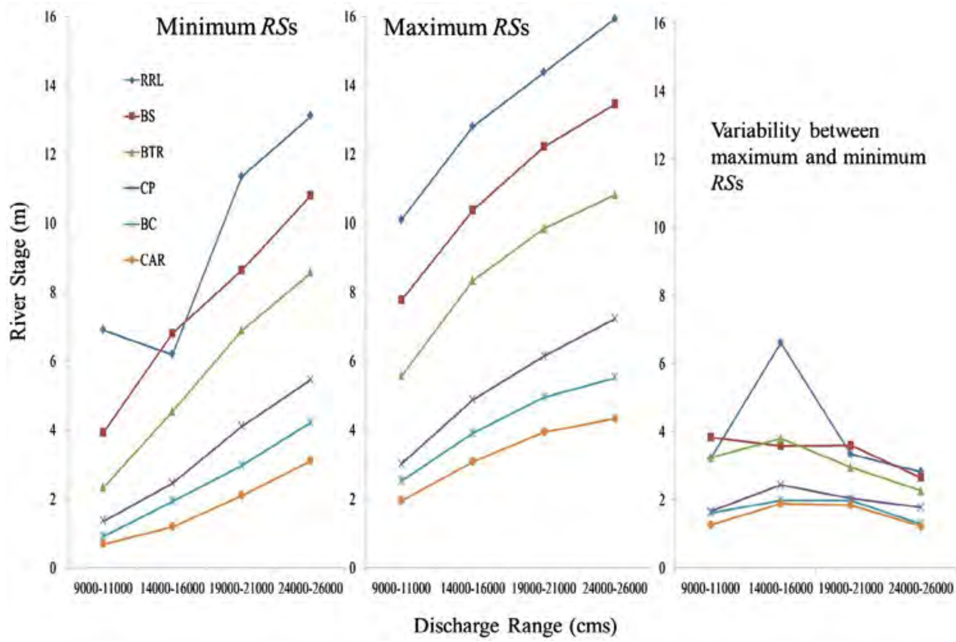


Figure 4. Minimum (left) and maximum (middle) river stages (RS) and variability between maximum and minimum RS (right) in the four selected discharge regimes at the following locations on the Lower Mississippi River and their corresponding periods o: Red River Landing (RRL, 1987–2015); Bayou Sara (BS, 1973–2015); Baton Rouge (BTR, 1987–2015); College Point (CP, 1973–2015); Bonnet Carre (BC, 1989–2015); and Carrollton (CAR, 1986–2015).

at Red River Landing (6.61 m), while the lowest variability was for 24,000–26,000 cms flow range at Carrollton (1.22 m). All other intra-discharge variabilities between maximum and minimum discharge had a low range from 1.26 m (for 9000–11,000 cms discharge at Carrollton during 1986–2015) to 3.83 m (for 9000–11,000 cms discharge at Bayou Sara during 1986–2015) (Figure 4). The intra-discharge variability in river stages generally decreased gradually from upstream to downstream locations (Figure 4).

Specific river stage changes

From 1987 to 2015, an increasing RS_d and mean annual RS trend was found in all Q_ds at Red River Landing ($p < 0.0001$ and % difference between mean annual RS of 1987 and 2015 = 11.5, 12.2, 12.8, and 10.9 for 10,000, 15,000, 20,000, and 25,000 cms Q_d types, respectively) and Baton Rouge ($p < 0.0001$ and % difference between mean annual RS of 1987 and 2015 = 13.9, 11.2, 13.5, and 15.1 for 10,000, 15,000, 20,000, and 25,000 cms Q_d types, respectively) (Figures 5(a), (c), 6; Table 3). However, Bayou Sara (the station between Red River Landing and Baton Rouge) showed a decreasing trend of RS_d and mean annual RS in two of the four Q_d types (1973–2015) (15,000 and 20,000 cms Q_d types: $p = 0.0047$ and < 0.0001 and % difference between mean annual RS of 1973 and 2015 = −13.4 and −8.6, respectively) (Figures 5(b), 6; Table 3). RS_d and mean annual RS at Bayou Sara had no significant trend in 10,000 cms flow ($p = 0.19$ and % difference between mean annual RS of 1973 and 2015 = 2.9) (Figures 5(b), 8; Table 2), while, trend could not be concluded

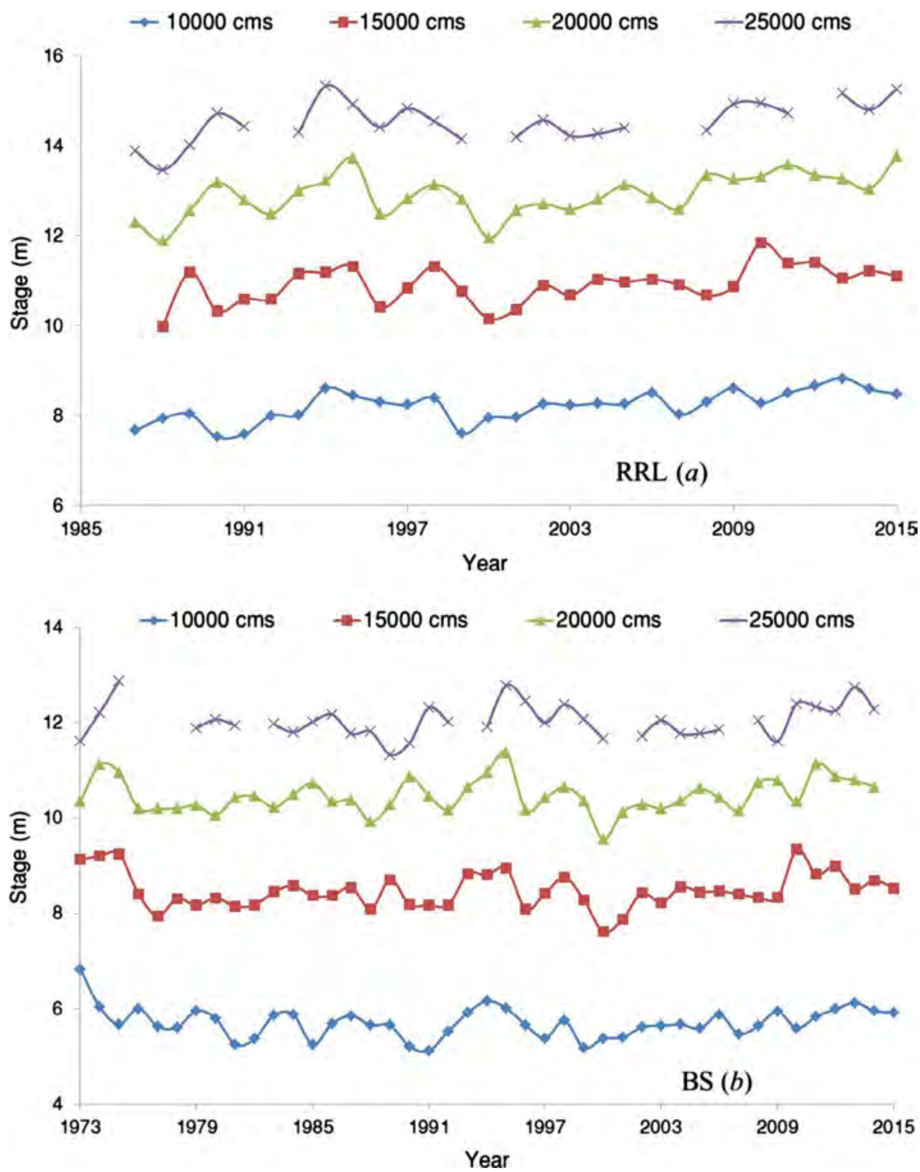
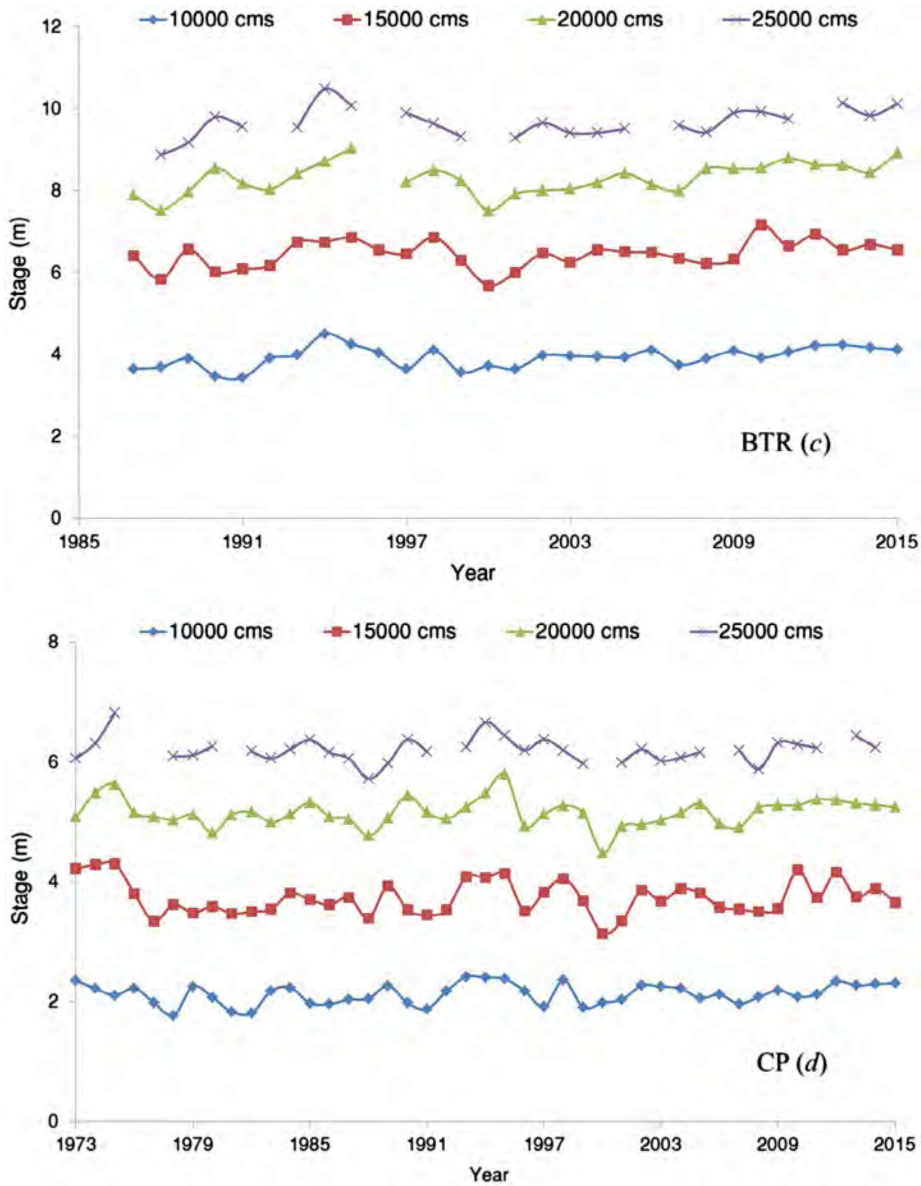


Figure 5. Trends in mean annual *RS*s of four Q_d types at (a) Red River Landing (RRL), (b) Bayou Sara (BS), (c) Baton Rouge (BTR), (d) College Point (CP), (e) Bonnet Carre (BC), and (f) Carrollton (CAR) on the Lower Mississippi River.

for the 25,000 cms flow ($p = 0.0123$ and % difference between mean annual RS of 1973 and 2015 = 2.9) (Figures 5(b), 6; Table 3).

No clear trend in RS was found for all other sites further downstream from Baton Rouge (Figures 5(d)–(f), and 6, Table 3). RS_ds and mean annual *RS*s further downstream from Baton Rouge had a decreasing trend only in one Q_d type at College Point (1973–2015) (15,000 cms flow: $p < 0.0001$ and % difference between mean annual *RS*s of 1973 and 2015 = -13.4) (Figures 5(d), 6; Table 3), and two Q_d types at Bonnet Carre (1989–2015) (10,000 and 15,000 cms flow: $p = 0.008$ and 0.014 and % difference between mean annual *RS*s of 1989 and 2015 = −6.8 and −7.3 respectively) (Figures 5(e), 6; Table 3). RS_ds and



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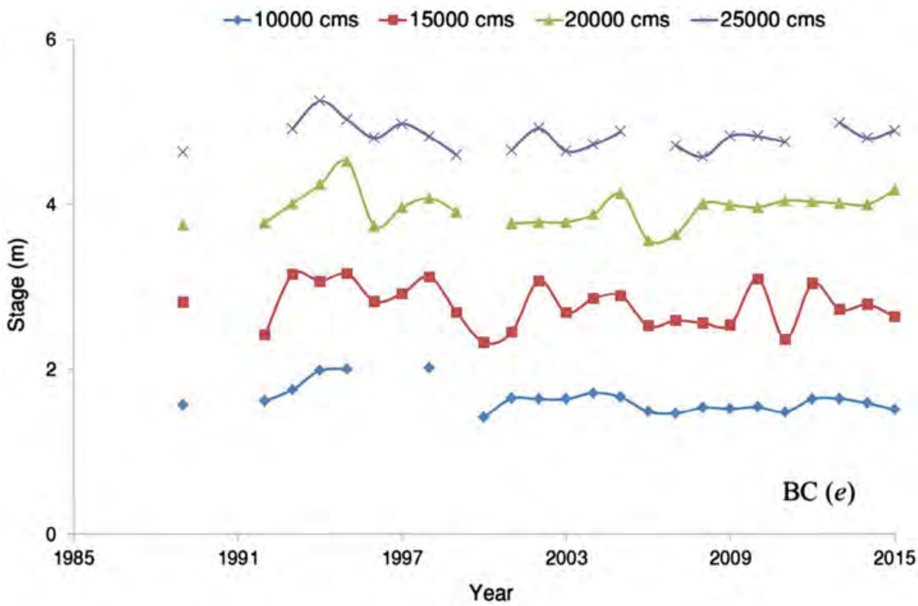
mean annual *RS*s of all other Q_d types at all other locations had insignificant trends in six instances (25,000 cms flow at College Point, 20,000 cms flow at Bonnet Carre and all flows at Carrollton) and inconclusive trends in two instances (20,000 cms flow at College Point and 25,000 cms flow at Bonnet Carre) (Figures 5(d)–(f), 8; Table 3).

River stage slope changes

Significant long-term river surface slope trends between maximum annual *RS*s of all Q_ds were observed only at upper consecutive sites of LMR (Red River Landing-Bayou Sara and Bayou Sara-Baton Rouge), while, the lower consecutive sites (Baton Rouge-College Point, College Point-Bonnet Carre, Bonnet Carre-Carrollton) all had either insignificant



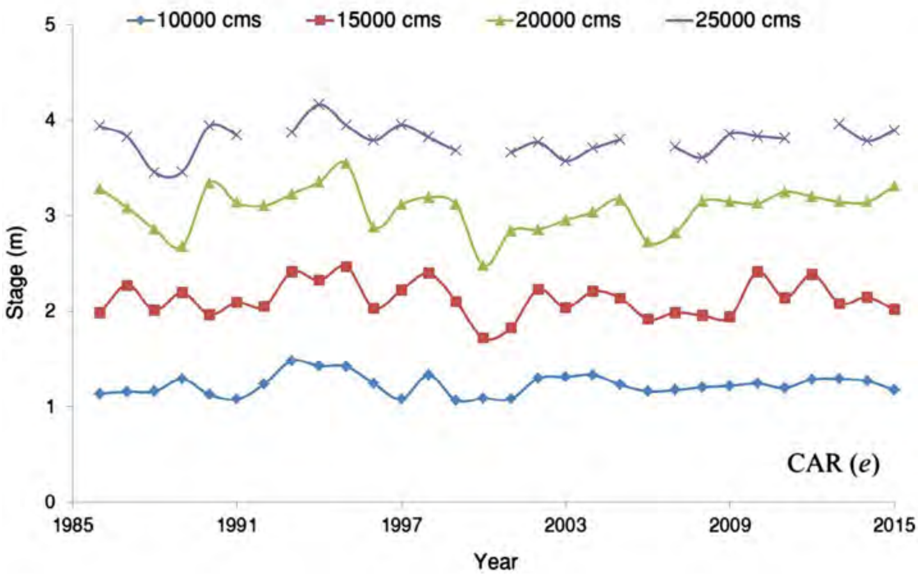


Figure 5. (*Continued*).

or inconclusive trends (Figure 7; Table 4). Annual slope from Red River Landing to Bayou Sara had a decreasing trend in 10,000 cms flow type (p = 0.0004) (Figure 7(a); Table 4), increasing trend in 25,000 cms flow type (p = 0.0072) (Figure 7(d); Table 4), while inconclusive and insignificant trends in the 15,000 and 20,000 cms flow types, respectively (p = 0.02 (inconclusive) and 0.12 (insignificant)) (Figure 7(b), (c); Table 4). Further downstream from Bayou Sara to Baton Rouge, slope had an increasing trend for 10,000, 15,000, and 20,000 cms flow types (p = 0.0075, 0.0019, and 0.0037, respectively) (Figure 7(a)–(c); Table 4), while the trend could not be concluded for 25,000 cms flow type (p = 0.022) (Figure 7(d); Table

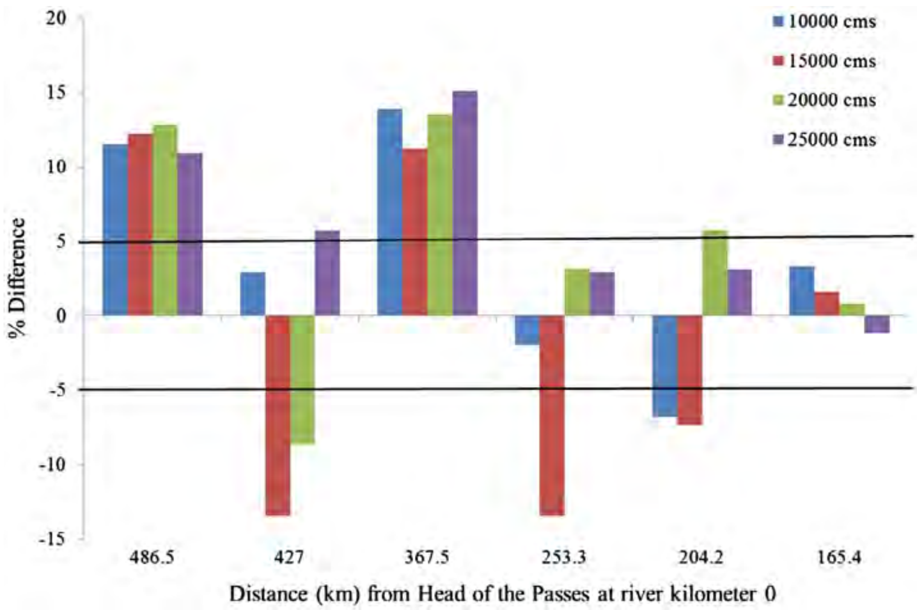


Figure 6. Percentage differences between mean annual RSs of starting and ending years in all Q_d types at Red River Landing (RRL, at river km (rk) 486.5, 1987–2015); Bayou Sara (BS, rk 427, 1973–2015); Baton Rouge (BTR, rk 367.5, 1987–2015); College Point (CP, rk 253.3, 1973–2015); Bonnet Carre (BC, rk 204.2, 1989–2015); and Carrollton (CAR, rk 165.4, 1986–2015).

Notes: Percentage differences falling within the black horizontal lines in both axes were considered insignificant based on the selected error range of ±5% for significance in average annual *RS*s of all Q_d values. *X*-axis distances are from the Head of the Passes (rk 0) near the LMR's Gulf of Mexico outlet.

4). All but one of the LMR slope trends in maximum annual river stage of all flow types at all other consecutive reaches downstream from Baton Rouge (Baton Rouge-College Point, College Point-Bonnet Carre, and Bonnet Carre-Carrollton) were insignificant (Figure 7; Table 4). Only, the slope trend in maximum annual *RS* of 25,000 cms flow from College Point to Bonnet Carre could not be concluded ($p = 0.07$) (Figure 7(d); Table 4).

Discussion

Our findings suggest that the first 135–140 km reach of the LMR below the ORCS, covering Tarbert Landing, Red River Landing, Bayou Sara, and Baton Rouge, experienced significant changes in cross-sectional area, river stage and river surface slope in specific discharge regimes. However, we did not observe any noticeable change in these components along the lower reach of the LMR from 140 to 327 km below the ORCS, which covers College Point, Bonnet Carre and Carrollton. Specifically, we noticed a significant decrease in cross-sectional area during 1992–2013 and a significant increase in river stages of all flows during 1987–2015 along the first 20–25 km LMR reach below ORCS, covering Tarbert Landing and Red River Landing (reach 1) and the 60 km reach further downstream (from ~80 to 140 km below ORCS) covering Baton Rouge (reach 3). In the 55–60 km river reach between these reaches (from ~20–25 to 80 km below ORCS) covering Bayou Sara (reach 2), we observed a significant increase in the cross-sectional area during 1992–2013, a significant

Table 3. Yearly trends in river stages of four flow types [(*a*) 10,000 cms (flow duration = 65.67%) (35th Percentile); (*b*) 15,000 cms (flow duration = 43.88%) (57th Percentile); (*c*) 20,000 cms (flow duration = 26.35%) (73rd Percentile); and (*d*) 25,000 cms (flow duration = 11.92%) (87th Percentile)] at the following six LMR sites downstream chronologically: Red River Landing (RRL), Bayou Sara (BS), Baton Rouge (BTR), College Point (CP), Bonnet Carre (BC), and Carrollton (CAR).

Station	Flow type	Stage-time trend line equation	*p*-value	Stage trend
RRL	10,000	$y = 7.06 + 0.00007x$	<0.0001	SI
	15,000	$y = 9.96 + 0.00006x$	<0.0001	SI
	20,000	$y = 11.71 + 0.00008x$	<0.0001	SI
	25,000	$y = 13.65 + 0.00006x$	<0.0001	SI
BS	10,000	$y = 5.75 - 0.000004x$	0.19	ND
	15,000	$y = 8.32 + 0.00001x$	0.0047	SD
	20,000	$y = 10.24 + 0.00002x$	<0.0001	SD
	25,000	$y = 11.91 - 0.00001x$	0.0123	IC
BTR	10,000	$y = 3.33 + 0.00004x$	<0.0001	SI
	15,000	$y = 5.83 + 0.00004x$	<0.0001	SI
	20,000	$y = 7.49 + 0.00004x$	<0.0001	SI
	25,000	$y = 9.06 + 0.00004x$	<0.0001	SI
CP	10,000	$y = 1.98 + 0.00001x$	0.02	IC
	15,000	$y = 3.63 + 0.000006x$	<0.0001	SD
	20,000	$y = 5.1 + 0.000006x$	0.08	IC
	25,000	$y = 6.25 - 0.000003x$	0.26	ND
BC	10,000	$y = 1.73 - 0.000009x$	0.008	SD
	15,000	$y = 3.05 - 0.000002x$	0.014	SD
	20,000	$y = 3.97 - 0.0000002$	0.96	ND
	25,000	$y = 4.924 - 0.000007$	0.097	IC
CAR	10,000	$y = 1.20 + 0.00001x$	0.5	ND
	15,000	$y = 2.19 - 0.000005x$	0.18	ND
	20,000	$y = 3.13 - 0.000001x$	0.8	ND
	25,000	$y = 3.88 - 0.000005x$	0.12	ND

Notes: Information on the range of each flow types can be found in Section "Bathymetric and specific river stage analyzes". River stage trends have been denoted as – SI: Significantly Increasing, SD: Significantly Decreasing, ND: No Difference (insignificant trend), and IC: Inconclusive (trend could not be concluded).

decrease in river stages of 15,000 and 20,000 cms flows at Bayou Sara during 1973–2015, and a significant increase in slopes of maximum annual river stages of 10,000, 15,000, and 20,000 cms flows from Bayou Sara to Baton Rouge during 1987–2015.

Conclusive areal changes along the upper 140 km LMR reach have not been found earlier although Little and Biedenharn (2014) also analyzed cross sections throughout the reach for 1963–2004. They reported noticeable increase in a few cross-sectional areas from ~10 km above to ~4 km below the ORCS and negligible changes in most cross-sectional areas from Tarbert Landing to the Head of Passes. Differences between their observations and those of our study could be because the cross sections in their study were at least 2 km away from the cross sections in our study. We selected our sites according to their exact location in river kilometers provided by USACE. With respect to river stage changes in specific discharge, however, their finding was opposite to ours only at Bayou Sara during 1993–2011 (increasing trend in RS_ds of three specific flow conditions [low flow: 7500–9000 cms; medium flow: 15,500–18,000 cms; and high flow: 26,500–29,500 cms]). The contrasting observations at Bayou Sara between both studies could be because of the difference in comparison periods and flow ranges. However, Little and Biedenharn (2014) also found inconclusive or insignificant trends in annual *RS*s of all flows for the lower LMR reach (with different study sites) further downstream from Baton Rouge to Carrollton (reach 4), which match our findings. Previously, Winkley (1977) also found increasing river stages across several discharge ranges from ~6000 to 14,500 cms at Red River Landing for the period

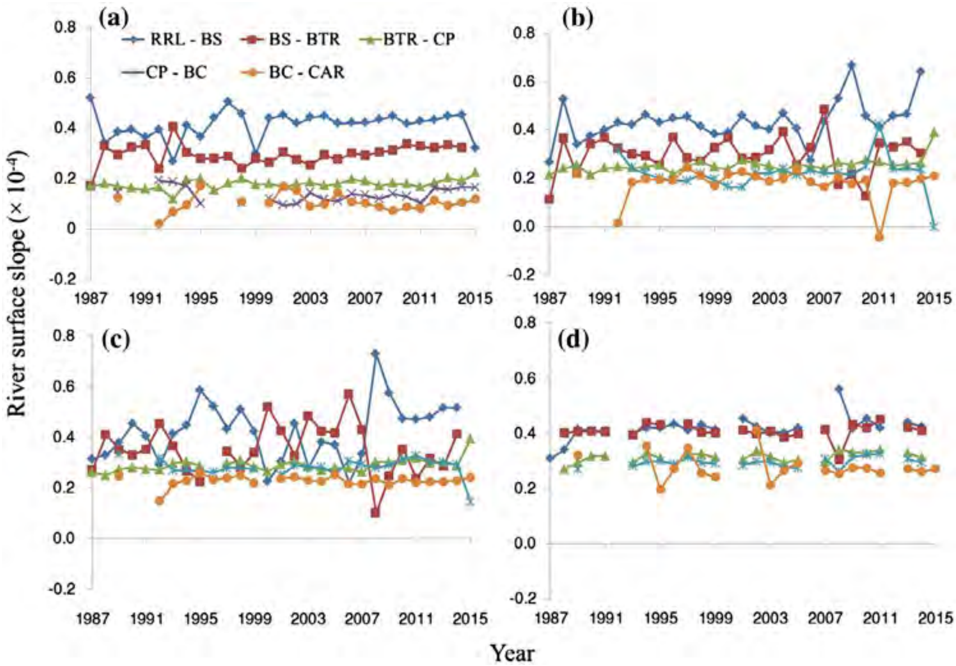


Figure 7. Trends in river surface slopes of maximum annual *RS*s (a) of Q_d type = 10,000 cms (flow duration = 65.67%, 35th percentile); (b) 15,000 cms (flow duration = 43.88%, 57th percentile); (c) 20,000 cms (flow duration = 26.35%, 73rd percentile); and (d) 25,000 cms (flow duration = 11.92%, 87th percentile) from Red River Landing to Bayou Sara (RR–BS), Bayou Sara to Baton Rouge (BS–BTR), Baton Rouge to College Point (BTR–CP), College Point to Bonnet Carre (CP–BC), and Bonnet Carre to Carrollton (BC–CAR) along the Lower Mississippi River.

between the early 1940s and mid-1970s. Recently, Mossa (2013) reported an increase of ~2 m in river stages for specific discharges of 5000, 10,000 and 15,000 cms, respectively, at Tarbert Landing (~5 km upstream of Red River Landing) between the mid-1930s and the early 2010s. A few other studies also analyzed long-term river stage trends for the LMR, but used Natchez and Vicksburg, ~95 and 210 km upstream of Tarbert Landing, respectively, as locations for their analyzes (Biedenharn & Watson, 1997; Wasklewicz et al., 2004). Biedenharn and Watson (1997) found increasing river stage trends at both locations for 1972–1994, while Wasklewicz et al. (2004) found decreasing river stage trends at Vicksburg and non-significant trends at Natchez for 1887–1999. With respect to river surface slope trends, Biedenharn et al. (2000) compared pre-cutoff (1880s to 1930s) and post-cut off (1943–1992) slopes along the LMR ~930 to 95 km upstream of Tarbert Landing. One of their conclusions, that slopes during post-cutoff periods were more variable than pre-cutoff slopes, resembles the notable variability we observed in slopes along the upper three LMR reaches during 1987–2015.

Several factors could have caused these multi-decadal morphological and hydrological changes along the first three LMR reaches. The channel length of LMR from Memphis, TN (~690 km upstream from Tarbert Landing) to Tarbert Landing was artificially shortened by 30% (~274 km in length) following the construction and execution of 14 meander cut-offs at several locations along this reach during 1929 and 1942 (Smith & Winkley, 1996; Winkley, 1977, 1994). Several significant morphological and hydraulic alterations were

Table 4. Yearly trends in river surface slopes of maximum annual *RS*s in four flow types [(*a*) 10,000 cms (flow duration = 65.67%) (35th Percentile); (*b*) 15,000 cms (flow duration = 43.88%) (57th Percentile); (*c*) 20,000 cms (flow duration = 26.35%) (73rd Percentile); and (*d*) 25,000 cms (flow duration = 11.92%) (87th Percentile)] for consecutive LMR sites downstream, i.e. from Red River Landing to Bayou Sara (RRL-BS), Bayou Sara to Baton Rouge (BS-BTR), Baton Rouge to College Point (BTR-CP), College Point to Bonnet Carre (CP-BC) and Bonnet Carre to Carrollton (BC-CAR).

Channel Reach (from – to)	Time period	Flow type (cms)	*p*-value	Slope trend
RRL-BS	1987–2015	10,000	0.0004	SD
		15,000	0.02	IC
		20,000	0.12	ND
		25,000	0.0072	SI
BS-BTR	1987–2015	10,000	0.0075	SI
		15,000	0.0019	SI
		20,000	0.0037	SI
		25,000	0.022	SI
BTR-CP	1987–2015	10,000	0.32	ND
		15,000	0.14	ND
		20,000	0.28	ND
		25,000	0.94	ND
CP-BC	1989–2015	10,000	0.283	ND
		15,000	0.3	ND
		20,000	0.61	ND
		25,000	0.07	IC
BC-CAR	1989–2015	10,000	0.98	ND
		15,000	0.74	ND
		20,000	0.75	ND
		25,000	0.34	ND

Notes: Information on the range of each flow types can be found in Section "Bathymetric and specific river stage analyzes". Notations for slope trends are same as those of river stage trends as explained in Table 2.

reported in the LMR channel during the post-cutoff periods, such as continuous widening of channel with increased pool depth (Biedenharn et al., 2000; Winkley, 1977), increase in minimum river stages (Elliott, Rentschler, & Brooks, 1991), subtle variation in channel roughness (Biedenharn et al., 2000; Stanley Consultants, 1990), and significant increase in channel slope at a few locations (Biedenharn et al., 2000). Although the cut-offs were executed specifically from ~50 to 600 km above Tarbert Landing, it is likely that the reported changes could also be occurring along the substantial portion of LMR reach downstream from Tarbert Landing. A few studies noted that the effects of backwater flows on river stages and channel bed along the LMR reach, such as depositional backwater zones, and divergent offshore plumes cannot be neglected (Chatanantavet, Lamb, & Nittrouer, 2012; Lamb, Nittrouer, Mohrig, & Shaw, 2012; Nittrouer et al., 2012). Furthermore, local modifications in the LMR over small patches during 1973–2015, such as opening of Morganza Spillway during the 1973 and 2011 floods and Bonnet Carre Spillway during the 1973, 1993, and 2011 floods, construction of river training dikes in reach 3 (Pokrefke, Nickles, Raphelt, Trawle, & Boyd, 1995), and dredging to maintain navigational depths, could also have had subtle effects on LMR channel alternations.

Spatiotemporal changes in LMR cross sections, and river stages and slopes in the four discharge regimes along the first three reaches, and non-significant changes in these components along the fourth reach, can also be linked to bed adjustment pertaining to sediment deposition and erosion. In this regard, we propose a schematic model for channel adjustment along the LMR reach over the last three decades based on the aforementioned changes in cross sections, river stages, and river surface slopes (Figure 8). In the model, we deduce that over the last three

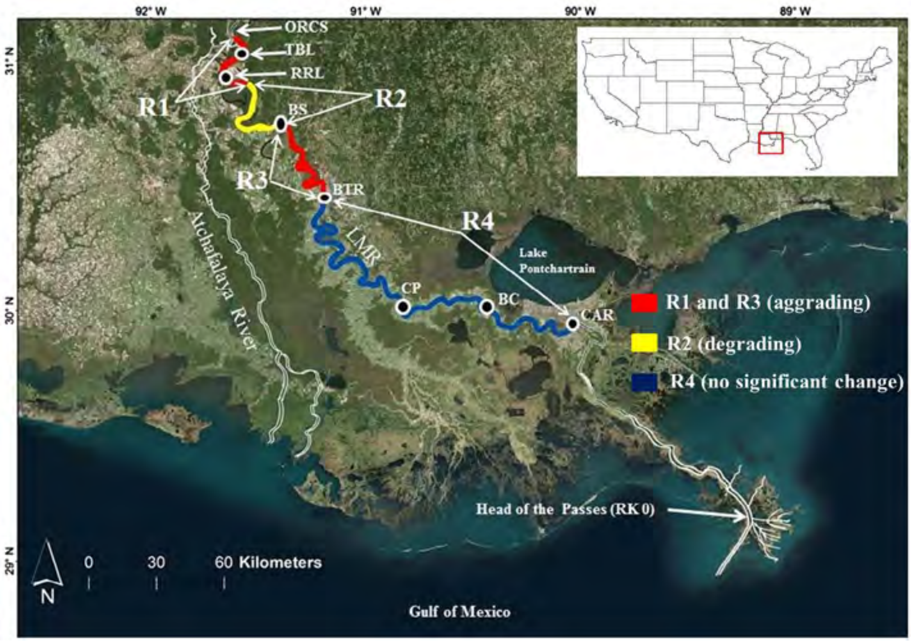


Figure 8. Schematic model showing aggrading, degrading, and unchanged reaches along the Lower Mississippi River during 1987–2015. This figure was modified from the world imagery base map made publically available by Esri (Source: Esri, DigitalGlobe, Earthstar Geographics, CNES/Airbus DS, GeoEye, USDA-FSA, USGS, Getmapping, Aerogrid, IGN, IGP, and the GIS user community).
Note: Changes along the reaches have been deduced according to the study observations of cross-sectional area change and river stage and slope change in specific discharge regimes.

decades LMR reaches 1 and 3 have probably been aggrading gradually over time, with more sediment deposition, while reach 2 has probably been degrading gradually, with more sediment erosion (Figure 8). We also deduce that no significant change has occurred along reach 4 of the LMR over the last three decades (Figure 8). The following two important phenomena seem to contribute significantly to sediment deposition along reach 1:

(1) Reach 1 starts just below the ORCS, from where ~25% flows are diverted to the Atchafalaya River (Copeland & Thomas, 1992). The reduced flows along the Mississippi River have existed since the ORCS establishment in 1963 and have lower velocities, which can further aid in sediment deposition along the reach.
(2) Reach 1 consists of a few sediment channel bars, three of which were recently investigated by Wang and Xu (2015, 2016). Wang and Xu (2015) reported that the total surface area of three channel bars located at 18, 24, and 26 km downstream from the ORCS, respectively, increased by 7.3% during the 2011 spring flood in the LMR. Similarly, Wang and Xu (2016) estimated that the three bars accumulated a total of ~36 MT sediment load during 1985–2013. These observations support our argument that river stages along reach 1 were probably increasing gradually over the last three to four decades because of sediment deposition, which possibly resulted in a decrease in cross-sectional area along the reach.

We further hypothesize the potential existence and significant growth of sediment channel bars along reach 3, based on our observations of identical morphological and hydrological changes between reaches 1 and 3. However, channel bars either do not exist or did not experience noticeable sediment accumulation along reaches 2 and 4 because we observed contrasting morphological and hydrological changes along reach 2 and non-significant alternations along reach 4.

The possible alternative riverbed adjustment trend, which we deduced along reaches 1, 2, and 3, and negligible sediment deposition along reach 4, have been quantifiably supported by a short-term sediment budget study by Allison et al. (2012). They reported the highest sediment load at Tarbert Landing (470 MT) and significantly lower loads downstream at St. Francisville (416, ~11 km downstream from Bayou Sara) (271 MT) and Baton Rouge (277 MT), respectively during 2008–2010. These findings indicate that a substantial sediment load (199 MT) was trapped between Tarbert Landing and Bayou Sara (near St Francisville), while almost all load was eroded from Bayou Sara to Baton Rouge. They calculated a sediment load of 264 MT for only one location further downstream from Baton Rouge: Belle Chasse (rk 121.6, ~43 km downstream from Carrollton). Similarity between sediment loads at Baton Rouge and Belle Chasse (difference of 13 MT in 3 yr) in their study coincides with our observation that the lowermost 187 km reach is nearing dynamic equilibrium with negligible sediment deposition. A few recent studies found high long-term annual sediment and sand loads (30–40 yr) at Tarbert Landing (Rosen & Xu, 2014: 3180 MT sediment load during 1980–2010; Nittrouer & Viparelli, 2014: 936 MT sand load during 1973–2012; Joshi & Xu, 2015: 1115 MT sand load during 1973–2013). Also, Allison and Meselhe (2010) estimated that the annual sediment load at Tarbert Landing was higher than at St. Francisville by 20 MT/yr during 1981–2004. These studies provide some evidence of higher multi-decadal sediment deposition along reach 1. However, long-term sediment loads at other locations downstream from St. Francisville have not yet been quantified. Sediment and sand loads in all these studies were quantified from their corresponding rating curves; hence, all the loads are subjected to their corresponding error ranges.

Our proposed model of channel bed adjustment along the first 327 km of LMR from the ORCS to Carrollton, New Orleans, could have important implications for riverine management further downstream from Carrollton to Head of the Passes, too. Currently, sediment diversions have been planned only along the LMR reach below Carrollton, although a substantial portion of sediment load seems to be trapped along the first 140 km downstream of ORCS (~335–200 km above Carrollton). Therefore, sediment management along LMR could benefit if sediment load trapped along reaches 1 and 3 is systematically outsourced to reach 4. The sediment outflow from reach 4 to proposed diversion sites below Carrollton can be achieved without further engineering the LMR, as we deduced that reach 4 is probably approaching its dynamic equilibrium.

Conclusions

This study used the hydrographic survey measurements conducted in 1992, 2004, and 2013 as well as daily river discharge and stage records over the past three decades to assess long-term channel morphological changes at seven locations along a 327-km reach of the Lower Mississippi River (LMR), one of the most regulated alluvial rivers in the world. We found significant changes in cross-sectional area, river stage, and river surface slope in specific discharge regimes along the first 140 km downstream of the LMR's diversion to the Atchafalaya River at the Old River Control Structure (ORCS), covering Tarbert Landing, Red River Landing, Bayou Sara, and Baton Rouge. Specifically, the first

20–25 km reach (reach 1) and the reach further downstream from 80 to 140 km (reach 3) showed continuous decreases in cross-sectional area and increases in river stage and river slope under all flow conditions. However, the 55–60 km reach in between (from 20–25 km to 80 km below ORCS) (reach 2) experienced exactly opposite trends, i.e. increase in cross-sectional area and decrease in river stages. Furthermore, the remaining 187 km reach (from 140 to 327 km; reach 4) had insignificant changes in its cross-sectional area, river stage, and river surface slope. We link these changes to channel bed adjustment pertaining to sediment deposition and erosion partially and propose that reaches 1 and 3 have probably experienced sediment deposition, reach 2 has probably experienced bed erosion, and reach 4 is probably approaching dynamic equilibrium over the past three to four decades. Therefore, substantial amount of sediment, potentially useful for land-building purposes, appears to be trapped along the first 140 km LMR reach below ORCS, while sediment flow seems higher along the next 187-km reach. These findings suggest that large alluvial rivers with intensive human interventions go through noticeable spatial and temporal changes in their corresponding bed adjustment processes. Such information can have relevant implications for riverine sediment management, channel engineering, and coastal land restoration in the world's sinking deltas fed by regulated alluvial rivers.

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Disclosure statement

The authors have no potential conflict of interest.

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Attachment B

National Wildlife Federation Comments

Scoping Comments on Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement

Submitted October 15, 2018

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IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF ILLINOIS

NATIONAL WILDLIFE FEDERATION, PRAIRIE RIVERS NETWORK, MISSOURI COALITION FOR THE ENVIRONMENT, RIVER ALLIANCE OF WISCONSIN, GREAT RIVERS HABITAT ALLIANCE, and MINNESOTA CONSERVATION FEDERATION, Plaintiffs, vs. UNITED STATES ARMY CORPS OF ENGINEERS; LT. GENERAL THOMAS P. BOSTICK, Commanding General and Chief of Engineers, LT. GENERAL DUKE DELUCA, Commander of the Mississippi Valley Division of the Army Corps of Engineers, Defendants.	CASE NO. 14-00590-DRH-DGW **DECLARATION OF NICHOLAS PINTER, Ph.D. IN SUPPORT OF PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION; EXHIBITS 1-3** HEARING: TBD TIME: TBD

I, Nicholas Pinter, declare as follows:

Professional Experience and Background

1. I am a Professor in the Geology Department and Environmental Resources and Policy Program at the Southern Illinois University, and Director of the SIU's Integrative Graduate Education, Research and Training (IGERT) program in "Watershed Science and Policy." I have a Ph.D. (1992) from the University of California, Santa Barbara and an M.S. (1988) from Penn State University. I have authored, edited, or contributed to at least five books and authored over 39 peer-reviewed, published scholarly articles in rivers, flood hazard, and related fields.

2. My primary field of expertise is in earth-surface processes (geomorphology) applied to a broad range of theoretical questions and practical applications. Much of my recent work focuses on rivers, fluvial geomorphology, flood hydrology, and floodplains. This research includes field-based work, modeling, and significant public-policy involvement.

3. My lab uses hydrologic and statistical tools, 1D and 2D hydraulic modeling, and loss-estimation modeling to quantify the impacts of river and floodplain engineering, and to assess regional floodplain management strategies and mitigation solutions. My research group has also compiled a large NSF-funded GIS database of over 100 years of channel hydrography, floodplain topography, and engineering construction and infrastructure on over 2500 miles of the Mississippi and Missouri Rivers in order to empirically test the causal connections between channel and floodplain modifications and flood response. Another recent NSF-funded project assessed the impacts of progressive levee growth along the Mississippi River through hydraulic modeling of multiple calibrated time steps and multiple change conditions.

4. My research group also runs a series of FEMA-funded grants doing hazard modeling and mitigation planning across the central United States. To date, the group has completed more than 40 FEMA disaster mitigation studies, and we have a number of new plans and plan updates on-going. One principal modeling tool is the Hazus-MH package that, along with various GIS-based and modeling tools, allows estimation of disaster damages and effects for a range of hazards and disaster scenarios. This modeling capability nicely bridges the gap between pure hydrologic and hydraulic analyses (as well as site-specific earthquake studies) and broad societal impacts.

5. My Curriculum Vitae is attached hereto as Exhibit 1.

Documents Reviewed for this Declaration

6. I am familiar with the literature regarding the morphology and dynamics of the Mississippi and other rivers and the interaction between river engineering structures and floods, including the studies cited in Appendix A, Summary of Research on the Effects of River Training Structures on Flood Levels, to the Final Environmental Assessments with Finding of No Significant Impact prepared by the U.S. Army Corps of Engineers ("Corps") for the Dogtooth Bend, Monsenthein/Ivory Landing, and Eliza Point/Greenfield Bend projects, and the Draft Environmental Assessment and Unsigned Finding of No Significant Impact for the Grand Tower project.

7. I have reviewed the Environmental Assessments with Finding of No Significant Impact for the Dogtooth Bend, Monsenthein/Ivory Landing, and Eliza Point/Greenfield Bend projects, and the Draft Environmental Assessment and Unsigned Finding of No Significant Impact for the Grand Tower project.

Analysis

8. I have been asked to form an independent professional opinion as to whether building new river training structures, including those planned by the Corps in the Dogtooth Bend, Monsenthein/Ivory Landing, Eliza Point/Greenfield Bend, and Grand Tower projects, may pose a significant risk of irreparable harm to the natural environment and to people and the property of people who live, work, attend school, or recreate in the floodplains, including by raising flood stage heights on the Mississippi River. As discussed in the following analysis, I conclude that the Corps' proposed projects, and river training structures generally, do pose such a risk.

9. Damages from floods worldwide have risen dramatically over the past 100 years (Munich Re Group, 2007). While much of this increase is due to economic development in floodplains (Pinter, 2005; Pielke, 1999), it is also clear that flooding itself has physically increased in magnitude and frequency on many rivers, including the Mississippi River. (Pinter et al., 2006a; Pinter et al., 2006b; Helms et al., 2002). Historical time series of stage data, which are

unequivocally homogenous over time (Criss and Winston, 2008), show strong and statistically significant increases of flood heights on the Mississippi River over time.

10. A number of processes can lead to flood magnification or otherwise alter flood response in a river basin. These include climate change, agricultural practices, forestry practices, urbanization, road construction, construction of other impervious surfaces, loss of wetlands, decreases in floodplain storage areas, construction and operation of dams, and modifications and engineering of river channels. The range of these changes can alter the volume and timing of runoff (discharge or flow of water) entering and moving through river systems. In addition, other natural or human-induced changes to river channels and their floodplains can alter the conveyance of flow with the river channels, resulting in increases or decreases in water levels (including flood stages) for the same discharge.

11. The Mississippi River has been intensively engineered by the Corps over the past 50 to 150-plus years (depending on the reach), and some of these modifications are associated with large decreases in the river's capacity to convey flood flows. Numerous scientific investigations including Corps reports, some dating back to the 1950s, have noted large increases in flood levels in association with wing-dike construction. For example, investigators recognized as early as 1952 that "the carrying capacity of the river has been decreased so materially by the [river training] work that floods have occurred at such points as Waverly, Boonville and Hermann, Mo., at lower gauge readings with smaller volumes of water than the 1929 flood stage." (Schneiders, 1996 at 346). These investigations have prompted some agencies to rethink their river management strategies. In the Netherlands, for example, the government has begun modifying river training structures on the Rhine River to reduce this recognized risk. General Accounting Office, "Mississippi River: Actions Are Needed to Help Resolve Environmental and Flooding Concerns about the Use of River Training Structures (December 2011) ("GAO Report") at 41. To date, however, the Corps has never addressed in an EIS the vast body of peer-reviewed, independent research showing that river-training structures increase flood heights. *Id.*

12. My research has looked extensively at the extent and causes of flood magnification, particularly on the Mississippi River. This research documents that climate, land-use changes, and

river engineering have contributed to statistically significant increases in flooding along portions of the Mississippi River system. However, the most significant cause of flood height increases on the Middle Mississippi River and Lower Missouri River can be traced to the construction of wing dikes and other river training structures. Indeed, flood height increases on those river segments exceed by a factor of ten the maximum credible increases that could be expected from climate-driven and land-cover-driven flow increases (e.g., Pinter et al., 2008). The large multivariate study by Pinter et al. (2010) identified the age, location, and extent of every large levee system added to the Mississippi-Lower Missouri system during the past century, documenting that levees do contribute some but not all of the observed flood-level increases on the Middle Mississippi and elsewhere (confirming modeling by Remo et al., 2009; see Exhibit 2 to this declaration).

13. Recent theoretical analysis has shown that increased flood levels caused by wing-dike construction are "consistent with basic principles of river hydro- and morphodynamics" (Huthoff et al., 2013). This study concluded that even with extremely conservative parameters used in modeling, "the net effect of wing dikes will be higher flood levels." *Id.*

14. This theoretical analysis is supported by empirical studies that have utilized hydrologic analyses; rigorous statistics; geospatial analyses; and 1D, 2D, and 3D hydraulic modeling to confirm, empirically as well as theoretically, the potential for significant increases in flood levels in response to the dense emplacement of wing-dike structures, such as employed on the Middle Mississippi River. Among this body of research, my research group was funded by the National Science Foundation to construct two large river-related databases to rigorously test for trends in flood magnitudes over time on over 4000 kilometers (over 2400 miles) of the Mississippi and Missouri Rivers, and to quantify the impacts on flood levels from each unit of channel and floodplain infrastructure construction or other change.

15. Our hydrologic database consists of more than 8 million discharge and river stage values, including new synthetic discharges generated for 41 stage-only stations. This hydrologic database was used to test for significant trends in discharges, stages, and ''specific stages.'' We also conducted an extensive review of the validity of using discharge data taken from different types of measurement devices (float meters vs. other types of meters). Pinter (2010) tested whether

it was appropriate to utilize older discharge measurements by examining 2150 historical discharge measurements digitized from the three principal stations on the Middle Mississippi River (MMR), including 626 float-based discharges and 1516 meter-based discharges, and including 122 paired measurements. All statistical tests we performed demonstrated that it was appropriate to utilize both older historical discharge data and newer discharge data as those different types of measurement tools produced accurate discharge measurements.

16. Our geospatial database consists of the locations, emplacement dates, and physical characteristics of over 15,000 structural features constructed along the study rivers over the past 100 to 150 years. In developing this database we utilized: more than 4000 individual map and survey sheets; structure-history databases from six Corps Districts; databases from other agencies including the Coast Guard; and archival maps and surveys digitized and calibrated into a modern coordinate system and frame of reference. Within this database we parameterized 130 bridges, 54 dam structures, 25 artificial meander cut-offs, 1093 levees, and 13,231 wing-dam segments, among many other structures.

17. Together these two databases were used to generate reach-scale statistical models of hydrologic response. These models quantify changes in flood levels at each station in response to construction of wing dikes, bendway weirs, meander cutoffs, navigational dams, bridges, and other river modifications.

18. Our analyses show that while climate and other land-use changes did lead to increased flows*, the largest and most pervasive contributors to increased flooding on the Mississippi River system were wing dikes and related navigational structures*. In contrast, large reaches of the Mississippi and Missouri Rivers with little or no dike construction showed *no* significant increases in flood levels. System-wide, the hydrologic pattern was that large-scale increases in flood levels occurred when and where large numbers of dikes and dike-like structures have been built. Progressive levee construction was the second largest contributor.

19. Our analyses demonstrate that wing dikes constructed downstream of a location were associated with increases in flood height ("stage"), consistent with backwater effects upstream of these structures. Backwater effects are the rise in surface elevation of flowing water upstream

from, and as a result of, an obstruction to water flow. These backwater effects were clearly distinguishable from the effects of upstream dikes, which triggered simultaneous incision and conveyance loss at sites downstream. On the Upper Mississippi River, for example, stages increased more than four inches for each 3,281 feet of wing dike built within 20 RM (river miles) downstream. These values represent parameter estimates and associated uncertainties for relationships significant at the 95 percent confidence level in each reach-scale model. The 95-percent level indicates at least a 95% level of certainty in correlation or other statistical benchmark presented, and is considered by scientists to represent a statistically verified standard. Our study demonstrated that the presence of river training structures can cause large increases in flood stage. For example, at Dubuque, Iowa, roughly 8.7 linear miles of downstream wing dikes were constructed between 1892 and 1928, and were associated with a nearly five-foot increase in stage. In the area affected by the 2008 Upper Mississippi flood, more than six feet of the flood crest is linked to navigational and flood-control engineering.

20. More than 143 linear miles of wing dikes have been constructed on the Middle Mississippi River over the past 100 years (Remo and Pinter 2007; Remo et al. 2008). This represents about 3,960 feet of wing dikes per mile (or about 2,460 feet per kilometer) of channel. Wing dikes have also been heavily utilized on the Lower Missouri River, with over 383 linear miles constructed since 1890. This represents nearly 3,700 feet of wing dike per mile (or about 2,300 feet per kilometer) of channel in the Lower Mississippi River. These and similar river training structures are utilized to assist in river bank protection and stimulate channel scour which can reduce the amount of dredging required to maintain adequate navigation depths (e.g. COPRI 2012).

21. The effects of wing dikes and other structures during flooding should not be confused with effects during periods of low flow. There is general agreement that during low in-channel flows, wing dikes lead to lowered water levels. This happens because the dikes cause channel incision, which is a process of channel adjustment by which channel flow removes sediment from the stream bed and ultimately establishes a lower bed elevation. Channel incision is a process that has been well documented after dike construction in many (but not all) areas of the alluvial Mississippi and Missouri Rivers (e.g., Pinter and Heine 2005; Maher 1964).

22. For example, water levels at St. Louis measured during periods of low to average flows have decreased over a period of about 60 years. This decrease reflects the well documented effects of dike construction (also dredging) that has constricted the channel, eroded the channel bed, and thus lowered such non-flood water levels. Downstream at the Chester and Thebes measurement stations, water levels have also decreased during low flows, but they have risen for all conditions from average flows up to large floods. At Grand Tower, Illinois, water levels for just average flows have increased by almost three feet due to dike and weir construction. Near Grand Tower, bedrock underlies parts of the Middle Mississippi channel and limits incision (Jemberie et al. 2008). At all of these locations, *at flood flows* (flows equal to four or more times the average annual discharge level), *water levels have increased by three to ten feet or more.*

23. Many other studies confirm and corroborate these findings. Particularly after the record-breaking floods on the Middle Mississippi, researchers sought to answer why such large increases in flood levels had occurred for the same discharges (volumes of flow) that had been observed in the past. (e.g., Belt 1975; Stevens et al. 1975). Since then, multiple studies involving hydrologic time-series analyses, statistical analyses, geospatial analyses, and hydraulic modeling have correlated the timing and spatial distribution of dike construction with increases in flood stages (e.g., Criss and Shock 2001; Wasklewicz et al. 2004; Jemberie et al. 2008; Pinter et al. 2008; Remo et al. 2009; Pinter et al. 2010, and others).

24. Wing dikes and other river training structures increase flood heights during high water because of the way they interact with river flow and the way they change the shape and form of the river channel. Since the beginning of historical "training" (engineering of the river to facilitate navigation) of the Mississippi and Missouri rivers, construction of dikes has narrowed large portions of these river channels to one-half or less of their original width. In addition, construction of dikes, bendway weirs, and other in-channel navigational structures has increased the "roughness" of the channel, leading to decreased flow velocities during floods.

25. Channel roughness is a measure of objects and processes that cumulatively resist the flow of water through a given reach of a river, including drag effects of sedimentary grains, bedforms (e.g., ripples and dunes on the bed), vegetation, turbulence, eddy circulation, and many

others. A rough river bed exerts more resistance than a smooth river bed, resulting in slower flow of water. All other factors being equal, a flood that passes through a river reach with half the average flow velocity will result in average water depths that are double what they would otherwise be.

26. Recent modeling studies demonstrate the significant effects of flow turbulence and large-scale vertical and horizontal eddy circulation (Huthoff et al., 2013) of river training structures during flood events. Other recent studies have focused on flow dynamics around submerged wing dikes and their impact on channel flow resistance (e.g., Yossef 2005; Yossef and de Vriend 2011; Azinfar and Kells 2011). These studies show that submerged wing dikes create flow mixing in their wake zones (e.g., Yossef 2005; Yeo and Kang 2008; Jamieson et al. 2011). These recirculating flows consume energy from the bulk flow field, causing increases in effective resistance near wing dikes and through wing-dike fields. The impact of wing dikes on flow resistance was quantified by Yossef (2004, 2005), whose proposed relationship allows for an initial assessment of wing-dike impact on water levels (e.g., Azinfar 2010). According to Yossef's laboratory experiments, the effective cumulative hydraulic roughness of the bank zone relates to the size and longitudinal distance between the wing dikes.

27. The role of river training structures in increasing flood heights is well recognized. For example, in the Netherlands, the impacts of wing dikes (navigational "groynes") on flood levels have both been recognized and taken into account in flood protection strategies. The government of the Netherlands recently completed a €45 million program to lower 450 wing dikes (groynes) on the Rhine system as part of its strategy to reduce flood levels.

28. Changes in channel geometry and roughness related to river engineering tools employed for improved navigation and flood control are the principal drivers behind changes in flood stage on the Mississippi River. The increases in flood stage are caused by both the direct effects of wing dikes, meaning interaction with flow, and the indirect effects of wing dikes, meaning the effects of the wing dike in changing the shape or form of the river bed. Hydrodynamic simulations of indirect and direct effects of wing dikes show decreases in velocity, increases in roughness, and corresponding increases in flood stage.

29. River training structures constructed by the Corps to help maintain the nine-foot navigation channel have caused large-scale increases in flood levels, up to 15 feet in some locations and by some measures, and six to ten feet over broad stretches of the river where these structures are prevalent. Such large increases in flood heights in these rivers have occurred when and where – and only when and where – wing dikes, bendway weirs, and other river training structures have been built. These structures have led to significant increases in the frequency and magnitude of large floods.

30. The projects now proposed on the Middle Mississippi River are particularly problematic for several reasons. First, as mentioned above, bedrock underlies parts of the Middle Mississippi channel near the Grand Tower project, which limits incision (Jemberie et al. 2008). In such locations, the ameliorating effect of new wing dikes in causing bed incision is reduced or eliminated, leading in the past to the largest observed increases in flood levels.

31. The new dike construction projects now proposed on the Middle Mississippi are also problematic because they threaten nearby levees that already have identified deficiencies. The Dogtooth Bend Project is immediately downstream of one of the sites where the Len Small levee failed during floods in 2011 (Dogtooth Bend EA at E2). This 5,000-foot breach yielded to fast-moving water that "scored farmland, deposited sediment, and created gullies and a crater lake" (K.R. Olson and L.W. Morton, "Impacts of 2011 Len Small levee breach on private and public Illinois lands," *Journal of Soil and Water Conservation*, Vol. 68:4, attached as Exhibit 3).

32. The proposed Grand Tower project spans approximately seven River Miles along the Big Five Levee Drainage and Levee Districts, including the Preston, Clear Creek, East Cape, and Miller Pond levees, together protecting over 49,000 acres of Illinois floodplain. The proposed Grand Tower wing dike project also lies just downstream of the Degognia/Fountain Bluff and Grand Tower Drainage and Levee Districts, protecting a further 56,000 acres. Currently, every segment of these levee systems have "Unacceptable" ratings following Corps inspections and assessment. The Dogtooth Bend Project likewise poses an unusually high potential for flood damage. The Cairo levee system ("Mississippi and Ohio Rivers Levee System at Cairo & Vicinity") is located a few miles downstream of the Dogtooth Bend Project. Although the greatest

effects of wing dikes occur upstream, statistically significant increases in flood levels have also been identified downstream. Corps inspections have identified major deficiencies in the Cairo levee system, leading to its current "Unacceptable" rating in the National Levee Database.

33. My work with local levee commissioners and other informed officials has revealed deep concern and widespread discussion about levee safety and performance during future floods, even without additional stresses. For at least the past decade, local stakeholders have repeatedly called for the St. Louis District of the Corps of Engineers to rigorously and independently assess the cumulative impacts of wing-dike construction in the Middle Mississippi River. Instead, a new wave of dike construction has been undertaken, with each new project evaluated – perfunctorily – on an individual basis and without regard to cumulative effects.

34. The new dike construction projects here – at Dogtooth Bend, Monsenthein/Ivory Landing, Eliza Point/Greenfield Bend, and Grand Tower – pose significant threats of increased flooding and flood risk. They are the latest manifestations of a flawed process that has allowed construction of hundreds of new dikes and dike-like structures that are causing elevated flood stages throughout the Middle Mississippi River. Unless these new dike construction projects are halted to allow their reconsideration based on a comprehensive Supplemental Environmental Impact Statement that takes the foregoing studies and analyses into consideration, needless and potentially severe flooding will likely occur.

35. I declare under penalty of perjury that the foregoing facts are true of my personal knowledge, that the foregoing expressions of professional judgment are honestly held in good faith, that I am competent to and if called would so testify, and that I executed this declaration on June 24, 2014 in Chicago, Illinois.

Nicholas Pinter

Nicholas Pinter, Ph.D

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EXHIBIT
1

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EDUCATION

1988 - 1993 PhD., Geology, University of California, Santa Barbara
1986 - 1988 M.S., Geology, Penn State University, Univ. Park, PA
1982 - 1986 B.A., Geology and Archaeology, Cornell University, Ithaca, NY

RESEARCH AREAS

- Geomorphology: the geology of the earth-surface
- Human influences on landscapes and geomorphic processes
- Rivers, flooding, and floodplain management

PROFESSIONAL POSITIONS

1996 - Full Professor (since 7/05), Southern Illinois University
Author: Prentice Hall and John Wiley & Sons
1995 -1996 Postdoctoral Researcher, Yale University

RECENT HONORS/AWARDS

- 2013-2018: Fulbright Specialist, U.S. State Dept., Bureau of Educational and Cultural Affairs (roster)
- 2013: Nominee: W.K. Kellogg Foundation & APLU Engagement Award (to SIU Olive Branch team)
- 2012: Illinois Mitigation Award: Illinois Association of Floodplain and Stormwater Managers
- 2010: Marie Curie Fellowship (IIF), European Commission
- 2010: Fulbright Fellowship (declined; see above)
- 2009: Leo Kaplan Research Award, Sigma Xi, SIU Chapter
- 2008: SIU College of Science, Outstanding Researcher award
- 2007: Alexander von Humboldt Foundation, Germany Research Renewal Fellowship
- 2005, 2006: SIU nominee, Jefferson Fellows Program; National Academy of Sciences
- 2003 Friedrich Wilhelm Bessel Prize; Alexander von Humboldt Foundation
- 2002 John D. and Catherine T. MacArthur Foundation, Research and Writing Award
- 2000 Fulbright Foundation Fellowship
- 1999 Charles A. Lindbergh Foundation Prize

BOOKS, WORKSHOPS, EDITED VOLUMES, and OTHER PROF. ACTIVITIES

Invited Written Testimony: Statement submitted for hearings entitled "A Review of the 2011 Floods and the Condition of the Nation's Flood Control Systems," before the Senate Environment and Public Works Committee, United States Senate, Washington DC, October 18, 2011.

Panelist, U.S. National Academy of Science: Committee on Missouri River Recovery and Associated Sediment Management Issues, 2008-2010.

Associate Editor: Environmental & Engineering Geoscience, Association of Environmental & Engineering Geologists, Denver, CO.

Convener, American Association for the Advancement of Science Workshop: Managing rivers and floodplains for the new millennium. AAAS national meeting, 2006.

External Reviewer, National Research Council, The National Academies: Review of the U.S. Army Corps of Engineers Restructured Upper Mississippi River-Illinois Waterway Navigation Study.

Member, Advisory Board: The Nature Conservancy Great Rivers Center (Upper Mississippi, Parana-Paraguay, and Upper Yangtze River systems).

Lead Editor: Pinter, N., G. Grenerczy, J. Weber, S. Stein, and D. Medak, 2006. The Adria Microplate: GPS Geodesy, Tectonics, and Hazards. Spring Verlag.

Expert Witness: e.g., B&H Towing, Inc., Case No. 06-05-0233 (U.S. District Court, Southern District of W. Virginia); Great Rivers Habitat Alliance v. U.S. Army Corps of Engineers, No. 4:05-CV-01567-ERW (U.S. District Court, Eastern District of Missouri); Great Rivers Habitat Alliance v. City of St. Peters, No. 04-CV-326900 (Circuit Court of Cole County, Missouri); Henderson County Drainage District No. 3 et al. v. United States, No. 03-WL-179780 (Ct. Fed. Cls, Kansas City), etc.

Associate Editor: Geomorphology, Elsevier Science, 2004-2008

Instructor, European Union Advanced School on Tectonics: 3D Monitoring of Active Tectonic Structures, International Centre for Theoretical Physics, Trieste, April 18-22, 2005.

Convener, NATO Advanced Research Workshop: The Adria microplate: GPS geodesy, tectonics, and hazards. Veszprém, Hungary; April, 2004.

Convener, Pardee Keynote Symposium: Pinter, N., and J.F. Mount, 2002, Flood hazard on dynamic rivers: Human modification, climate change, and the challenge of non-stationary hydrology. Geological Society of America national meeting, 2002.

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Author: Pinter, N, 1996. Exercises in Active Tectonics. Prentice Hall.

Convener and Instructor: Pazzaglia, F.J., and N. Pinter, 1996. Geomorphic expression of active tectonics. Short course at the 1996 Geological Society of America meeting, Denver.

Convener, Theme Session: N. Pinter, and D.W. Burbank, 1996. Feedbacks between tectonics and surface processes in orogenesis. Geological Society of America meeting, Denver.

Author: Pinter, N., and S. Pinter, 1995. Study Guide for Environmental Science. J. Wiley & Sons.

REFERENCES

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FUNDED PROJECTS

Active: NSF Infrastructure Management for Extreme Events: Community resilience through pro-active mitigation in the rural Midwest.

Active: NSF IGERT: Multidisciplinary, team-based training watershed science and policy. (Lead PI: Pinter; $3.2 million) **+ International Supplement**

Active: FEMA: Illinois multi-hazard mitigation initiative (Lead PI: Pinter; with Indiana University-Purdue University at Indianapolis). ~40 awarded + ~12 pending.

NSF RAPID: A massive floodplain reconnects: physical and biotic responses of the Birds Point levee breach in the Mississippi River (J. Garvey, lead PI).

IEMA: Illinois statewide flood-hazard assessment (J. Remo, lead PI).

Walton Family Foundation: Olive Branch, IL Relocation Initiative: Community Disaster-Recovery Networking

NSF Sedimentology and Paleobiology program: Testing hypotheses of latest Pleistocene paleo-environmental collapse, Northern Channel Islands, California (Lead PI: Pinter; collaborative project with Northern Arizona University; Univ. of Oregon)

Emergency Management Institute curricula: HAZUS-MH for earthquakes.

U.S. Steel: Levee-breach modeling, Metro East Drainage and Levee District area.

European Commission, Marie Curie IIF Program: Early anthropogenic signatures on landscapes: geomorphic, paleobotanical, and other paleo-environmental fingerprints.

NSF, Geography and Regional Science: A multivariate geospatial model of levee impacts on flood heights, Lower Mississippi River + **International Supplement** awarded

National Geographic Society: Testing a hypothesis of latest Pleistocene paleo-environmental collapse, Northern Channel Islands, California.

USGS Upper Midwest Environmental Sciences Center: Development of a virtual hydrologic and geospatial data repository for the Mississippi River System

NSF, Office of International Science and Engineering: U.S.-Chile: Morphotectonic evolution of the U.S.-Chile: Mejillones Peninsula, northern Chile using precise GPS measurement of uplifted coastal terraces

NSF Hydrologic Sciences Program: Multivariate geospatial analysis of engineering and flood response, Mississippi River System, USA.

NSF, International Science and Engineering: US-Chile cooperative research on the Cenozoic paleoceanographic and paleoclimatic evolution of northern and central Chile. (Ishman and Pinter)

NATO Science Program: The Adria microplate: GPS geodesy, tectonics, and hazards.

John D. and Catherine T. MacArthur Foundation: Exporting Natural Disasters: Flooding and Flood Control on Transboundary Rivers

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USGS National Cooperative Geologic Mapping Program (6/03-5/04). Plio-Pleistocene Deposits of the White/Inyo Mountains Range Front, Inyo and Mono Counties, CA

Alexander von Humboldt Foundation: Human forcing of hydrologic change and magnification of flood hazard on German Rivers

NASA (9/01-8/02)). Assessing mass wasting and landslide susceptibility using GIS and remotely sensed imagery, Santa Cruz Island, California. (ESS Fellowship for E. Molander)

Association of State Floodplain Managers (9/01-8/02). Rapid revision of flood-hazard mapping. (Fellowship for R. Heine)

Missouri Coalition for the Environment (7/01-5/02). Hydrologic history of the Lower Missouri River.

NOAA Channel Islands National Marine Sanctuary (12/99-6/02). Orthorectification of 1997, pre-El Niño air-photo set from the California Channel Islands.

Petroleum Research Fund (7/99-10/01). Timing and rates of basin inversion from tectonic geomorph-ology, Pannonian Basin, Hungary. (**Supplement** [5/00-4/01] for an ACS-PRF Summer Fellow)

USGS National Cooperative Geologic Mapping Program (5/00-4/01). Mapping landslide susceptibility, Santa Cruz Island, California: A field- and GIS-based analysis.

National Park Service, Channel Islands National Park (4/00-9/00). Orthorectification of 1998, post-El Niño air-photo set from the California Channel Islands.

USGS National Cooperative Geologic Mapping Program (6/99-5/00). Mapping coastal terraces and Quaternary cover on Santa Rosa and San Miguel Islands, California, using dual-frequency kinematic GPS positioning.

NSF Active Tectonics Program (3/97-2/00), (**Supplement** granted). Testing models of fault-related folding, Northern Channel Islands, California.

NASA (9/00-8/01)). Assessing mass wasting and landslide susceptibility using GIS and remotely sensed imagery, Santa Cruz Islands, California. (ESS Fellowship for W.D. Vestal)

National Earthquake Hazards Reduction Program (7/97-12/99): Slip on the Channel Islands/Santa Monica Mountains Thrust. (**Supplement** granted)

NSF, Instrumentation and Facilities Program (8/97-7/99): Acquisition of a GIS-dedicated UNIX workstation laboratory.

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National Earthquake Hazards Reduction Program (2/92-7/93). Latest Pleistocene to Holocene rupture history of the Santa Cruz Island fault. (with Ed Keller)

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Szilagyi, J., N. Pinter, and R. Venczel, 2008. Application of a routing model for detecting channel flow changes with minimal data. Journal of Hydrologic Engineering, 13: 521-526.

Remo, J.W.F., N. Pinter, B. Ickes, and R. Heine, 2008. New databases reveal 200 years of change on the Mississippi River System. Eos, 89(14): 134-135.

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ABSTRACTS AND PAPERS PRESENTED

Below + numerous invited talks at universities, agencies, and organizations

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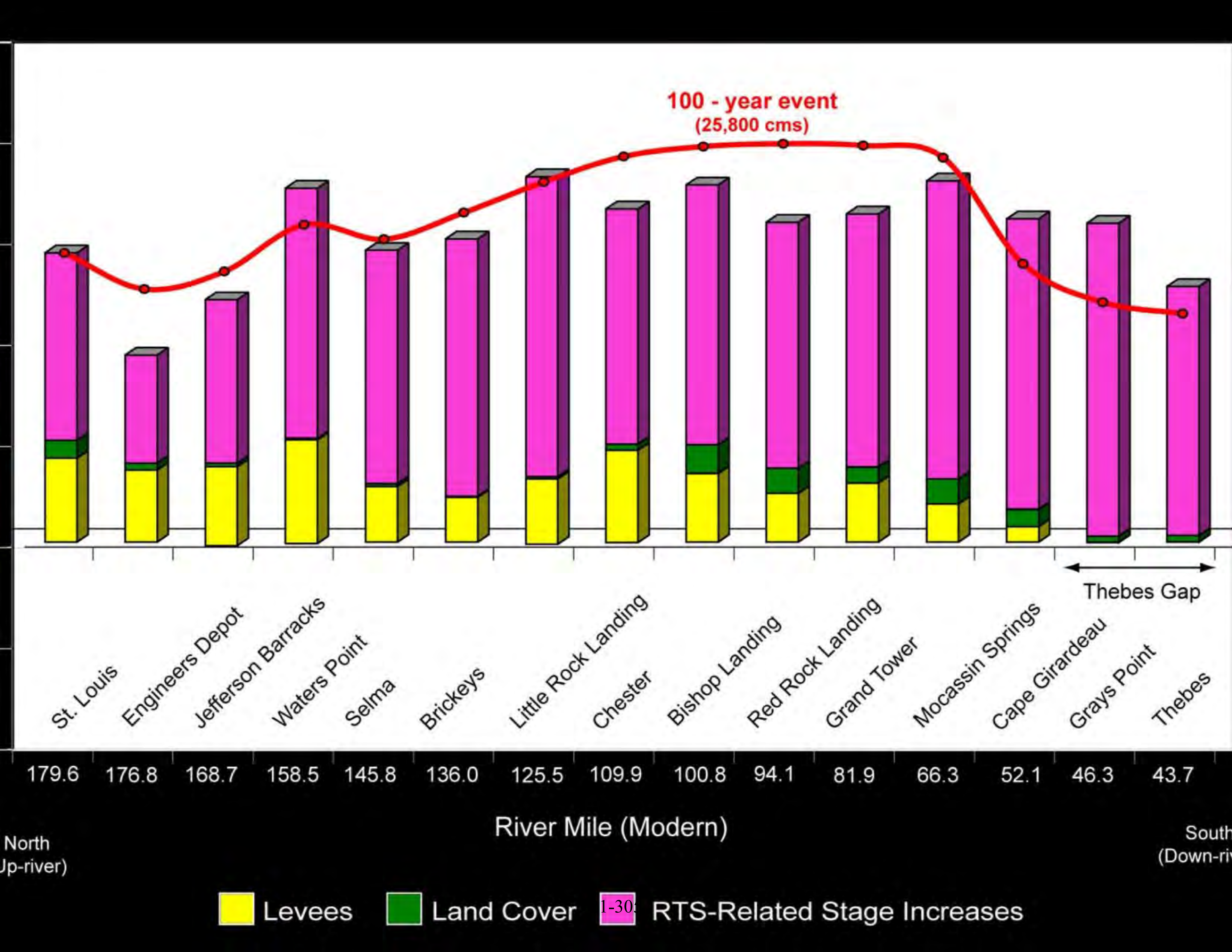
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Engineers Depot
Jefferson Barracks
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Red Rock Landing
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Cape Girardeau
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FEATURE

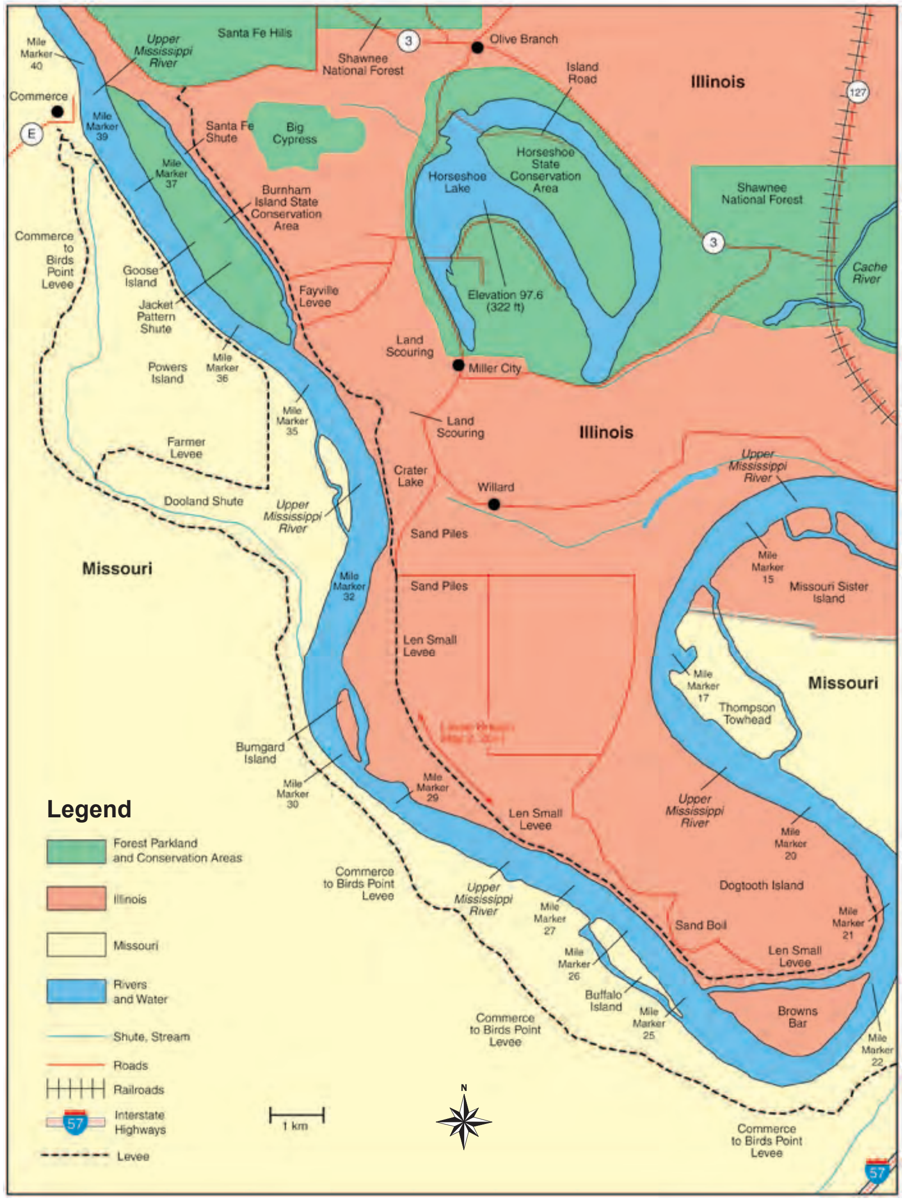
Impacts of 2011 Len Small levee breach on private and public Illinois lands

Kenneth R. Olson and Lois Wright Morton

Agriculture, the dominant land use of the Mississippi River Basin for more than 200 years, has substantively altered the hydrologic cycle and energy budget of the region (NPS 2012). Extensive systems of US Army Corps of Engineers (USACE) and private levees from the Upper Mississippi River near Cape Girardeau, Missouri, southward confine the river and protect low-lying agricultural lands, rural towns, and public conservation areas from flooding. The Flood of 2011 severely tested these systems of levees, challenging public officials and landowners to make difficult decisions, and led to extensive damage to crops, soils, buildings, and homes. One of these critical levees (figure 1), the Len Small, failed, creating a 1,500 m (5,000 ft) breach (figure 2) where fast-moving water scoured farmland, deposited sediment, and created gullies and a crater lake. The Len Small levee, built by the Levee and Drainage District on the southern Illinois border near Cairo to protect private and public lands from 20-year floods, is located between mile marker 21 and mile marker 35 (figure 1). It connects to Fayville levee that extends to Mississippi River mile marker 39, giving them a combined length of 34 km (22 mi) protecting 24,000 ha (60,000 ac) of farmland and public land, including the Horseshoe Lake Conservation area. The repair of the breached levee, crater lake, gullies, and sand deltas began in October of 2011 and continued for one year.

Figure 1

Map of Alexander County, Illinois, including the Len Small levee and the northern part of the Commerce to Birds Point levee, Missouri, areas.



HISTORICAL GEOLOGICAL FEATURES OF THE WESTERN ALEXANDER COUNTY

The Mississippi River is a meandering river of oxbows and cutoffs, continuously eroding banks, redepositing soil, and changing paths. Its willful historic meandering is particularly apparent in western Alexander County, Illinois, where a topographical map shows swirls and curves and an oxbow lake, Horseshoe Lake, where the river once flowed south of Thebes and east of the modern day Len Small levee. The loess-covered upland hills (Fehrenbacher et al. 1986) of the Shawnee National Forest just north of Route 3 (figure 1) give way to a low-lying plain between the Mississippi and Ohio rivers. The ancient Ohio River drained through the Cache River valley during the Altonian and Woodfordian glacial advances (60,000 to 30,000 years B.P.) and converged with the Mississippi River waters just northwest of Horseshoe Lake. The Cache River valley is 3 km (1.9 mi) wide and carried a substantive flow of water from the eastern Ohio River Basin

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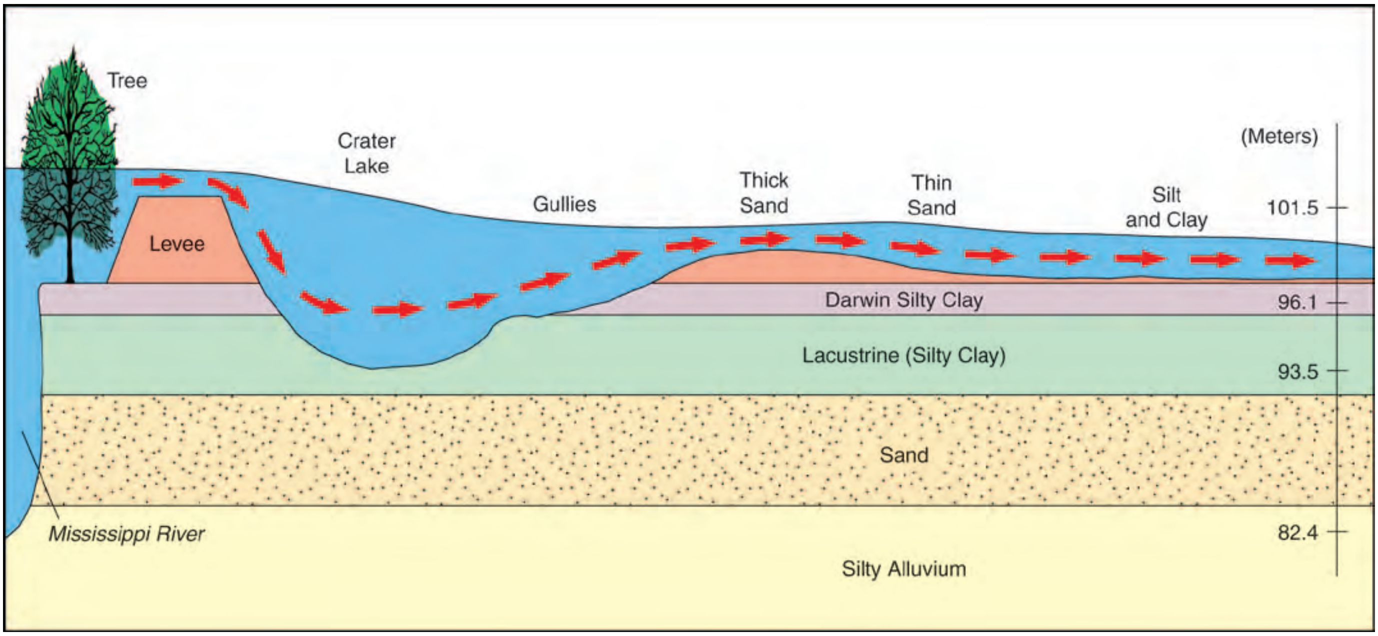
Figure 2

Diagram of Len Small levee failure and creation of crater lake, gullies, and sand delta.



in addition to the local waters from the Cache River valley into the Mississippi River valley. Historically, the region has been a delta, confluence and bottomlands dating back 30,000 to 800,000 years B.P., with many of the Illinois lands shown on the maps located on both sides of the Upper Mississippi River as its channel changed locations over time. As a result, the fertile farmland of western Alexander County soils formed in alluvial and lacustrine deposits.

Horseshoe Lake (figure 3), a former oxbow and remnant of a large meander of the Mississippi River, is now a state park of 4,080 ha (10,200 ac) (Illinois DNR 2012). This oxbow lake, formerly a wide curve in the river, resulted from continuous erosion of its concave banks and soil deposition on the convex banks. As the land between the two concave banks narrowed, it became an isolated body of water cutoff from the main river stem through lateral erosion, hydraulic action, and abrasion. With 31 km (20 mi) of shoreline, the 1.3 m (4 ft) deep lake is the northernmost natural range for Bald cypress (*Taxodium distichum* L.) and Tupelo (*Nyssa* L.) trees (figure 3) and has an extensive growth of American lotus (*Nelumbo lutea*), a perennial aquatic plant, and native southern hardwoods which grow well in lowlands and areas which are subject to seasonal flooding.

Figure 3

The bald cypress trees and American lotus at Horseshoe Lake conservation area.

The agricultural lands which surround this oxbow lake are highly productive alluvial soils —mostly Weinbach silt loam, Karnak silty clay, Sciotoville silt loam, and Alvin fine sandy loam. Almost two-thirds of the area (16,000 ha [40,000 ac]) protected by the Len Small and Fayville levees is privately owned. Corn (*Zea mays* L.), soybeans (*Glycine max* L.), and wheat (*Triticum* L.) are the primary crops, with some rice (*Oryza sativa* L.) grown in this area.

THE COMMERCE TO BIRDS POINT, CAIRO, AND WESTERN ALEXANDER COUNTY LEVEES

In early May of 2011, the floodwaters at the Ohio River flood gage in Cairo, Illinois, had reached 18.7 m (61.7 ft) (NOAA 2012). The Ohio River was 6.7 m (22 ft) above flood stage and had been causing a back-up in the Mississippi River floodwater north of the Cairo confluence prior to the USACE opening of the Birds Point–New Madrid Floodway. For more than a month, the Mississippi River back-up placed significant pressure on the Len Small and Fayville levees (figure 1). As a result, approximately 1,500 m (5,000 ft) of the Len Small levee was breached (figure 2) near mile marker 29 (figure 1) on the morning of May 2, 2011.

The flood protection offered by the Len Small and Fayville levees is important to the landowners, homeowners, and farmers in southwestern Alexander County, Illinois. However, the Len Small and Fayville levees are not the mainline levees which control the width and height of the Mississippi River. The controlling mainline levees are the frontline Cairo levee located in Illinois (Olson and Morton 2012a) and the Commerce to Birds Point levee in Missouri (figure 4). These two frontline levees, by design, are much higher and stronger than the Len Small and Fayville levees. The Len Small and Fayville levees were built by the local levee district and are not part of the Mississippi River and Tributaries project for which USACE has responsibility (figure 5). The Cairo levee has a height of 19.4 m (64 ft), or 101.4 m (334.5 ft) above sea level, and levee failure would destroy the City of Cairo. The frontline Commerce to Birds Point levee has a height of 19.8 m (65.5 ft), and its failure would result in more than 1 million ha (2.5 million ac) of agricultural bottomlands in Missouri Bootheel and Arkansas on west side of the Mississippi River being flooded (figure 5). Commerce to Birds Point levee connects to a setback levee on the west side of the Birds Point–New Madrid Floodway, which extends the protection another 51 km (33 mi) to the south where it joins the frontline levee at New Madrid, Missouri, further extending the protection of the Bootheel bottomlands (Camillo 2012; Olson and Morton, 2012a, 2012b, 2013). The failure of the Hickman (Kentucky) levee on the east side of the Mississippi River would have resulted in the flooding of 70,000 ha (170,000 ac) of protected bottomlands in Tennessee and Kentucky (figure 5). The floodwater height and pressure on the Commerce to Birds Point and Birds Point to New Madrid levees has increased over the years during Mississippi River flooding events with the construction of the Len Small and Fayville levees and with a strengthening of the levee near Hickman, Kentucky, which had the effect of narrowing the Mississippi River Floodway corridor and removing valuable floodplain storage areas for floodwaters.

Figure 4

The Commerce to Birds Point mainline US Army Corps of Engineers levee.

THE MISSISSIPPI RIVER COMMISSION AND ITS ROLE IN LEVEE CONSTRUCTION ALONG THE MISSISSIPPI RIVER AND TRIBUTARIES

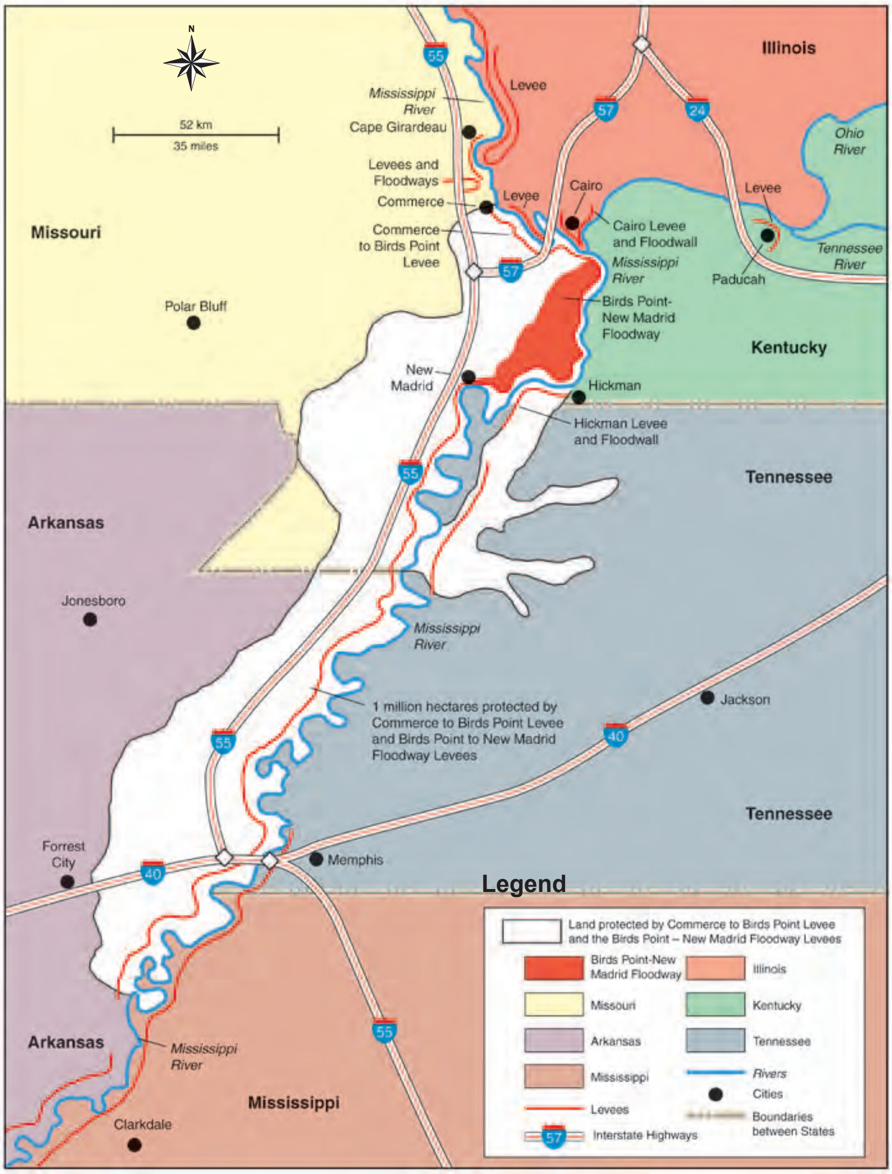
The Mississippi River Commission (MRC) was established by Congress in 1879 to combine the expertise of the USACE and civilian engineers to make the Mississippi River and tributaries a reliable shipping channel and to protect adjacent towns, cities, and agricultural lands from destructive floods (Camillo 2012). The Mississippi River Commission has a seven-member governing body. Three of the officers are from the USACE, including the chairman who is the final decision maker when it comes to decisions like opening the floodways. Another member is an Admiral from National Oceanic and Atmospheric Administration (NOAA), and the other three members are civilians, with at least two of the civilian members being civil engineers. Each member is appointed by the President of the United States. Senate confirmation is no longer necessary. The MRC is the lead federal agency responsible for addressing the improvement and maintenance of the Mississippi River and Tributaries project, including flow and transportation systems.

Between 1899 and 1907, MRC assisted local levee districts in Missouri with construction of a federal levee between Birds Point, Missouri, and Dorena, Illinois. At that time, the MCR jurisdiction was limited to the areas below the confluence of the Ohio and Mississippi rivers (Camillo 2012; Olson and Morton 2012a, 2012b), which is at the southern tip of Illinois (Fort Defiance State Park). This levee is located approximately where the current frontline levee of the Birds Point–New Madrid Floodway was constructed between 1928 and 1932 after Birds Point to Dorena levee failed in 1927.

In 1902, the MRC helped Kentucky construct a levee from the Hickman,

Figure 5

The bottomlands in Missouri and Arkansas protected by the Commerce to Birds Point mainline levee and bottomlands in Tennessee and Kentucky protected by the Hickman levee.



Kentucky, bluff to Tennessee, where it connected with another levee to extend the levee system 7.8 km (5 mi) to Slough Landings, Tennessee. During this time period, a portion of the natural floodplain near Cape Girardeau was walled off by a local Missouri levee to provide protection of farmland adjacent to the river (figure 1). These two levees narrowed the river channel and during high-water events on the Mississippi River increased floodwater back-up, placing tremendous pressure on the existing systems of levees and floodwalls above and below the Cairo confluence (Camillo 2012; Olson and Morton 2012a, 2012b).

The Commerce to Birds Point levee (figure 5) has long been considered by the MRC and the USACE to be the most critical levee in the Mississippi River valley since it protects nearly 1 million ha (2.5 million ac) of prime agricultural bottomlands in Arkansas and Missouri Bootheel. The Commerce to Birds Point levee, shown in figures 1 and 4, had two major threats (1973 and 1993) from past major flooding events. During the 1973 flood, a 455 m (1,500 ft) section of the Commerce to Birds Point levee fell into the Mississippi River. The caving extended to the top of the levee. The USACE Memphis District placed 21,600 t (18,000 tn) of riprap stone carried in by barges to prevent additional caving (Camillo 2012). The Len Small levee on the Illinois side of the Mississippi River (figure 1) and across from the Commerce to Bird Point levee, Missouri, had historically overtopped or failed during larger flooding events, thereby reducing the pressure on the Commerce to Birds Point levee. The local levee and drainage district and owners of the Len Small levee strengthened their levee during the 1980s, which increased pressure on the Commerce to Birds Point levee when the river flooded. As a result, in the 1993 flood event, the Len Small levee held and the Mississippi remained confined as it climbed to within 1 m (3 ft) of the top of the Commerce to Birds Point levee. Sand boils developed in the Commerce levee were treated until the underseepage stabilized. In 1995, USACE Memphis District raised the height and strengthened the Commerce to Birds Point levee and installed relief wells.

LOCAL AND MISSISSIPPI RIVER FLOODING OF FARMLAND AND TOWNS LOCATED IN WESTERN ALEXANDER COUNTY

The 2011 flood and record peak on the Ohio River caused the Mississippi River near the confluence to back up for many kilometers to the north and affected all bottomlands in Alexander County, Illinois, that were located on the east side of Upper Mississippi River (figure 1). Since the gradient on the Mississippi River is between 12 and 25 cm km^{-1} (0.5 to 1 ft mi^{-1}), the Mississippi River water rose an additional 5.5 m (18 ft) above the flood stage further north. This occurred at a time when the Ohio River was 6.7 m (22 ft) above flood stage and the Mississippi River north of Cape Girardeau, Missouri, was 3 m (9.9 ft) above flood stage. Cities farther to the north like St. Louis, Missouri, were only subjected to floodwaters 2 m (6.6 ft) above flood stage as a result of water flowing from the Upper Mississippi and Missouri rivers.

The May 2nd topping and breach of the Len Small levee occurred just a few hours before the pressure of record flood levels was relieved with the opening of the Birds Point–New Madrid Floodway at 10:00 p.m. Illinois farmers, landowners, and homeowners protected by the Len Small levee might have benefited if the floodway had been opened on April 28th or 29th (2011) when the first weather forecast was issued with a projected Ohio River peak level of 18.3 m (60.5 ft) or higher on the Cairo gage. This is the criteria set in 1986 USACE operational plan that needs to be met before the USACE can artificially breach the levee at Birds Point and use New Madrid Floodway to relieve river pressure and store excess floodwaters. There were a number of reasons why the USACE did not open the floodway on April 28, 2011, and waited until the evening of May 2, 2011. These reasons included the possibility that the forecasted peak would never happen and concern about the damage it would have caused to the 53,200 ha (133,000 ac) of farmland and buildings in the Birds Point–New Madrid Floodway. Consequently, the USACE continued to monitor the situation and waited a few more days before making the final decision to load the trinitrotoluene (TNT) (once loaded it would be difficult to remove if not exploded) into the Birds Point fuse plugs and blow it up on May 2, 2011 (Camillo 2012). The other reasons for the delay were the mega sand boil in Cairo, the heavy local rains in the area of the confluence of the Ohio and Mississippi rivers, and the new peak forecast of 19.2 m (63.5 ft) (Camillo 2012). All these events occurred on May 1, 2011, the day the Supreme Court rejected the Missouri Attorney General's lawsuit filed in an attempt to block the USACE from opening the Birds Point–New Madrid Floodway in an effort to protect Missouri citizens and property.

Flooding of Alexander County from the Ohio and Cache rivers resulted in some flooding in the town of Olive Branch in late April and on May 1, 2011. This was before the Len Small breach occurred on May 2, 2011, and there was some damage to private and public lands prior to the breach. Floodwater from the Mississippi River added to the local flooding caused by the middle Cache River in late April when the record high Ohio River returned to its historic path and poured through the 2002 unrepaired Karnak levee breach into the middle Cache River valley and flooded the Olive Branch and Horseshoe Lake area. These floodwaters eventually drained back into the Mississippi River near Route 3 and through the diversion near mile marker 15 (figure 1) and through the Len Small levee breach.

Figure 6

Land scouring, gullies, and erosion north of the Len Small levee breach.

As a result of Cache River valley floodwater flowing through the Karnak levee breach and the additional Mississippi River floodwaters pushing through the Len Small breach, 4,000 ha (10,000 ac) of farmlands lost the winter wheat crop or were not planted in 2011, and about half of that land (mostly Weinbach silt loam, Karnak silty clay, Sciotoville silt loam, and Alvin fine sandy loam) (Parks and Fehrenbacher 1968) had significant soil damages, including land scouring and sediment deposition, or was slow to drain. Crater lakes, land scouring (figure 6), gullies, and sand deltas were created when the Len Small levee breached and removed agricultural land from production (Olson 2009; Olson and Morton 2012b). Most of the other farmland in Alexander County dried out sufficiently to permit planting of wheat in fall of 2011. It appears that all of Alexander County soils dried sufficiently by spring of 2012 to allow the planting of corn and soybeans. It is not clear how much 2011 farm income replacement came from flood insurance since not all Alexander County, Illinois, farmers had crop insurance. In addition, roads and state facilities were impacted by floodwaters which passed through the Len Small breach.

Illinois agricultural statistics recorded that 1,800 fewer ha (4,500 ac) of corn and 2,600 less ha (6,500 ac) of soybeans were harvested in Alexander County in 2011 compared to 2010. The area produced 1,570,000 bu of corn in 2010 but only 710,000 bu in 2011. The soybean production level was 1,200,000 bu in 2010 but dropped to 865,000 bu in 2011 due to flooding, crop, and soil damage. The floodwaters also scoured the agricultural lands in some places and deposited sand at other locations.

FLOODING OF PUBLIC AND PRIVATE BOTTOMLANDS WITH AND WITHOUT LEVEE PROTECTION IN WESTERN ALEXANDER COUNTY, ILLINOIS

All bottomlands north of the confluence between the Mississippi River and the western Alexander County levees with an elevation of less than 100.7 m

(332 ft) above sea level were flooded when the Mississippi River backed up. Approximately 24,000 ha (60,000 ac) of public and private alluvial lands, both levee protected and without levees, were flooded along the east and north sides of the Mississippi River (figure 1) between mile markers 12 and 39. The 1957 to 1963 soil maps of the area show alluvial soils consisting of recently deposited sediment that varies widely in texture (from clay to sand) with stratified layers. The natural vegetation on these alluvial bottomlands ranges from recent growth of willows (*Salix* L.) and other plants to stands of cottonwood (*Populus deltoides* L.), sycamore (*Platanus occidentalis* L.), and sweet gum (*Liquidambar styraciflua* L.).

The map (figure 1) shows the public and private lands of the southwest Alexander County, Illinois, area that were impacted by the flood of 2011. Approximately one third of the area (8,000 ha [20,000 ac]) is in public lands, including uplands (the Shawnee National Forest and Santa Fe Hills) and bottomlands (Burnham Island Conservation, Horseshoe State Conservation area, Goose Island, Big Cypress, and the land adjacent to the Len Small and Fayville levees). The unleveed bottomlands and public conservation areas sustained flood damage but were more resilient than the private agricultural and urban lands inside the levees. The Mississippi bottomlands are riparian forests (transition ecosystems between the river and uplands) with fertile, fine textured clay or loam soils that are enriched by nutrients and sediments deposited during flooding (Anderson and Samargo 2007). Bottomlands that experience periodic flooding have hydrophytic plants and hardwood forests that provide valuable habitat for resident and migratory birds. The Illinois Department of Natural Resources has an extensive research program monitoring migratory birds and waterfowl at Horseshoe Lake. Although these alluvial river bottomland species are well adapted to periodic flood cycles which can last several days to a month or more (Anderson and Samargo 2007), the impact of the 2011 flood duration (2 to 4 weeks) on these wetlands habitat and woodlands has not been assessed.

Figure 7

A farmstead protected by a farmer-built levee.

There are a number of towns and villages in western Alexander County, including Olive Branch, Miller City, and Cache. Floodwaters covered roads and railroads and damaged some bridges, homes, and other building structures. In western Alexander County, floodwater destroyed 25 Illinois homes and damaged an additional 175 homes and building structures located on Wakeland silt loam and Bonnie silt loam soils (Parks and Fehrenbacher 1968) or similar alluvial floodplain soils. The Olive Branch area (figure 1) was one of the hardest hit according to Illinois Emergency Management Agency.

Agricultural and forest lands on the riverside of the Len Small levee are not protected from flooding and store significant amounts of floodwater with minimal damage to the crops such as soybeans, which can be planted later in the spring or early summer. This farmland was under water prior to planting for the entire months of April and May, 2011. After both the Ohio and Mississippi rivers dropped and drained by late June of 2011, these fields were planted to soybeans. Late May and early June is the normal planting time for soybeans in the area, so a small soybean yield reduction was noted.

REPAIR OF LEN SMALL LEVEE IN WESTERN ALEXANDER COUNTY

In the fall of 2011, local farmers and members of the Len Small Levee District patched the Len Small levee. They created a sand berm 1 m (3 ft) lower than the original levee. They hoped the USACE would cover the levee with a clay cap and restore it at least to the original height. The USACE agreed to do this in August of 2012 after receiving additional funds from Congress. The project was completed in 90 days. Some individual farmers created berms around their farmsteads (figure 7) to protect their farmsteads from any future flooding that might occur.

In June of 2012, the USACE received US$802 million in emergency Mississippi River flood-repair funding for up to 143 high-priority projects to repair levees, fix river channels, and repair other flood-control projects in response to the spring of 2011 flood, which set records from Cairo, Illinois, to the Gulf of Mexico. Both the Birds Point–New Madrid Floodway levee repair and the Cairo area restoration projects were high on the list with the USACE targeting US$46 million to repair the damage to Cairo area, including the Alexander County area flood-control systems (Camillo 2012; Olson and Morton

2012a, 2012b). Improvements were completed throughout Alexander County, including work on pump stations, drainage systems, and small levees, some of which failed in April of 2011. These projects were funded by the county matching funds with the USACE and a combination of grants from the Delta Regional Authority and the State of Illinois (Koenig 2012). The creation of a larger drainage system running through northern Alexander and Union counties included large culverts and levees designed to better protect Illinois communities such as East Cape Girardeau, McClure, Gale, and Ware, and help keep water from collecting in low-lying bottomland areas.

CONCLUSIONS

In 2011, the record Ohio River flood resulted in the USACE blasting open the Birds Point levee fuse plug as waters reached a critical height on the Cairo gage. However, this unprecedented flood level at the confluence put tremendous pressure on and under the Mississippi levees to the north in western Alexander County. The delay in the decision to blow up the Birds Point fuse plugs and frontline levees had significant consequences for rural Illinois landowners, farmers, and residents in Alexander County near the Len Small levee that failed the morning of May 2, 2011, at a time when the peak flow on the Ohio River caused the Mississippi River water to back up many kilometers to the north. Local flooding and damage to building structures, crops, and soils initially occurred in late April of 2011when the Ohio River at flood stage poured through the Post Creek cutoff and a previously unrepaired Karnak levee breach and rushed to the west through the middle Cache River valley. Consequently, the town of Olive Branch would have flooded even if the Len Small breach had not occurred. The Len Small levee situation does not seem to have been a factor in the USACE decision-making process or have affected the time of the opening of the Birds Point–New Madrid levee fuse plug. The USACE did consider the need to protect the Cairo mainline levee and floodwall and the Commerce to Birds Point main line levee from a breach, as well as potential impact on landowners in the Birds Point–New Madrid Floodway. The mega sand boil in Cairo, the heavy local rains on May 1st in the Mississippi River watershed, and the new peak forecast of 19.2 m (63.5 ft) on the Cairo gage proved opening the Floodway was the correct decision. The frontline Commerce to Birds Point levee did not fail, and more than 1 million ha (2.5 million ac) of agricultural bottomlands in Missouri Bootheel and Arkansas were protected from flooding. Even if the Birds Point–New Madrid levee had been opened four days sooner at a time when the record level floodwaters were 1.3 m (4 ft) lower, the prolonged record Mississippi River floodwater levels and pressure on the Len Small levee, which continued for weeks, would likely have still resulted in the Len Small levee breach a few days later.

ACKNOWLEDGEMENTS

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CERTIFICATE OF SERVICE

I hereby certify that on July 3, 2014, I electronically filed the Declaration of Nicholas Pinter, Ph.D. in Support of Plaintiffs' Motion for Preliminary Injunction and Exhibits 1, 2 and 3 thereto with the Clerk of the Court using the CM/ECF system which will send notification of such filings to all registered counsel participating in this case. There are no non-registered participants in this case.

Respectfully submitted,

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IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF ILLINOIS

NATIONAL WILDLIFE FEDERATION, PRAIRIE RIVERS NETWORK, MISSOURI COALITION FOR THE ENVIRONMENT, RIVER ALLIANCE OF WISCONSIN, GREAT RIVERS HABITAT ALLIANCE, and MINNESOTA CONSERVATION FEDERATION, Plaintiffs, vs. UNITED STATES ARMY CORPS OF ENGINEERS; LT. GENERAL THOMAS P. BOSTICK, Commanding General and Chief of Engineers, LT. GENERAL DUKE DELUCA, Commander of the Mississippi Valley Division of the Army Corps of Engineers, Defendants.	CASE NO. 14-00590-DRH-DGW **REPLY DECLARATION OF NICHOLAS PINTER, Ph.D. IN SUPPORT OF PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION** HEARING: TBD TIME: TBD

I, Nicholas Pinter, declare as follows:

1. The facts set forth in this Declaration are based upon my personal knowledge. If called as a witness, I could and would testify to these facts. As to those matters that present an opinion, they reflect my professional opinion and judgment on the matter. I make this Declaration in support of plaintiffs National Wildlife Federation *et al.*'s reply memorandum of points and authorities in support of their motion for preliminary injunction halting construction of any new river training structures as part of the U.S. Army Corps of Engineers' ("Corps'") management of the Upper Mississippi River System, including those planned as part of the Dogtooth Bend, Monsenthein/Ivory Landing, Eliza Point/Greenfield and Grand Tower projects.

2. I am a Professor in the Geology Department and Environmental Resources and Policy Program at the Southern Illinois University ("SIU"), and Director of the SIU's Integrative Graduate Education, Research and Training ("IGERT") program in "Watershed Science and Policy." I have over 20 years' experience in the fields of geology, geomorphology, fluvial geomorphology and flood hydrology. My qualifications, professional experience and background are set forth in my original June 24, 2014 (filed July 3) declaration ("Original Declaration" or "Pinter Declaration"), and Exhibit 1 thereto. Pinter Dec. ¶¶ 1-5 & Exh. 1.

Documents Reviewed for this Declaration

3. In preparing this Declaration, I reviewed the following documents in addition to the documents listed in paragraphs 6 and 7 of my original declaration: (1) Defendants' Opposition to Plaintiffs' Motion for a Preliminary Injunction ("Opposition Brief"), (2) the Declaration of Edward J. Brauer ("Brauer Declaration"), (3) the Declaration of Michael G. Feldman ("Feldman Declaration") and Attachments 1 and 2 thereto, and (4) the Declaration of Jody H. Schwarz in Support of Defendants' Opposition to Plaintiffs' Motion for a Preliminary Injunction ("Schwarz Declaration") and Exhibits 1 through 6 thereto.

Analysis

4. I was asked prior to preparing my Original Declaration to form an independent professional opinion as to whether building new river training structures, including those planned by the Corps in the Dogtooth Bend, Monsenthein/Ivory Landing, Eliza Point/Greenfield Bend and

Grant Tower projects, may pose a significant risk of irreparable harm to the natural environment and to people and the property of people who live, work, attend school and/or recreate in the floodplain, including by raising flood stage heights on the Mississippi River. As discussed below, my original conclusion remains the same after reviewing the Opposition Brief and the Brauer, Feldman and Schwarz declarations. I conclude that the Corps' proposed projects, and river training structures generally, *do* pose a significant risk of irreparable harm to the natural environment, human safety and human property. As discussed in detail below, neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations provides evidence that river training structures do *not* raise flood levels.

5. I was also asked prior to preparing this Reply Declaration to review the Feldman Declaration and, to the extent he discusses topics within my area of expertise, to form an independent professional opinion as to his claims regarding the benefits of river training structures and the costs of delaying or permanently tabling the Dogtooth Bend, Monsenthein/Ivory Landing and Eliza Point/Greenfield Bend projects. As discussed in detail below, I conclude after reviewing Mr. Feldman's Declaration that he overstates some of benefits of river training structures as well as the costs of delaying or permanently tabling the proposed the Dogtooth Bend, Monsenthein/Ivory Landing and Eliza Point/Greenfield projects.

A. The Information and Conclusions in My Original Declaration Remain Accurate and Unchanged.

6. As I attested in paragraph 9 of my Original Declaration, damages from floods worldwide have risen dramatically over the past 100 years (Munich Re Group, 2007). While much of this increase is due to economic development in floodplains (Pinter, 2005; Pielke, 1999), it is also clear that flooding itself has physically increased in magnitude and frequency on many rivers, including the Mississippi River. (Pinter et al., 2006a; Pinter et al., 2006b; Helms et al., 2002). Historical time series of stage data, which are unequivocally homogenous over time (Criss and Winston, 2008), show strong and statistically significant increases of flood heights on portions of

the Mississippi River over time. Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations rebuts these facts.

7. As I attested in paragraph 10 of my Original Declaration, a number of processes can lead to flood magnification or otherwise alter flood response on a river. These include climate change, agricultural practices, forestry practices, urbanization and construction of other impervious surfaces, loss of wetlands, decreases in floodplain areas, construction and operation of dams, and modifications and engineering of river channels. The range of these changes can alter the volume and timing of runoff (discharge or flow of water) entering and moving through river systems. In addition, other natural or human-induced changes to river channels and their floodplains can alter the conveyance of flow within the river channel, resulting in increases or decreases in water levels (including flood stages) for the same discharge. Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations rebuts these facts.

8. As I attested in paragraph 11 of my Original Declaration, the Mississippi River has been intensively engineered by the Corps over the past 50 to 150-plus years (depending on the reach), and some of these modifications are associated with large decreases in the river's capacity to convey flood flows. Numerous scientific investigations, including Corps reports, some dating back to the early 1900s or earlier, have noted large increases in flood levels in association with wing-dike construction. For example, investigators recognized as early as 1933 that "bankful [sic] carrying capacity [of the Missouri River] would be permanently reduced by existing works, such as dikes and revetments used in shaping and controlling the stream for modern barge transportation" (Hathaway, 1933 (quote); Schneiders, 1996 at 346 (same)). Harrison (1953) likewise found that at discharges greater than 50,000 cubic feet per second the "controlled [channel of the Missouri River] has [a] smaller capacity, having 35% less discharge at bankfull stage," one "principal reason" for which was the "increase in roughness" caused by "[t]raining dikes protruding into the flow." These findings that river training structures increase flood levels have been confirmed worldwide and are considered accepted knowledge elsewhere. In the Netherlands, for example, the government has begun modifying river training structures on the Rhine River to lower flood levels (U.S. Government Accountability Office, "Mississippi River: Actions Are Needed to Help Resolve

Environmental and Flooding Concerns about the Use of River Training Structures, December 2011; "GAO Report") at 41. To date, however, the Corps has never addressed in an EIS the vast body of peer-reviewed, independent research showing that river-training structures increase flood heights. *Id.* These facts are unrebutted by both the Corps in its Opposition Brief and Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations.

9. The Corps and Mr. Brauer do both contend, however, that contrary to the weight of the published studies discussed above and below, the "results of . . . independent expert external reviews all lead to the conclusion that river training structure construction has *not* resulted in an increase in flood levels." Brauer Dec. ¶ 8 (emphasis added); Opposition Brief at 13. But Mr. Brauer fails to describe or cite to the alleged "external reviews," and thus provides no evidence on which to judge his assertion. Mr. Brauer also provides no evidence refuting, among other things, the aforementioned evidence discussed in Hathaway (1933) and Schneiders (1996) that "the carrying capacity of the [Missouri] river has been decreased so materially by the [river training] work that floods have occurred at such points as Waverly, Boonville and Hermann, Mo., at lower gauge readings with smaller volumes of water than the 1929 flood stage." Mr. Brauer asserts that Schneiders (1996) does not "draw any conclusions on the impact of river training structure construction on flood levels." Brauer Dec. ¶ 12. But his assertion is directly refuted by the quoted passage from Schneiders (1996). It is only by ignoring or improperly discrediting the evidence I have cited that Mr. Brauer is able to claim that none of the "additional 11 references cited by Dr. Pinter . . . would lead the Corps to a different conclusion on the impacts of river training structure construction on flood levels and public safety than what was established in the EAs." Brauer Dec. ¶ 13.

10. Mr. Brauer and the analysis in Appendix A to the environmental assessments ("EAs") for the Dogtooth Bend, Monsenthein/Ivory Landing and Eliza Point/Greenfield projects are also wrong in concluding that 51 studies attached to the comments of the National Wildlife Federation, Izaak Walkton League of America, Missouri Coalition for the Environment, Prairie Rivers Network and Sierra Club on the draft EAs, including many of my own studies, do *not* "support[] the conclusion that flood levels have . . . been increased as a result of construction of

river training structures." Brauer Dec. ¶ 9. For example, in discrediting many of "the 51 studies provided to the Corps" as only discussing "flow frequency, physical modeling and model scale distortion [or] levee construction" rather than "the construction of river training structures and/or increases in flood levels," Mr. Brauer makes the unfounded and erroneous conclusion that any research study without "river training structure" in its title is not relevant to the effect of such structures on flood levels. Brauer Dec. ¶ 10. To the contrary, all of the topics covered by those studies are necessary for understanding the processes by which river training structures interact with flow and affect flood levels. Increases in flood frequency, for example, are merely a statistical transformation of – meaning they are essentially the same as – increases in flood levels. As discussed further below, Mr. Brauer is also wrong that the all of my research and others' studies that "link river training structures to an increase in flood levels" contains "[m]ajor errors" that "put[] into question [the studies'] conclusion that the construction of river training structures impacts flood levels and consequently public safety." Brauer Dec. ¶ 16.

11. As I attested in paragraph 12 of my Original Declaration, my research has looked extensively at the extent and causes of flood magnification, particularly on the Mississippi River. This research documents that climate, land-use changes, and river engineering have contributed to statistically significant increases in flooding along portions of the Mississippi River system. However, the most significant cause of flood height increases on the Middle Mississippi River and Lower Missouri River can be traced to the construction of wing dikes and other river training structures. Indeed, flood height increases on those river segments exceed by a factor of ten the largest possible flood-stage increases due to observed increases in climate-driven and land-cover-driven flow (e.g., Pinter et al., 2008). In addition, the large multivariate study by Pinter et al. (2010) identified the age, location, and extent of every large levee system added to the Mississippi-Lower Missouri system during the past century, documenting that levees do contribute some but not all of the observed flood-level increases on the Middle Mississippi and elsewhere (confirming modeling by Remo et al., 2009; see Exhibit 2 to my Original Declaration). As discussed further below, Mr. Brauer wrongly discredits my research and others' studies that reach similar conclusions for having allegedly "[m]ajor flaws," including "use of inaccurate early discharge," "use of

estimated daily discharge data," "statistical errors," "not counting for other physical changes within the channel," and "the use of non-observed interpolated synthetic data points."

12. As I attested in paragraph 13 of my Original Declaration, recent theoretical analysis has shown that increased flood levels caused by wing-dike construction are "consistent with basic principles of river hydro- and morphodynamics" (Huthoff et al., 2013). This study concluded that even with extremely conservative parameters used in modeling, "the net effect of wing dikes will be higher flood levels." *Id.* Mr. Brauer criticizes Huthoff et al. (2013) as having "major errors" that "lead[] to incorrect conclusions on the magnitude of change in water surface by the author." Brauer Dec. ¶ 22. Mr. Brauer is not only wrong, he overstates his own criticisms in his (Brauer and Duncan) comment letter to Journal of Hydraulic Engineering, in which Huthoff et al. (2013) was published after peer review. Huthoff et al. (2013) presents fluid dynamical calculations showing that increases in flood levels are consistent with wing-dike construction in river channels. Brauer and Duncan submitted a comment letter to the journal suggesting that Huthoff et al.'s method was "oversimplified" and "simplistic," on which Mr. Brauer bases his criticism of the paper in his declaration. Huthoff et al., however, have submitted for publication a detailed rebuttal of Brauer and Duncan's critique, concluding that "reasonable assumptions *do* lead to significant surcharges [stage increases due to wing dikes] . . . and Huthoff et al. (2013) reach the modest conclusion that wing-dike-induced stage increases 'are consistent with basic principles of river hydro- and morphodynamics'" (Huthoff et al., 2014, submitted) (emphasis added).

13. As I attested in paragraph 14 of my Original Declaration, the theoretical analysis of Huthoff et al. (2013) is supported by empirical studies that have utilized hydrologic analyses; rigorous statistics; geospatial analyses; and 1D, 2D, and 3D hydraulic modeling to confirm, empirically as well as theoretically, the potential for significant increases in flood levels in response to the dense emplacement of wing-dike structures, such as employed on the Middle Mississippi River. Among this body of research, my research group was funded by the National Science Foundation to construct two large river-related databases to rigorously test for trends in flood magnitudes over time on over 4000 kilometers (over 2400 miles) of the Mississippi and Missouri

Rivers, and to quantify the impacts on flood levels from each unit of channel and floodplain infrastructure construction or other change.

14. As I attested in paragraph 15 of my Original Declaration, our hydrologic database consists of more than 8 million discharge and river stage values, including new synthetic discharges generated for 41 stage-only stations. This hydrologic database was used to test for significant trends in discharges, stages, and ''specific stages.'' We also conducted an extensive review of the validity of using discharge data taken from different types of measurement devices (float meters vs. other types of meters). Pinter (2010) tested whether it was appropriate to utilize older discharge measurements by examining 2150 historical discharge measurements digitized from the three principal stations on the Middle Mississippi River ("MMR"), including 626 float-based discharges and 1516 meter-based discharges, and including 122 paired measurements. All statistical tests we performed demonstrated that it was appropriate to utilize both older historical discharge data and newer discharge data as those different types of measurement tools produced accurate discharge measurements.

15. Mr. Brauer asserts that our conclusion in Pinter (2010) that older and newer discharge data alike produce accurate discharge measurements is invalid because "Pinter (2010) fails to go further in comparing [the pre-1933 discharge measurements] with the post-1933 [U.S. Geological Survey ('USGS')] data to confirm that the two data sets can be used together." Brauer Dec. ¶ 18. Mr. Brauer misrepresents Pinter (2010). The explicit purpose and methodology of the paper was to compare float-based discharge measurements with meter-based measurements, which the Corps has repeatedly singled out as the source of purported bias in the older discharge measurements.

16. Mr. Brauer further contends that "[e]arly discharge data collected before the implementation of standard instrumentation and procedures by the USGS in 1933 has been proven to be inaccurate (Ressegieu 1952, Dyhouse 1976, Dyhouse 1985, Dieckmann and Dyhouse 1998, Huizinga 2009, Watson el al. 2013a)." Brauer Dec. ¶ 18 (quote); Opposition Brief at 14 (same). Mr. Brauer is wrong. None of these sources prove that early discharge measurements – measurements made by the Corps' St. Louis District – are incorrect. To the contrary, and as

outlined above, Pinter (2010) completed a detailed statistical analysis of side-by-side measurements (using velocity meters as well as floats, which is the point of contention here) and found that the early measurements are as reliable as and fully comparable with the later measurements. This conclusion reiterates the conclusions of a study in the 1970s by the Corps itself (Stevens, 1979). Mr. Brauer's purportedly dispositive citations are not analyses and provide little or no new information on this subject. Ressegieu (1952) is an internal Corps memo. Dyhouse (1976) is an opinion letter critiquing an academic study. Dyhouse (1985) is an unpublished opinion article, without any analysis. Dieckmann and Dyhouse (1998) is an intergovernmental presentation that that asserts flaws in early discharges without any supporting evidence. Huizinga (2009) and Watson et al. (2013) are both Corps-funded studies that question early discharge values without providing evidence that they are invalid. Pinter (2014) details thorough responses to Watson et al. (2013) demonstrating its shortcomings.

17. Mr. Brauer's focus on and criticism of our use of pre-1933 discharge data is further undermined by the fact that the large majority of the 67 stations analyzed in Pinter et al. (2008, 2010) utilized only the later, post-1933 USGS discharge values. Analyses of these numerous USGS-only measurement gages show stage increases fully consistent with gages consisting of both early and later measurements.

18. In addition to Mr. Brauer's erroneous claims that much of our hydrologic data is too early to be accurate, he also wrongly contends that our hydrologic database and subsequent analyses are flawed because they "use . . . daily discharge data" and data "fabricated using interpolation schemes." Brauer Dec. ¶¶ 19 (first quote), 20 (second quote); Opposition Brief at 14 (same). I rebut each of these two erroneous claims in turn below.

19. Mr. Brauer asserts that a "major error in Dr. Pinter's analyses is the use of daily discharge data." Brauer Dec. ¶ 19. Our use of daily discharge data is not in error. Daily discharge values are published and used by the Corps, USGS and many other agencies and scientists worldwide, and are the accepted technical standard for a wide range of analyses and modeling, including by the Corps. With specific respect to their use in determining flood-level trends, daily discharge values (derived from daily stage measurements, combined with accepted rating curves)

produce the same overall results as do the much more limited number of direct measurements. Disqualifying all Corps and USGS daily discharge datasets as Mr. Brauer suggests would do *nothing* to prove that flood level trends have not increased. Instead of demonstrating some contrary trend, disqualifying these datasets would merely reduce the number of discharge values and thereby lower the statistical significance of the increasing flood level trends already found (see Pinter, 2014).

20. Mr. Brauer claims that a "majority of the hydrologic data" in our hydrologic database "(data at 49 of the 67 stations on the Mississippi River and Lower Missouri River) were fabricated using interpolation schemes developed by Jemberie et al. (2008), and they are not real data points." Brauer Dec. ¶ 20. Mr. Brauer misrepresents the data used in Jemberie et al. (2008). That study created a numerical algorithm for utilizing nearby stations and the year-to-year pattern of hydrologic behavior in order to interpolate the shape of trends for the largest flows, which occur only every few years. As Jemberie et al. (2008) makes clear, the overall trends and conclusions therefrom are determined only by the *measured* values in *large flood years*, which are most events for assessing the relationship between flood stage and river training structures. The *interpolations* based on measurements for smaller floods help suggest the likely patterns during the *intervening years*. Jemberie et al. (2008) also uses flow measurements from nearby stations to infer discharges during select years, which improves the accuracy of the overall data. For example, one station may lack direct flood measurements in 1940, but another station just a few miles upstream may have full measurements for that year. On a river as large as the MMR, neighboring sites have nearly identical flows. Jemberie et al. (2008) creates these neighboring discharge estimates by scaling each site proportional to its drainage basin area, and explicitly excluding any pair of measurement sites separated by a major tributary input. Jemberie et al. (2008) and its discharge data and estimates are methodologically sound. Mr. Brauer offers no specifics to show otherwise, or demonstrate any flaws in our use of the study's data.

21. As I attested in paragraph 16 of my Original Declaration, we developed a geospatial database alongside our hydrologic database. Our geospatial database consists of the locations, emplacement dates, and physical characteristics of over 15,000 structural features constructed along

the study rivers over the past 100 to 150 years. In developing this database we utilized: more than 4000 individual map and survey sheets; structure-history databases from six Corps Districts; databases from other agencies including the Coast Guard; and archival maps and surveys, all digitized and calibrated into a modern coordinate system and frame of reference. Within this database we parameterized 130 bridges, 54 dam structures, 25 artificial meander cut-offs, 1093 levees, and 13,231 wing-dam segments, among many other structures. Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations disputes these facts.

22. As I attested in paragraph 17 of my Original Declaration, we used our hydrologic and geospatial databases together to generate reach-scale statistical models of hydrologic response. These models quantify changes in flood levels at each station in response to construction of wing dikes, bendway weirs, meander cutoffs, navigational dams, bridges, and other river modifications. Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations disputes these facts.

23. As I attested in paragraph 18 of my Original Declaration, our analyses show that while climate and other land-use changes did lead to increased flows, *the largest and most pervasive contributors to increased flooding on the Mississippi River system were wing dikes and related navigational structures*. In contrast, large reaches of the Mississippi and Missouri Rivers with little or no dike construction showed *no* significant increases in flood levels. System-wide, the hydrologic pattern was that large-scale increases in flood levels occurred when and where large numbers of dikes and dike-like structures have been built. Progressive levee construction was the second largest contributor. While, as discussed elsewhere in this Declaration, the Corps and Mr. Brauer make several erroneous criticisms of our hydrologic data and analyses thereof, they do not contend that we did not make the stated conclusions from our analyses.

24. As I attested in paragraph 19 of my Original Declaration, our analyses demonstrate that wing dikes constructed downstream of a location were associated with increases in flood height ("stage"), consistent with backwater effects upstream of these structures. Backwater effects are the rise in surface elevation of flowing water upstream from, and as a result of, an obstruction to water

flow. These backwater effects were clearly distinguishable from the effects of upstream dikes, which triggered simultaneous incision and conveyance loss at sites downstream. On the Upper Mississippi River, for example, stages increased more than four inches for each 3,281 feet of wing dike built within 20 RM (river miles) downstream. These values represent parameter estimates and associated uncertainties for relationships significant at the 95 percent confidence level in each reach-scale model. The 95-percent level indicates at least a 95% level of certainty in correlation or other statistical benchmark presented, and is considered by scientists to represent a statistically verified standard. Our study demonstrated that the presence of river training structures can cause large increases in flood stage. For example, at Dubuque, Iowa, roughly 8.7 linear miles of downstream wing dikes were constructed between 1892 and 1928, and were associated with a nearly five-foot increase in stage. In the area affected by the 2008 Upper Mississippi flood, more than six feet of the flood crest is linked to navigational and flood-control engineering. While, as discussed elsewhere in this Declaration, the Corps and Mr. Brauer make several erroneous criticisms of our hydrologic data and analyses thereof, they do not contend that we did not make the stated conclusions from our analyses.

25. In addition, the Corps and Mr. Brauer wrongly contend that my Original Declaration is "fatally flawed" because I "discuss[] [my and others' research on] many rivers and river reaches [not on the MMR] in an attempt to imply that dikes on the MMR . . . are increasing flood levels." Opposition Brief at 14 (first quote); Brauer Dec. ¶ 24(a) (second quote). Different reaches of the Mississippi River do vary in some of their characteristics, but the same laws of physics apply to the MMR as to the other rivers and river reaches I discuss and allow for valid comparisons. Contrary to the Corps' and Mr. Brauer's opposite contention, understanding the impacts of Middle Mississippi River training structures can *not* be limited to looking only at the Middle Mississippi River. Understanding how different rivers and river reaches are managed (e.g., whether river training structures are used) and the resulting impacts from those management practices are *critical* to assessing how river training structures impact flood stage height. Our research and studies by other researchers show that while there are little or no increasing flood trends on stretches of the Mississippi and other rivers with few or no river training structures, there are large increases in

flood trends at locations (like on the MMR) where and at times when many new river training structures are built.

26. As I attested in paragraph 20 of my Original Declaration, more than 143 linear miles of wing dikes have been constructed on the Middle Mississippi River over the past 100 years (Remo and Pinter 2007; Remo et al. 2008). This represents about 3,960 feet of wing dikes per mile (or about 2,460 feet per kilometer) of channel. Wing dikes have also been heavily utilized on the Lower Missouri River, with over 383 linear miles constructed since 1890. This represents nearly 3,700 feet of wing dike per mile (or about 2,300 feet per kilometer) of channel in the Lower Mississippi River. These and similar river training structures are utilized to assist in river bank protection and stimulate channel scour which can reduce the amount of dredging required to maintain adequate navigation depths (e.g. COPRI 2012). Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations rebuts these facts.

27. As I attested in paragraph 21 of my Original Declaration, the effects of wing dikes and other structures during flooding should not be confused with effects during periods of low flow. There is general agreement that during low in-channel flows, wing dikes lead to lowered water levels at most locations. This happens because the dikes cause channel incision, in which flow removes sediment from the stream bed and ultimately establishes a lower bed elevation. Channel incision is a process that has been well documented after dike construction in many (but not all) areas of the alluvial Mississippi and Missouri Rivers (e.g., Pinter and Heine 2005; Maher 1964). Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations rebuts these facts.

28. As I attested in paragraph 22 of my Original Declaration, incision has caused water levels during periods of low flow (not floods) to decrease over time at the St. Louis, Chester, and Thebes measurement stations, as well as at other, intermediate locations. For all flood flows (flows equal to four or more times the average annual discharge level), however, water levels have increased *by three to ten feet or more* at all of these locations along the MMR. At Grand Tower, Illinois, water levels for just average flows have increased by almost three feet due to dike and weir construction. Near Grand Tower, bedrock underlies parts of the Middle Mississippi channel and

limits incision (Jemberie et al. 2008). The majority of these facts are unrebutted by both the Corps in its Opposition Brief and Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations. However, as discussed and rebutted below, Mr. Brauer erroneously claims that there is no bedrock near the proposed Grand Tower project location. Brauer Dec. ¶ 24(g).

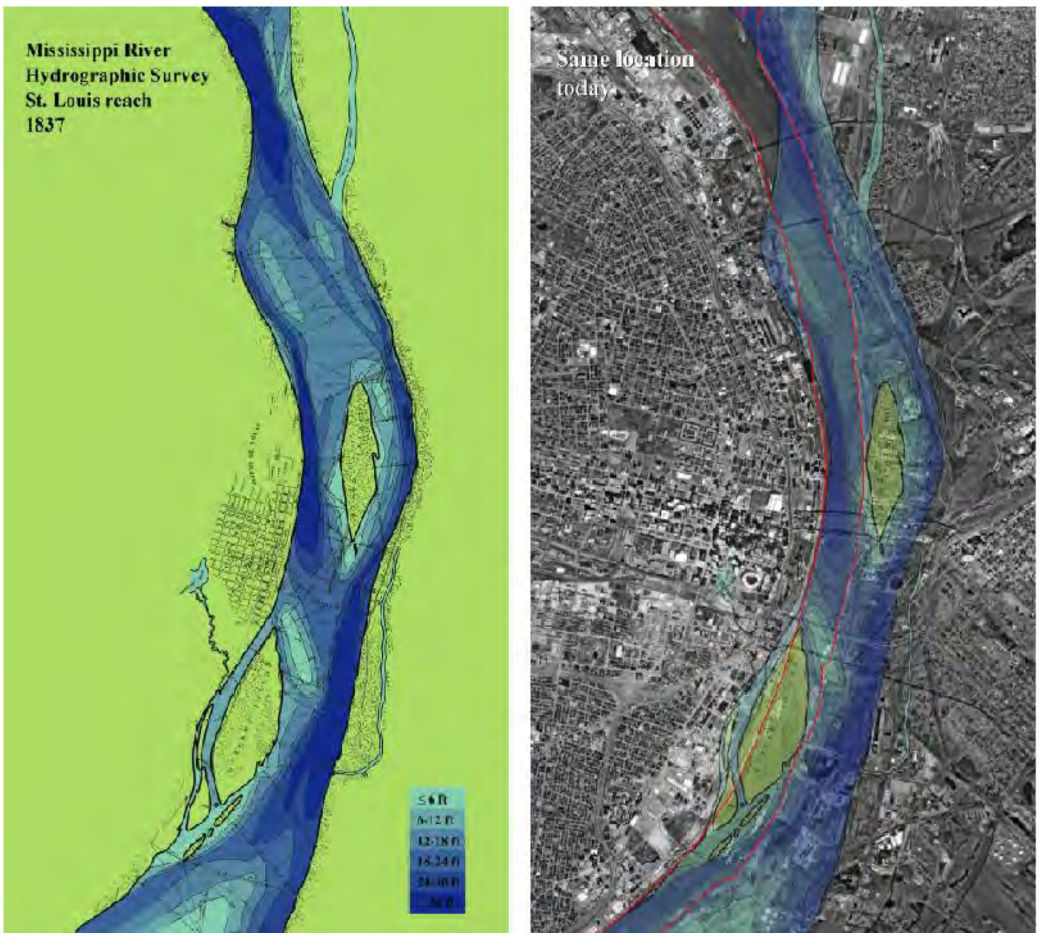
29. As I attested in paragraph 23 of my Original Declaration, many other studies confirm and corroborate these findings on the flow-dependent effects of river training structures. Particularly after the record-breaking floods on the Middle Mississippi, researchers sought to answer why such large increases in flood levels had occurred for the same discharges (volumes of flow) that had been observed in the past. (e.g., Belt 1975; Stevens et al. 1975). Since then, multiple studies involving hydrologic time-series analyses, statistical analyses, geospatial analyses, and hydraulic modeling have correlated the timing and spatial distribution of dike construction with increases in flood stages (e.g., Criss and Shock 2001; Wasklewicz et al. 2004; Jemberie et al. 2008; Pinter et al. 2008; Remo et al. 2009; Pinter et al. 2010, and others).

30. As I attested in paragraph 24 of my Original Declaration, wing dikes and other river training structures increase flood heights during high water because of the way they interact with river flow and the way they change the shape and form of the river channel. Since the beginning of historical “training” (engineering of the river to facilitate navigation) of the Mississippi and Missouri rivers, construction of dikes has narrowed large portions of these river channels to one-half or less of their original width. In addition, construction of dikes, bendway weirs, and other in-channel navigational structures has increased the "roughness" of the channel, leading to decreased flow velocities during floods.

31. Mr. Brauer responds by suggesting that I “may be referring to a river other than the MMR” in my statement that dike construction on the Mississippi and Missouri rivers has narrowed large portions of their channels to one-half or less of their original width. Brauer Dec. ¶ 24(c). I am not. And my original statement is correct. Wing dikes can reduce flow conveyance during floods and thereby increase flood levels either by reducing a river’s cross-sectional area, by increasing the roughness of the channel or both. Extensive width reductions occurred on the MMR

during the late 19th and early 20th centuries, with little long-term change thereafter. As shown by Figure 1 below, some portions of the MMR were narrowed to half or less of their original width.

Figure 1. Mississippi River at St. Louis, as surveyed by Robert E. Lee in 1837 (left), and compared with the modern width of the channel (right). The original survey has been superimposed on the right panel. The current channel is shown by the red lines on the right panel. The red-lined channel boundaries shown in the right panel demonstrate that, indeed, this portion of the MMR is half or less the width today as it was in 1837. Historical channel geometry, including depths, digitized from original survey maps.



32. Mr. Brauer also asserts that although the MMR channel "has been narrowed due to river training structure construction," studies "have shown (Maher 1964, Biedenharn et al. 2000)" that "the cross sectional area of the deeper channel is preserved and the [channel's] ability to pass flow (conveyance) is the same or in some cases increased." Brauer Dec. ¶ 24(c). He claims that

"[f]ield data taken on the MMR have shown that the narrower and deeper channel will have the same cross sectional area and average velocity as before the placement of the structure." Brauer Dec. ¶ 14. But his assertion contradicts published analyses demonstrating that the actual response of the MMR to river training structures over time has been a reduction in both cross-sectional area and velocity during large flood events due to, among other things, increased channel "roughness" (e.g. Pinter et al., 2000; Remo et al., 2009). Mr. Brauer's contention that the MMR channel's conveyance has either remained the same or increased is true only for *small non-flood* flows.

33. As I attested in paragraph 25 of my Original Declaration, channel roughness is a measure of objects and processes that cumulatively resist the flow of water through a given reach of a river, including drag effects of sedimentary grains, bedforms (e.g., ripples and dunes on the bed), vegetation, turbulence, eddy circulation, and many others. A rough river bed exerts more resistance than a smooth river bed, resulting in slower flow of water. All other factors being equal, a flood that passes through a river reach with half the average flow velocity will result in average water depths that are double what they would otherwise be. Mr. Brauer claims that my "description of the relationship between velocity and depth" is "oversimplified and misleading" because in "rivers that are natural, compound channels, all factors are not equal." Brauer Dec. ¶ 24(d). But Mr. Brauer ignores the fact that the velocity-depth relationship I describe is a physical law of hydrodynamics. Before analyzing how other factors affect that relationship, it is essential to start with a description and understanding of first principles, which is precisely what I have done.

34. As I attested in paragraph 26 of my Original Declaration, recent modeling studies demonstrate the significant effects of river training structures during flood events on flow turbulence and large-scale vertical and horizontal eddy circulation (Huthoff et al., 2013). Other recent studies have focused on flow dynamics around submerged wing dikes and their impact on channel flow resistance (e.g., Yossef 2005; Yossef and de Vriend 2011; Azinfar and Kells 2011). These studies show that submerged wing dikes create flow mixing in their wake zones (e.g., Yossef 2005; Yeo and Kang 2009; Jamieson et al. 2011). These recirculating flows consume energy from the bulk flow field, causing increases in effective resistance near wing dikes and through wing-dike fields. The impact of wing dikes on flow resistance was quantified by Yossef (2004, 2005), whose

proposed relationship allows for an initial assessment of wing-dike impact on water levels (e.g., Azinfar 2010). According to Yossef's laboratory experiments, the effective cumulative hydraulic roughness of the bank zone relates to the size and longitudinal distance between the wing dikes.

35. Neither the Corps nor Mr. Brauer disputes that river training structures cause flow resistance. Brauer Dec. ¶ 24(e). Mr. Brauer does, however, contend that "the flow resistance is greatest at stages in which the dikes are the least submerged (stages below flood stages)." *Id*. Mr. Brauer's contention states his interpretation of hydraulic theory; in fact no laboratory, numerical, or field study has comprehensively tested if such a relationship exists or quantified how the depth of flow over overtopped dikes alters the effective resistance. Contrary to such theory, empirical studies show that the stage increases caused by new wing dike fields are proportionally greater for larger flows (e.g., Belt 1975; Criss and Shock 2001; Wasklewicz et al. 2004; Jemberie et al. 2008; Pinter et al. 2008; Remo et al. 2009; Pinter et al. 2010, and others). Additional data-based research is needed to reconcile hydraulic theory with observations. Reasonable hypotheses for the observed pattern include effects of flow velocity, which increases dramatically with increasing discharge, on net resistance. The Corps and Mr. Brauer consistently turn the scientific method on its head by beginning with a conclusion – the assumption that river training structures do not increase flood levels – and fashioning arguments to fit that assumption.

36. The Corps and Mr. Brauer also attempt to discount the applicability of a small subset of the studies demonstrating that river training structures increase channel roughness, reduce conveyance and increase flood stage levels on the grounds that they are "fixed bed physical flume studies (Azinfar and Kells 2009, 2008, 2007, and Azinfar 2010)." Brauer Dec. ¶ 23 (quote); Opposition Brief at 14. But they ignore the fact that experimental studies in controlled circumstances are still relevant evidence that river training structures can increase flood stage heights, along with hydrologic analyses, statistical analyses, geospatial analyses, fluid dynamical calculations, and 1D, 2D and 3D hydraulic modeling. Each of these types of research has its advantages and limitations, which is why accurate scientific synthesis looks at the conclusions from the full corpus of scientific research. Fixed-bed physical models are imperfect simulations of water flow over river training structures, but they are nonetheless relevant. Indeed, physical modeling

like that done in the Azinfar and Azinfar and Kells studies that the Corps and Mr. Brauer criticize as irrelevant is the *primary tool* used by the Corps' St. Louis District, albeit with a sedimentary bed, for the design and prototyping of all new river training structures.

37. As I attested in paragraph 27 of my Original Declaration, the role of river training structures in increasing flood heights is well recognized. For example, in the Netherlands, the impacts of wing dikes (navigational "groynes") on flood levels have both been recognized and taken into account in flood protection strategies. The government of the Netherlands recently completed a €45 million program to lower 450 wing dikes (groynes) on the Rhine system as part of its strategy to reduce flood levels.

38. Mr. Brauer questions the relevancy of the Dutch example to the Mississippi River, contending that the "structures used on the MMR are much different in size, spacing, and top elevation than those used by the Dutch." Brauer Dec. ¶ 24(f). Yet while Dutch groynes do differ from MMR dikes in some details, Mr. Brauer fails to cite a single study showing that the Dutch groynes are more likely to cause flood stage increases that the MMR dikes.

39. As I attested in paragraph 28 of my Original Declaration, changes in channel geometry and roughness related to river engineering tools employed for improved navigation and flood control appear to be the principal drivers behind changes in flood stage on the Mississippi River. The increases in flood stage are caused by both the direct effects of wing dikes, meaning interaction with flow, and the indirect effects of wing dikes, meaning the effects of the wing dike in changing the shape or form of the river bed. Hydrodynamic simulations of indirect and direct effects of wing dikes show decreases in velocity, increases in roughness, and corresponding increases in flood stage. Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations specifically addresses paragraph 28 of my Original Declaration. I rebut elsewhere in this Declaration the Corps' and Mr. Brauer's general criticisms of my research and the other studies supporting my conclusion that river training structures increase flood stage heights and that the new dike construction projects here – at Dogtooth Bend, Monsenthein/Ivory Landing, Eliza Point/Greenfield Bend, and Grand Tower – will do the same and threaten public safety.

40. As I attested in paragraph 29 of my Original Declaration, river training structures constructed by the Corps to help maintain the nine-foot navigation channel have caused large-scale increases in flood levels, including increases of six to ten feet over broad stretches of the river where these structures are prevalent. Such large increases in flood heights in these rivers have occurred when and where – and only when and where – wing dikes, bendway weirs, and other river training structures have been built. These structures have led to significant increases in the frequency and magnitude of large floods. Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations specifically addresses paragraph 29 of my Original Declaration. I rebut elsewhere in this Declaration the Corps' and Mr. Brauer's general criticisms of my research and the other studies supporting my conclusion that river training structures increase flood stage heights and that the new dike construction projects here – at Dogtooth Bend, Monsenthein/Ivory Landing, Eliza Point/Greenfield Bend, and Grand Tower – will do the same and threaten public safety.

41. As I attested in paragraph 30 of my Original Declaration, the projects now proposed on the Middle Mississippi River are particularly problematic for several reasons. First, as mentioned above, bedrock underlies parts of the Middle Mississippi channel near the Grand Tower project, which limits incision (Jemberie et al. 2008). In such locations, the ameliorating effect of new wing dikes in causing bed incision is reduced or eliminated, leading in the past to the largest observed increases in flood levels.

42. Mr. Brauer asserts that "[t]here is no support for the claim by Dr. Pinter" that there is bedrock underlying parts of the channel near the Grand Tower Project. Brauer Dec. ¶ 24(g). He contends that the "nearest bedrock formation (at an elevation capable of having an impact) to the Grand Tower work area is approximately five and a half miles upstream and over twenty miles downstream." *Id*. Mr. Brauer is wrong. Bedrock *is* present in this river reach, and it is alarming that the Corps' St. Louis District has designed and modeled (in their table-top physical model) the proposed new Grand Tower dikes in apparent ignorance of such a fundamental and important characteristic of the MMR channel. Specifically, historical surveys show that bedrock crops out at the channel-bottom surface, or in the shallow subsurface just beneath, forming a ledge along the

western margin of the channel around river mile ("RM") 68.7, and between RM 70.0-70.3 and RM 71.1-72.7 – *i.e.* through a significant portion of the Grand Tower project area. Mr. Brauer contends to the contrary that "bed samples taken in the Grand Tower reach confirm that the bed material is a combination of medium to coarse sands and pebbles up to one inch in diameter." *Id*. He is mistaken. In a river like the MMR, which transports an active sedimentary bed load at all times throughout its length, isolated channel grab samples will *always* yield sand and gravel, even on river reaches with an underlying bedrock substrate. Such samples in no way "confirm" that the channel is only underlain by sediment.

43. The presence of bedrock in the Grand Tower project area helps explain why observed flood stage increases have been so severe along this portion of the MMR. As discussed above, new wing dikes raise flood levels, but they also induce scour of the bed, which creates additional cross-sectional area within the central portion of the channel and reduces the net increases. However, where, as in the section of the MMR in the Grand Tower project area, a bedrock substrate inhibits scour, there is less or no cross-sectional area increase to reduce the flood stage increases. In these circumstances, the risk of large flood stage increases and the corresponding risk to public safety are at their peak.

44. As I attested in paragraph 31 of my Original Declaration, the new dike construction projects now proposed on the Middle Mississippi are also problematic because they threaten nearby levees that already have identified deficiencies. The Dogtooth Bend Project is immediately downstream of one of the sites where the Len Small levee failed during floods in 2011 (Dogtooth Bend EA at E2). This 5,000-foot breach yielded to fast-moving water that "scored farmland, deposited sediment, and created gullies and a crater lake" (K.R. Olson and L.W. Morton, "Impacts of 2011 Len Small levee breach on private and public Illinois lands," *Journal of Soil and Water Conservation*, Vol. 68:4, attached as Exhibit 3 to my Original Declaration). Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations rebuts these facts.

45. As I attested in paragraph 32 of my Original Declaration, the proposed Grand Tower project spans approximately 7 River Miles along the Big Five Levee Drainage and Levee Districts,

including the Preston, Clear Creek, East Cape, and Miller Pond levees, together protecting over 49,000 acres of Illinois floodplain. The proposed Grand Tower wing dike project also lies just downstream of the Degognia/Fountain Bluff and Grand Tower Drainage and Levee Districts, protecting a further 56,000 acres. Currently, all segments of these levee systems have "Unacceptable" ratings following Corps inspections and assessment. The Dogtooth Bend Project likewise poses an unusually high potential for flood damage. The Cairo levee system ("Mississippi and Ohio Rivers Levee System at Cairo & Vicinity") is located a few miles downstream of the Dogtooth Bend Project. Although the greatest effects of wing dikes occur upstream, statistically significant increases in flood levels have also been identified downstream. Corps inspections have identified major deficiencies in the Cairo levee system, leading to its current "Unacceptable" rating in the National Levee Database. The majority of these facts are unrebutted by both the Corps in its Opposition Brief and Mr. Brauer, Mr. Feldman and Ms. Schwarz in their declarations.

46. The one thing in paragraph 32 of my Original Declaration that Mr. Brauer disputes is my conclusion that statistically significant increases in flood levels have also been identified downstream. Brauer Dec. ¶ 24(b). My conclusion is based on two of my published studies, Pinter et al. (2008) and (2010), which identify both large increases in flood levels *upstream* of new river training structures and smaller, but statistically significant, increases *downstream* of new structures. Mr. Brauer declares this to be impossible, but he bases his opinion solely on his interpretation of hydraulic theory, not any published research. In fact, turbulence and eddy circulation downstream of wing dikes represent a plausible mechanism for empirical increases in flood stages after dike construction. Mr. Brauer cannot wish away observed empirical trends based on his understanding of hydraulic theory.

47. As I attested in paragraph 33 of my Original Declaration, my work with local levee commissioners and other informed officials has revealed deep concern and widespread discussion about levee safety and performance during future floods, even without additional stresses. For at least the past decade, local stakeholders have repeatedly called for the St. Louis District of the Corps of Engineers to rigorously and independently assess the cumulative impacts of wing-dike construction in the Middle Mississippi River. Instead, a new wave of dike construction has been

undertaken, with each new project evaluated – perfunctorily – on an individual basis and without regard to cumulative effects. Neither the Corps in its Opposition Brief nor Mr. Brauer, Mr. Feldman or Ms. Schwarz in their declarations rebuts these facts.

B. Reply to the Feldman Declaration

48. As discussed in detail below, I conclude after reviewing the Feldman Declaration that Mr. Feldman overstates some of benefits of river training structures as well as the costs of delaying or permanently tabling the proposed the Dogtooth Bend, Monsenthein/Ivory Landing and Eliza Point/Greenfield projects.

49. Mr. Feldman asserts that "under the Upper Mississippi River Biological Opinion issued by the U.S. Fish and Wildlife Service and the Upper Mississippi River Restoration-Environmental Management Program, new river training structures are constructed for the purpose of providing environmental benefits for fish and wildlife." Feldman Dec. ¶ 4. Yet little or no benefit of river training structures to endangered fish species on the MMR has ever been demonstrated. The Corps has touted many of its navigational dike projects as having environmental benefits (*e.g.* DuBowy, P.J., 2012 and cover of same magazine issue), but rigorous monitoring has shown no actual species benefits associated with these activities (e.g., Papanicolaou et al., 2011).

50. Mr. Feldman claims that, "[a]s the Mississippi River is a dynamic system due to natural variances that affect sedimentation, impacts associated with delay of not awarding the contracts or constructing the features provided in those contracts will increase the length of that delay." Feldman Dec. ¶ 8. Mr. Feldman is mistaken that any large change in the Mississippi River's sediment flux or geomorphic conditions would occur if the proposed river training structure projects are delayed. For many decades, the Corps' St. Louis District has maintained the 9-foot navigation channel through dredging. In the absence of new river training structures, the Corps could continue to maintain the navigation channel through dredging. And outside factors being equal, no large change in the river's sediment flux would occur, nor, contrary to Mr. Feldman's conclusion, would there be any increased costs due to sediment accumulation.

51. Mr. Feldman contends that "[s]ignificant delays in awarding contracts and/or not constructing any new training structures will delay the overall Regulating Works Project completion date." Feldman Dec. ¶ 17. But in assuming that the construction of additional river training structures could eliminate the need for future dredging, Mr. Feldman ignores growing anecdotal evidence suggesting that recent river training structure construction is largely just *shifting locations* of the required dredging instead of *reducing* or *eliminating* the *long-term need* for dredging.

52. Mr. Feldman asserts that the "benefit to cost ratio for the Regulating Works Project construction completion is 18 to 1," and that the project "is one of the most valuable projects in the nation in terms of returns on investment." Feldman Dec. ¶ 17. But Mr. Feldman's claim is based on the erroneous assumption that new river training structures have zero impact on flood levels. As discussed thoroughly above and in my Original Declaration, and as document by Pinter et al. (2012), even small increases in flood levels cause large increases in flood risk that can overwhelm any purported cost-savings from reduced dredging. Furthermore, as just discussed, Mr. Feldman ignores the growing anecdotal evidence suggesting that recent river training structure construction is largely just shifting locations of the required dredging instead of reducing or eliminating the long-term need for dredging.

Conclusion

53. The new dike construction projects here – at Dogtooth Bend, Monsenthein/Ivory Landing, Eliza Point/Greenfield Bend, and Grand Tower – pose significant threats of increased flooding and flood risk. They are the latest manifestations of a flawed process that has allowed construction of hundreds of new dikes and dike-like structures that are causing elevated flood stages throughout the Middle Mississippi River. Unless these new dike construction projects are halted to allow their reconsideration based on a comprehensive and independent Supplemental Environmental Impact Statement that takes the foregoing studies and analyses into consideration, needless and potentially severe flooding will likely occur. The costs of halting the projects would be much less than Mr. Feldman claims in his declaration. Indeed, halting the projects would

significantly reduce taxpayer expenditures – along with societal and environmental hardship – by reducing long-term flood risk and flood damages.

54. I declare under penalty of perjury that the foregoing facts are true of my personal knowledge, that the foregoing expressions of professional judgment are honestly held in good faith, that I am competent to and if called would so testify, and that I executed this declaration on August 13, 2014 in Chicago, Illinois.

Nicholas Pinter

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Nicholas Pinter, Ph.D

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CERTIFICATE OF SERVICE

I hereby certify that on August 13, 2014, I electronically filed the Reply Declaration of Nicholas Pinter, Ph.D. in Support of Plaintiffs' Motion for Preliminary Injunction with the Clerk of the Court using the CM/ECF system which will send notification of such filings to all registered counsel participating in this case. There are no non-registered participants in this case.

Respectfully submitted,

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Discussion of "Analysis of the Impacts of Dikes on Flood Stages in the Middle Mississippi River" by Chester C. Watson, David S. Biedenharn, and Colin R. Thorne

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Thanks to Watson and colleagues (original paper) for bringing further attention to the issue of flood magnification on portions of the Mississippi and other navigable rivers. Unfortunately their article does more to cloud this issue than clarify it. The original paper claims to present an "objective review" (p. 1072, 1077) of the specific gauge technique and the hydraulic impacts of navigational dikes. It should be understood that this article is functionally identical to Watson and Biedenharn (2009), a consulting report commissioned by the St. Louis District of the U.S. Army Corps of Engineers for the purpose of refuting previous studies showing rising flood levels linked to ongoing dike construction on the Middle Mississippi River (MMR).

Watson et al.'s review of the broader issues here—empirical increases in flood levels and frequencies on the Mississippi River system, and the causal mechanisms thereof—is a highly incomplete analysis. It ignores the large breadth of methodologies, study rivers, locations, and years of record in previous studies. Instead, Watson et al. limit their analyses to a single station (St. Louis, MO) on a single river, using a truncated data record (Pinter 2010, 2015), and their criticisms target a single methodology (specific gauge analysis) largely in a single 12-year-old paper (Pinter et al. 2001). In actuality, numerous scientific studies and Corps of Engineers reports, dating back to the 19th century, have noted large increases in flood levels in association with wing-dike construction. For example, Hathaway (unpublished data, 1933) concluded "[i]t would appear that the bankful [sic] carrying capacity of the Missouri River would be permanently reduced by existing works, such as dikes and revetments used in shaping and controlling the stream for modern barge transportation." Recent studies have utilized hydrologic analyses; rigorous statistics; geospatial analyses; and one-dimensional, two-dimensional, and three-dimensional (1D, 2D, and 3D) hydraulic modeling to confirm, both empirically and theoretically, the potential for significant increases in flood levels in response to the dense emplacement of wing-dike structures, such as employed on the MMR. For example, Pinter et al. (2008, 2010) reported results from a 4-year NSF-funded initiative to assemble more than 8 million hydrologic data for the Mississippi-Missouri system, using Corps structure-history databases, and digitizing and rectifying river maps and surveys dating back to the mid-1800s. A large multivariate statistical model showed that many river engineering toolkits showed no association with increased flooding (e.g., much of the Lower Mississippi), but large empirical increases occurred when and where many wing-dikes were built in proximity to long-term measurement stations.

In place of reviewing this broad body of research, Watson et al. instead simply make a dogmatic assertion that "dikes are designed to have strong impacts at low flows that diminish as discharge increases and disappear at flows above bankfull," paraphrasing statements from St. Louis District staff that submerged wing dikes become "invisible to the river's flow." A recent U.S. Government Accountability Office (GAO) study noted the discrepancy between assertions of "hydraulic invisibility" and empirical evidence to the contrary, concluding that "despite the Corps' efforts, professional disagreement remains over the cumulative impact of river training structures during periods of high flow," disagreement that should be resolved through additional "physical and numerical modeling" (GAO 2011). In fact, recent modeling studies demonstrate the significant effects of flow turbulence and large-scale vertical and horizontal eddy circulation (Huthoff et al. 2013a, b), flow dynamics that are undeniably clear by observation of these structures during flood events. The Dutch government just completed a €45 million program to lower 450 wing dikes (groynes) on the Rhine system as part of its "Room for the River" strategy to reduce flood levels.

The Watson et al. manuscript attempts to refute the suggestion that wing dikes may increase flood levels, but the actual work here is limited to specific gauge analysis. The paper presents itself as the final word on the specific gauge technique, but Watson et al. make broad and surprising statistical errors. To begin with, they calculate p values to test null hypotheses of no trend over time in specific stages (stages for fixed discharge values), asserting, "For *p*-values greater than 0.1, the null hypothesis is accepted." In fact, failure to meet such a confidence threshold (typically 95% or 99%) means that the null hypothesis cannot be rejected with that level of confidence. Freshman textbooks teach students to avoid this error: "Null hypotheses are never accepted. We either reject them or fail to reject them … failing to reject H_0 does not mean that we have shown that there is no difference" (Dallal 2001). Nonetheless, Watson et al. repeatedly assert that their statistics prove that MMR specific stages are invariant over time. Furthermore, between rejecting H_0 for p values <0.01 and (erroneously) accepting H_0 for $p > 0.1$, the authors create a new statistical outcome of "inconclusive." Where Watson et al.'s own analyses show significant increases in flood stages (above the 99% confidence level), the authors use "visual inspection of the data" to infer secondary mechanisms and use *post facto* subdivisions of their time series in order to mask the statistical trend. In fact, our research group long ago reviewed such secondary factors, including the effects of sediment concentrations and water temperature on stages, and quantified these effects on MMR stages (e.g., Pinter et al. 2000; Remo and Pinter 2007). Statistical trends, when significant, represent long-term driving forces, such as wing-dike impacts, rising up from the many known sources of short-term variability.

It is hard to deny that some process is driving flood levels higher on rivers such as the MMR and Lower Missouri River. Historical time series of stage data, which are unequivocally homogenous over time (e.g., Criss and Winston 2008), show strong and statistically significant increases, and these increases exceed by ~10× the maximum credible increases in climate-driven and land-cover-driven flows (e.g., Pinter et al. 2008). Watson et al. obliquely acknowledge the upward trend in flood magnitudes and frequencies, but conjecture that levee construction is the cause. In reaching this conclusion, Watson et al. present no evidence, but instead speculate about enhanced momentum losses due to channel-overbank flow shear and about voluminous "sediment accumulation … between the channel and the levee"; speculative processes that are contradicted by real-world measurements (e.g., Bhowmik and Demissie 1982; Heine and Pinter 2012). In fact, the large multivariate study by Pinter et al. (2010) identified the age, location, and extent of every large levee system added to the Mississippi–Lower Missouri system during the past 100+ years, documenting that levees do contribute some but not all of the observed flood-level increases on the MMR and elsewhere (confirming modeling by Remo et al. 2009). These issues are too important to be addressed by unsupported speculation, especially when voluminous data exist to rigorously test these hypotheses.

Despite protestations to the contrary, the Watson et al. paper reveals broad areas of agreement with earlier studies on wing-dike impacts. They acknowledge that the "USACE has constructed numerous river engineering structures in and along the MMR." In fact, Watson et al. significantly underestimate the number of such structures by starting their count around 1930. Most dike construction on the Mississippi River near St. Louis was early, with 26,500 linear meters of dikes built prior to 1930 in the 10 river miles (16.5 km) centered on St. Louis. Wing dikes and similar training structures have been, and continue to be, the dominant tool for navigation engineering on the MMR, with a total of 1,200 linear meters of dikes per 1.0 km of channel. Watson et al. state that stages for the lowest, in-channel flows trend downward over time after wing-dike construction, which has been noted at St. Louis and other gauging stations by all previous studies. Dike-induced flow acceleration in the navigation channel stimulates bed scour, which lowers the water-surface elevation for low flows. Watson et al. also note that stage trends for larger in-channel flows go flat (become statistically "inconclusive"), as flow retardation by dikes balances the increased depths. And for flood flows, they acknowledge a statistically significant upward trend overall. In fact, measured flood stages at St. Louis in 1993 were ~1.2 m higher than for equal flows in the 1940s, even though most dike construction was earlier. Where we differ is that Watson et al. ignore the very large range of other research quantitatively showing how much of this increase, and similar and larger increases at numerous other stations, is linked to levee construction and how much is attributable to wing-dike construction.

There are legitimate discussions that researchers could have, for example the advantages of different approaches to specific gauge analysis (e.g., Watson's "rating curve" and "direct step" approaches), but instead Watson et al. limit themselves to reviewing a single technique on a single river at a single station using a truncated period of record (Pinter 2010, 2015). There is clear empirical evidence of statistically significant increases in flood magnitudes and frequencies on the Mississippi and other rivers, and extensive research and broad-based evidence that river-training structures have contributed to these increases. Current dike construction projects on the Mississippi River rely on the Watson et al. paper and the corresponding consulting report (Watson and Beidenharn 2009) as the central demonstration that large-scale new dike fields will not impact flood levels. Sound engineering design, environmental assessment, and flood-risk management should be based on vigorous science rather than advocacy and misdirection.

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Discussion of "Mississippi River Streamflow Measurement Techniques at St. Louis, Missouri" by Chester C. Watson, Robert R. Holmes Jr., and David S. Biedenharn

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Thanks to the authors of the original paper for another manuscript addressing pressing issues of hydrology and flooding on the Middle Mississippi River (MMR). Like another paper (Watson et al. 2013) and discussion (Pinter 2014), the authors of the original paper present findings from studies funded by the St. Louis District of the U.S. Army Corps of Engineers (USACE), in this case presenting elements of the Watson and Biedenharn (2009) and Huizinga (2009) reports. The original paper reviews historical discharge measurements and measurement techniques on the MMR, and in particular, discharges measured by the USACE prior to circa 1940. Unfortunately, the authors of the original paper present this review without necessary background and literature review, for example with no mention of Pinter (2010), a statistical study that tested the same issues. Outside readers will not understand the context or the purpose of the Watson et al. (2013) paper without additional background.

The seemingly arcane question of historical discharge measurements has been the focus of extensive discussion on the MMR. These discussions began with studies identifying rising trends in flood magnitudes and frequencies on the MMR and selected other river reaches. The long-term hydrologic effects of climate change, land use, and upstream dam storage on MMR flooding have also been documented and quantified (e.g., Pinter et al. 2002, 2008, 2010), but multiple studies have identified in-channel navigational construction (a variety of dikes and dike-like structures; see review in Pinter et al. 2010; Pinter 2014) as the largest influence on MMR flood trends over time. Put simply, this is the source of contention driving USACE investment in this issue and driving ongoing work on both sides.

After record flooding in 1973, Belt (1975) and Stevens et al. (1975) published studies linking flood-level increases over time with ongoing construction of navigational channel works. The MMR appears to be the most densely diked river reach in the United States, and perhaps of any river worldwide, with an average of about 1,370 m (linear) of dikes and weirs constructed per kilometer of MMR channel. The Belt (1975) and Stevens et al. (1975) papers stimulated vigorous discussion, in particular four letters responding to te Stevens et al. (1975), as follows: (1) Dyhouse (1976), (2) Stevens (1976), (3) Strauser and Long (1976), and (4) Westphal and Munger (1976), and various opinion articles disseminated by the St. Louis District of the USACE (e.g., P. R. Munger, et al., Contract DACW-43=75-C-0105, presented at U.S. Army Corps of Engineers, St. Louis, Missouri, 1976; Dyhouse 1985, 1995). Critiques included the argument that early discharge data on the Mississippi River cannot be compared with recent data because early discharge measurements (<1933 at St. Louis) used floats to measure flow velocity rather than Price current meters. In order to test this assertion, "[t]he Corps commissioned the University of Missouri Rolla to evaluate historical methods of discharge measurement, investigating the accuracy of the techniques and the need for any adjustments to historical discharge data" (Dyhouse 1985). Stevens (1979) completed same-day measurements of velocity and discharge near Chester, Illinois, using Price current meters and several varieties of floats.

Watson et al. repeat a now familiar assertion that Stevens (1979) identified systematic and significant differences between float-based and meter-based measurements. That is not the case. Stevens (1979) concluded that "an experienced person, using accepted techniques, can obtain excellent discharge determinations using any of the velocity measuring vehicles." Watson et al. points to differences between float-based and meter-based measurements, but the only broad differences in the Stevens (1979) results involved surface floats (as opposed to other varieties of floats), a technique used for only 10 of the thousands of early MMR discharge measurements. All 10 surface-float measurements were made in 1881 during very low flows at St. Louis (no surface-float measurements at the other gaging stations; i.e., Chester or Thebes). Furthermore, Stevens (1979) explicitly conclude that their results "do not substantiate correction of all recorded past discharges that have been determined using floats." And yet exactly such data modifications have been made, justified by citing Stevens (1979).

The Upper Mississippi River System Flow Frequency Study (UMRSFFS) was initiated in 1997 to update flow frequencies previously quantified in 1975 along the Upper Mississippi, Missouri, and Illinois River systems. When the UMRSFFS was released in 2004, areas of increased flood frequencies were identified in other USACE districts, but the new flood profiles were broadly lower through the St. Louis District, including drops of up to 52 cm (1.7 ft) for the 100-year flood. These decreases were puzzling given the empirical hydrologic trends, and remained enigmatic despite detailed review of the UMRSFFS methodology and results. A Freedom of Information Act request for additional UMRSFFS documentation (Missouri Coalition for the Environment v. U.S. Army Corps of Engineers, 07–2218) was refused by the USACE on the basis of "deliberative process privilege," a ruling subsequently upheld by a U.S. District Court. The St. Louis District results became clear only with the discovery of Dieckmann and Dyhouse (1998), a presentation made at a United States interagency meeting. Dieckmann and Dyhouse (1998) reported that "flood peak discharges at St. Louis prior to 1931 [and at the Chester and Thebes gages prior to c. 1940] were adjusted downward to reflect over-estimates made throughout the period when floats were primarily used for velocity measurements," citing Stevens (1979). These post facto data changes are nowhere presented in the public UMRSFFS methodology. More recent hydrologic measurements also were altered (Pinter 2010). Together these modified input data were used to calculate UMRSFFS flow frequencies and are now the basis for flood profiles and new flood-hazard maps throughout the St. Louis District. Similarly, the USGS Missouri Water Science Center has now altered its flood peak dataset, reducing the 1844 flood flow at St. Louis from 38,200 to 28,300 m^3/s (1.35 million to 1 million ft^3/s), based on Dyhouse (1995) and Dieckmann and Dyhouse (1998), and despite detailed analysis of 1844 measurements by Stevens (1979) suggesting a flow of 38,500 m^3/s (1.36 million ft^3/s) at St. Louis. Most scientists would argue for much greater caution before altering original data.

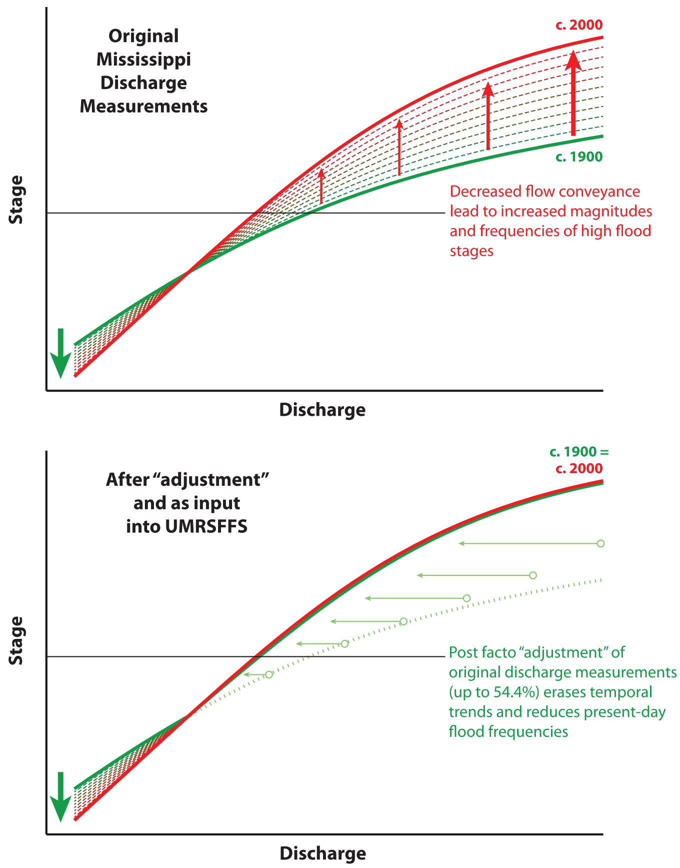

Fig. 1. (Color) Conceptual illustration showing how modification of historical discharge measurements (Dieckmann and Dyhouse 1998) erases temporal trends in MMR rating curves documented by previous researchers, including increases in flood stages for fixed discharges (red arrows); these modifications also reduce calculated flood frequencies

The effect of modifying early discharge measurements, as suggested by Dieckmann and Dyhouse (1998) and Watson et al., is to erase temporal trends in MMR rating curves (including rising flood stages) that previous researchers had ascribed primarily to construction of navigational structures in and along the MMR channel (Fig. 1). In the process, flood frequencies and magnitudes calculated using these input discharges are significantly reduced. The Dieckmann and Dyhouse (1998) data modifications reduced the UMRSFFS output flood magnitudes by up to 10% and more, for example a reduction of $> 3{,}100\ \mathrm{m^3/s}$ ($> 110{,}000\ \mathrm{ft^3/s}$) for the 100-year flood at St. Louis (Pinter 2010). Pinter et al. (2012) completed flood-loss modeling on the MMR, quantifying losses with and without the data adjustment mentioned previously; flood damages modeled based on the adjusted input discharges were up to 79% less than calculated using the original and unaltered annual flow maxima.

Pinter (2010) presented the issue of data adjustment in the UMRSFFS and set out to test the hypothesis that older discharge measurements were systematically overestimated relative to later USGS measurements. The study tested this hypothesis using 2,150 historical discharge measurements digitized from the three principal stations [(1) St. Louis, (2) Chester, and (3) Thebes] on the Middle Mississippi River, including 626 float-based discharges and 1,516 meter-based discharges, and including 122 paired measurements (pairs of meter-based and float-based measurements taken at the same locations on the same days). In all statistical tests, the hypothesis that early discharges were overestimated was rejected; on the contrary, in the cases where differences between early and later discharges were significant, the pre-USGS discharge measurements averaged slightly less (not more) than the later measurements. These statistical tests included separate analyses of the paired values and of all floats versus all meters, and separate tests at all three gaging stations.

The authors of the original paper provide no new data, and their one new analysis is a statistical comparison in one paragraph spanning pp. 1067–1068. The rest of their review discusses sources of variability in streamflows (e.g., temperature-based and bed-related hysteresis), largely duplicating Watson et al. (2013); see reply in Pinter (2014). That statistical comparison evaluates discharge values from Stevens (1979) and Ressegieu (Memo to division engineer, presented at Upper Mississippi Valley Division, U.S. Army Corps of Engineers, St. Louis, Missouri, 1952). Assessment of this comparison is impossible, because the authors of the original paper provide neither these data nor any indication of which data they looked at. One concern is that the authors of the original paper utilize the very small number of measurements in Stevens (1979) and Ressegieu (Memo to division engineer, presented at Upper Mississippi Valley Division, U.S. Army Corps of Engineers, St. Louis, Missouri, 1952), eschewing the several thousand meter-based and float-based discharges, including numerous paired measurements, assembled in Corps (1935). A copy of Ressegieu (Memo to division engineer, presented at Upper Mississippi Valley Division, U.S. Army Corps of Engineers, St. Louis, Missouri, 1952), which is a memo and internal assessment by the St. Louis District dated May 27, 1952, was recently obtained from the St. Louis District. Ressegieu (Memo to division engineer, presented at Upper Mississippi Valley Division, U.S. Army Corps of Engineers, St. Louis, Missouri, 1952) followed Congressional hearings in which "A House committee Thursday blasted the army engineers for their navigation work on the lower Missouri River, asserting that a 250-million dollar program appears actually to have increased flooding" (Sioux City Journal 1952), just as Stevens (1979) was initiated by the St. Louis District just after publication of Belt (1975). Ressegieu (Memo to division engineer, presented at Upper Mississippi Valley Division, U.S. Army Corps of Engineers, St. Louis, Missouri, 1952) looked at Mississippi discharge measurements and reached the same conclusion as Stevens (1979), that USACE "'rod float' measurements … for all practicable purposes may be considered equal" to USGS metered discharges," exactly contrary to the Dieckmann and Dyhouse (1998) rationale for altering pre-USGS discharge measurements.

Until now, most USACE workers and consultants have ascribed the source of purported heterogeneity in historic discharge data to the use of floats for velocity measurements (Dyhouse 1976, 1985, 1995; Stevens 1976; Strauser and Long 1976; Westphal and Munger 1976; Dieckmann and Dyhouse 1998; P. R. Munger, et al., Contract DACW-43=75-C-0105, presented at U.S. Army Corps of Engineers, St. Louis, Missouri, 1976). Pinter (2010) showed that the large majority of early discharges were based on Price current meters, and that float-based charges are not systematically higher (if anything lower) than meter-based measurements. Watson et al. now shift stance and assert that historical discharge bias results from changes in Price current meter design and measurements made from boats versus bridges. The finding of the authors of the original paper, that "pre-1930s discrete streamflow measurement data are not of sufficient accuracy to be compared with modern streamflow values" seems to be a conclusion in search of supporting evidence. Even Ressegieu (Memo to division engineer, presented at Upper Mississippi Valley Division,

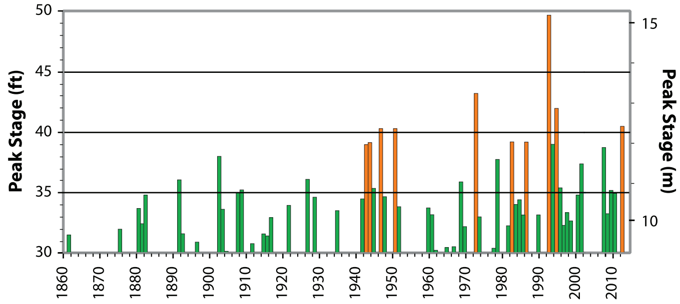

Fig. 2. (Color) Peak stages above flood level (30 ft above datum) for the Mississippi River at St. Louis; homogenous daily stages date back to 1861, and the 10 highest flood peaks (in orange) all occur in the latter half of the record; probability that this represents the random distribution of a stationary time-series is on the order of 0.00098

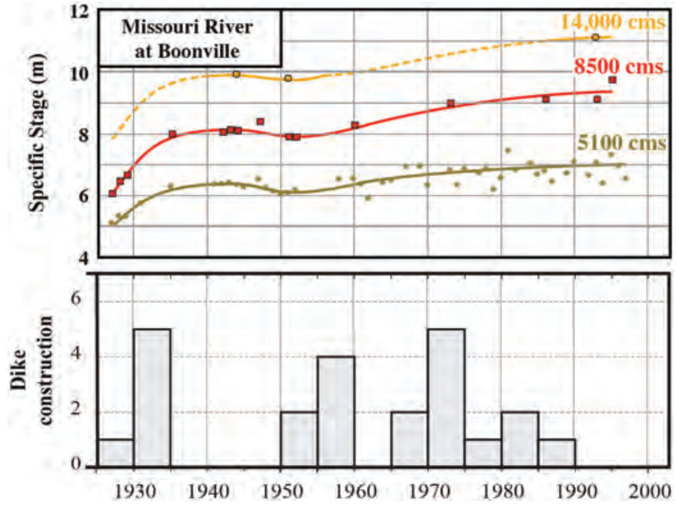

Fig. 3. (Color) Like most stations analyzed by Pinter et al. (2008, 2010), and others, discharges on the Missouri River at Boonville were developed exclusively by the USGS; flood stages increased when and where new navigational dikes were constructed (number of dike segments built within the 3.2 km of channel centered on the gage; data from Pinter and Heine 2005)

U.S. Army Corps of Engineers, St. Louis, Missouri, 1952) concluded that "it is not recommended that the C. of E. measured discharges be revised." At a minimum, the narrow analysis in the original paper does not justify redacting or altering thousands of discharge measurements, which represent key evidence of the hydrologic, hydraulic, and geomorphic response of the Mississippi River to its early engineering history.

Watson et al. concludes that "previous attempts … to assign a positive trend in stage … for a particular streamflow across the 1933 date boundary are incomplete without accounting for the pre-1933 measurement bias." Again, this is a familiar assertion, and several previous publications (Criss and Winston 2008; Criss 2009; Pinter et al. 2001, 2002, 2008) have shown that stage data alone provide a useful so-called empirical reality check that is independent of any question of discharge data homogeneity (Fig. 2). Stage data are dense, precise, and unequivocally homogenous (once any datum shifts have been noted). Criss and Winston (2008) examined the long and homogenous stage record for the Mississippi River at Hannibal, Missouri, with the period 1973–2013 experiencing 14 floods at or above the predicted 10-year level in the past 40 years, seven above the 25-year level, four at the ≥50-year level, and two at the ≥200-year level [Criss and Winston (2008), data updated through 2013]. Criss (2009) tested records of peak stages at stations on the Mississippi, Missouri, and other rivers, and found that observed flood stages pervasively exceeded UMRSFFS predictions, with significance levels ranging from 90–99.9%. Stage time series are sufficiently long, dense, and precise that rising trends clearly exceed the quantified effects of climate change and levee construction alone. Watson et al. focuses solely on pre-USGS versus post-USGS discharges (pre-1933 and post-1933 at St. Louis, 1942 at Chester, and 1941 at Thebes), but the large majority of the 67 stations analyzed in Pinter et al. (2008, 2010) utilized only USGS discharge values. All of those results showed rising stage trends in heavily diked river reaches (e.g., Fig. 3). Watson et al. carefully limit their discussion to the St. Louis location alone, when their conclusion that rising stage trends are "simply the result of mixing two discrete observation data sets" is negated, by definition, at locations where all discharges are from the USGS; in fact, the majority of all sites studied.

Pinter (2010) was a technical analysis, but the paper and subsequent discussions (e.g., Wald 2010) raised troubling questions. The UMRSFFS report and its appendices exceed several thousand pages but included no explanation of the large-scale adjustment of input data in the St. Louis District's portion of the study. These adjustments remained unknown until the discovery of the Dieckmann and Dyhouse (1998) report, although the data modifications affected resulting flood frequencies more than any other study assumption (e.g., choice of statistical distribution, or skew values), which are outlined in the UMRSFFS in great detail. No quantitative analysis was done to justify this data manipulation, which instead apparently was based on Stevens (1979) and on flume experiments; "adjustments in the data made by the corps were correct [because f]low tests using scale models determined that actual water flows in floods occurring in 1844 and 1903 could not possibly have been as high as were estimated using instruments of the time" [G. Dyhouse, quoted in Wald (2010)]. The Watson et al. paper serves to provide post facto justification for altering historical input data in the UMRSFFS and other applications. Even putting aside the specific technical question of historical data homogeneity, scientists and engineers should agree that the highest possible thresholds for (1) rigorous analysis, (2) transparency, and (3) burden of proof should apply before original measurement data are manually altered. Those thresholds should be highest of all for hydrologic data and flood-frequency analyses, which directly impact floodplain and river management projects, policies, and public safety.

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Attachment C

National Wildlife Federation Comments

Scoping Comments on Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement

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River Management and Flooding: The Lesson of December 2015–January 2016, Central USA

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ABSTRACT: The huge winter storm of December 23–29, 2015 delivered heavy rainfall in a broad swath across the USA, deluging East-Central Missouri. Record high river levels were set at many sites, but damages were most pronounced in developed floodplain areas, particularly where high levees were built or river channels greatly narrowed. An average of 20 cm of rain that mostly fell in three days impacted the entire 10 300 km^2 Meramec Basin. Compared to the prior record flood of 1982, the highest relative stage (+1.3 m) on Meramec River occurred at Valley Park proximal to (1) a new levee, (2) a landfill in the floodway, (3) large floodplain construction fills, and (4) tributary creek basins impacted by suburban sprawl. Even though only a small fraction of the 1.8 million km^2 Mississippi River watershed above St. Louis received extraordinary rainfall during this event, the huge channelized river near and below St. Louis rapidly rose to set the 3rd-highest to the highest stages ever, exhibiting the flashy response typical of a much smaller river.
KEY WORDS: floods, Mississippi River, levees, floodplain development.

0 INTRODUCTION

Human modification of landscapes and climate are profoundly impacting rivers and streams. Urbanization with its attendant impervious surfaces and storm drains is known to accelerate the delivery of water to small streams, causing flash flooding, channel incision and widening, and loss of perennial flow. The landscapes of large river basins in the central USA have been profoundly modified by agricultural activities and development. Meanwhile, large river channels have been isolated from their floodplains by progressively higher levees, and dramatically narrowed by wing dikes and other navigational structures (e.g., Pinter et al., 2008; Funk and Robinson, 1974). Direct consequences are higher, more frequent floods and underestimated flood risk (Criss, 2016; Belt, 1975). In many areas rainfall is becoming heavier, exacerbating flood risk (e.g., Pan et al., 2016), while new floodplain developments greatly magnify flood damages (Pinter, 2005).

The extraordinary winter storm of December 23–29, 2015 provides additional evidence for progressive climate change, while delivering more tragic examples of record flood levels and underestimated flood risk. What is perhaps most remarkable is that the flood on the middle Mississippi River had a much shorter duration than its prior major floods, and closely resembled the flashy response of a small river. This paper discusses how the Meramec River and the middle Mississippi River responded to this massive storm, and examines how their recent response differed from prior events.

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1 STORM SYNOPSIS

Very strong El Nino conditions developed during fall 2015, bringing some welcome relief to the California drought as well as anomalously warm temperatures to much of the USA. An extraordinary winter storm, appropriately named "Goliath", delivered heavy rainfall in a broad belt across the central USA, as a long cold front developed parallel to, and south of, a southwest to northeast-trending part of the jet stream. Rain delivery was greatest in the central USA, particularly southwest of St. Louis, Missouri (Fig. 1). The three-day rainfall delivered by Goliath is considered to be a "25-year" to "100-year" event at most meteorological stations in this region (NOAA, 2013). With this huge addition of late December precipitation, the record-high annual rainfall total (155.5 cm) was recorded at St. Louis in its official record initiated in 1871 (NWS, 2016a), although less reliable records suggest that annual rainfall was greater in 1848, 1858 and 1859. Flooding associated with Goliath resulted in great property damage and caused at least 12 fatalities in Missouri, 7 in Illinois, 2 in Oklahoma and 1 in Arkansas.

The extraordinary rainfall that fell at St. Louis on Dec. 26–28 closely followed significant rainfall on Dec. 21–23. The earlier storm saturated the ground, so runoff from the second pulse was greatly amplified.

2 MERAMEC RIVER FLOOD

Meramec River drains a 10 300 km^2 watershed in East-Central Missouri, and enters the Mississippi River 30 km south of St. Louis (Fig. 2). This river has very high wildlife diversity

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and is one of the very few un-impounded rivers in the USA (Criss and Wilson, 2003; Frederickson and Criss, 1999; Jackson, 1984). Population density is low, except for the lower basin near St. Louis. Intense rainfall events cause flash flooding of the basin, as recorded by numerous long-term gauging stations (Fig. 2). Winston and Criss (2002) described one such flash flood, and the references cited in the aforementioned publications provided abundant information on the basin.

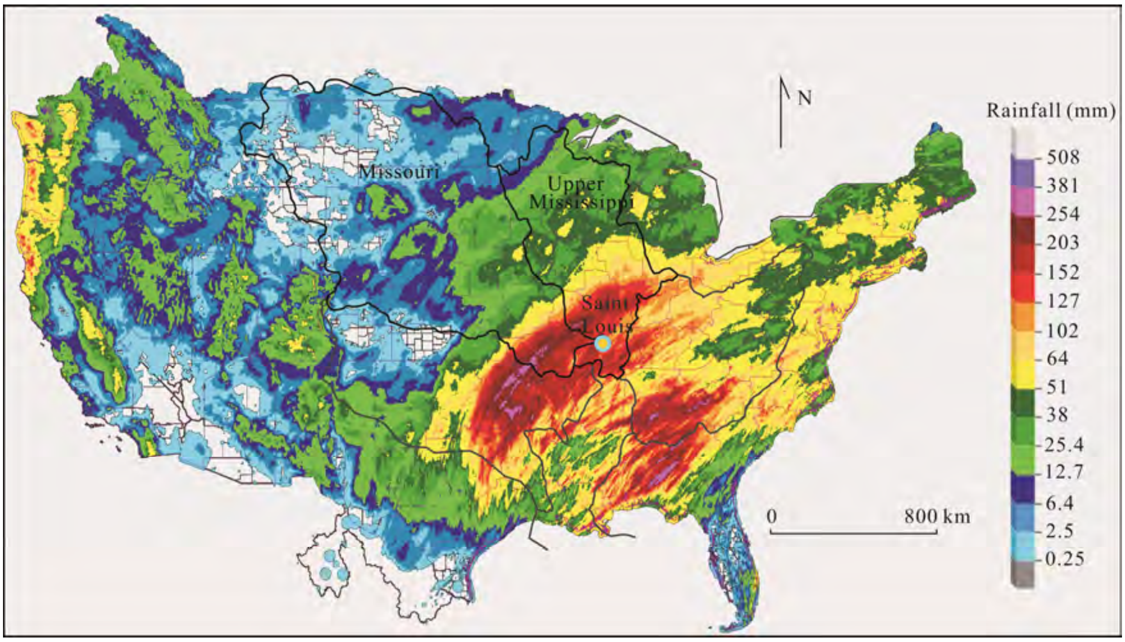

Figure 1. Map showing the observed, 7-day precipitation for December 22–29, 2015, according to NWS (2016a). Superimposed on this map are the boundaries of the upper Mississippi and Missouri watersheds (labeled) and other major river basins. Goliath delivered an average of 20 cm of rain to the entire Meramec River Basin (Fig. 2), but extraordinary rainfall exceeding 10 cm (orange, red and purple shading) impacted only a small fraction of the huge Mississippi-Missouri watershed upstream of St. Louis (blue dot near center).

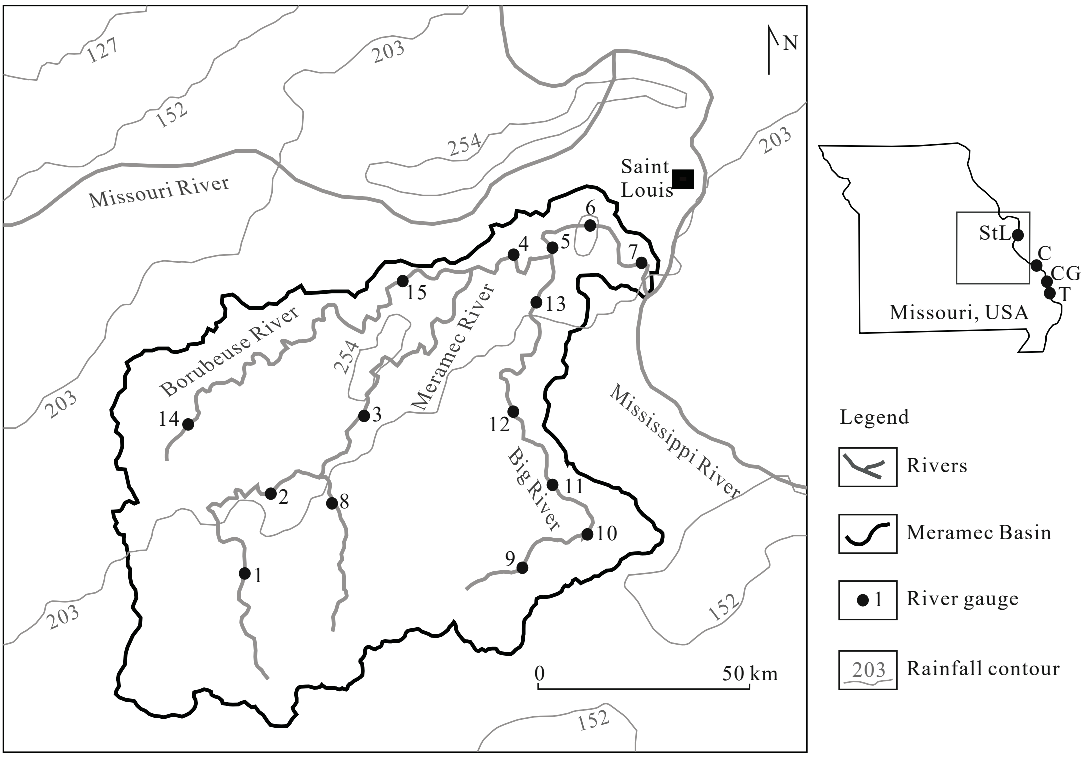

Figure 2. Map of East-Central Missouri showing the 10 300 km^2 Meramec River Basin (dark outline) and contours for precipitation delivered from December 22–29, 2015 according to NWS (2016a). Labeled dots are river gauging stations; stage hydrographs for the stations along the main stem of Meramec River (#1 to #7) are shown in Fig. 3. Water levels at Union (#15), Eureka (#5), Valley Park (#6) and Arnold (#7) set new records, while that at Pacific (#4) came close. The index map of Missouri shows the area of detail, and the location of river gauges at St. Louis (StL), Chester (C), Cape Girardeau (CG) and Thebes (T) along the middle Mississippi River (cf. Fig. 6).

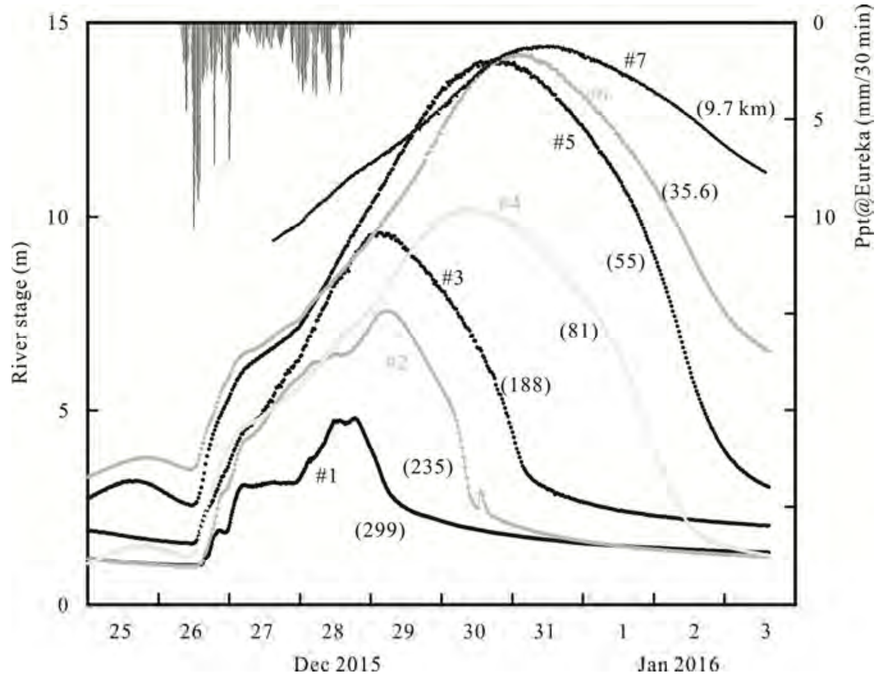

Figure 3. Stage hydrographs showing the propagation of the 2015 flood wave down the main stem of Meramec River, for sites #1 to #7 on Fig. 2. Numbers in parenthesis are the distance in km above the confluence with the Mississippi River to the south of St. Louis. Hydrographs for each site are plotted relative to its local datum, except that 0.75 m was added to the Valley Park hydrograph (#6) for clarity. Thin bars at upper left represent 30 minute precipitation (right scale). Data from USGS (2016) and NWS (2016b).

Goliath delivered an average of 20 cm of rain, mostly in 3 days, to the Meramec River Basin (Fig. 2). The resultant flood wave rapidly grew as it propagated downstream (cf. Yang et al., 2016), moving at a rate of about 3 km/h in the lower basin, where it set all-time record high stages (Fig. 3).

Runoff after storm Goliath was extraordinary, with flows attaining a value approaching 4 500 m^3/s, as documented by direct field measurements at the Eureka gauging station on December 30 (USGS, 2016). Of the precipitation delivered above Eureka by Goliath, 85% returned as runoff at Eureka in only 14.3 days. For comparison, the average, long-term annual flow at Eureka is only 92 m^3/s for a basin that receives an average of about 109 cm of precipitation per year, indicating an average runoff fraction of only 27% that is similar to the ~30% average for the USA.

3 COMPARISON TO 1982

The prior flood of record in most of the lower Meramec Basin occurred on December 6, 1982, during another very strong El Nino condition, although at some basin sites the flood of August 1915 was more extreme. Given the strong similarities in time-of-year, ENSO condition and basin response, it is very useful to compare the peak water levels of 1982 to those of 2015 (Fig. 4). The river stage at Pacific was slightly lower in 2015 than in 1982; this site is not rated for discharge, but the observed stage is consistent with the recent combined peak flows upstream at Sullivan and Union also being slightly lower in 2015. Big River enters the main stem of Meramec River about 4.8 km above the Eureka gauging station, and the peak flow at the lowermost station along it (#13 on Fig. 2) was about 150 m^3/s greater in 2015 than in 1982. Given these small differences, one might expect that the 2015 peak flow at Eureka would closely match that of 1982, but direct field measurements at Eureka on Dec. 30, 2015 suggest that the peak flow was 4 500 m^3/s (USGS, 2016), when it was only 4 100 m^3/s in 1982 (USGS, 1983). Taking this 400 m^3/s difference at face value, and using the rating curves (USGS, 2016, 1983), the associated river stage at Eureka should have been only about 0.5 to 0.6 m higher at Eureka in 2015 than in 1982, when the observed difference was 0.97 m.

Alternatively, the estimated difference between the 2015 and 1982 stages at Eureka would be only about 0.25 m if it is assumed that the flow at Pacific was identical in the two years, and the ~150 m^3/s difference for the flows on the lower Big River is accounted for. That the observed 2015 stage at Eureka was much higher than suggested by these two estimates (crosses, Fig. 4) demands explanation.

An even greater difference between the 2015 and 1982 river levels occurred at Valley Park (Fig. 4). This area has changed in the following way between these floods: (1) the size and height of a landfill at Peerless Park (cover photo) was greatly increased, significantly restricting the effective width of the Meramec River floodway mapped by FEMA (1995); (2) the 5.1 km-long Valley Park levee (Fig. 5) was constructed in 2005, restricting the width of the inundation area of the regulatory "100-year flood" (see FEMA, 1995) by as much as 70%, while reducing floodwater storage capacity; (3) the adjacent basins of three small tributaries, Williams, Fishpot and Grand Glaize Creeks, experienced rapid suburban development, destroying the riparian border, increasing the impervious surface, and making flash floods frequent (Hasenmueller and Criss, 2013); and (4) the floodplain area experienced continued commercial development on construction fill, impeding overbank flow while amplifying flood damages. It would appear that these changes added at least 1.0 m to the 2015 water levels at Valley Park, and at least 0.4 m upstream at Eureka, compared to what levels would have been in the 1982 landscape condition. Water levels may also have increased at Arnold due to such changes, but this is not clear, because the Mississippi River level was nearly 2 m higher in 2015 than in 1982 at the mouth of Meramec River during its flooding. This higher level at the confluence would impede the flow of the lowermost Meramec River, and flatten and elevate its water surface.

One final difference is that water temperatures measured by USGS (2016) were higher in 1982 (~13 °C) than in 2015 (~6 °C) near the times of peak flooding, so both the density and viscosity of water were higher in 2015. The associated effects on river levels are complex and not easy to determine. Nevertheless, if the 2015 peak stage and flow at Pacific were both similar to those in 1982, as is seemingly demanded by available data, temperature effects at Eureka are probably small.

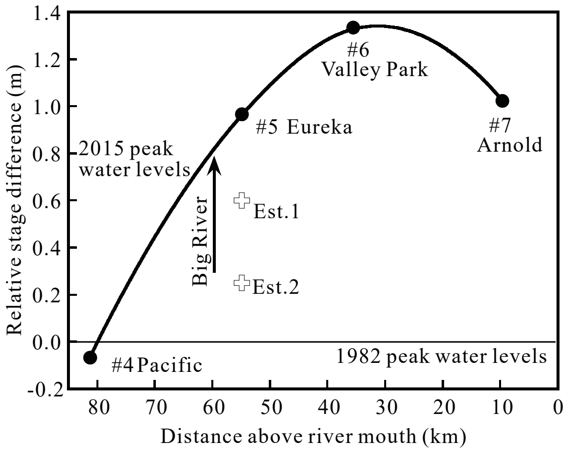

Figure 4. Relative difference between the peak water levels of December 30–31, 2015 and those of December 6, 1982 at different sites in the lower Meramec Basin (cf. Fig. 2). This difference was greatest close to Valley Park, where a large levee was built in 2005; this and other changes appear to have increased stages at Valley Park as well as upstream and downstream. Two estimates (crosses) suggest what the stage difference between these floods should have been at Eureka, had the 2015 flood occurred under the 1982 landscape condition (see text). Big River (arrow) enters the Meramec River from the south, 4.8 km upstream of Eureka.

Figure 5. The Valley Park levee looking south, only 1 hour after the flood gates were reopened on January 2, 2016. The floodwater level (dark) almost breached the levee and exceeded the estimated level for a “100-year flood” (FEMA, 1995) by nearly 2 m, forcing evacuation of the protected area to the left. Bicyclist (circled) on levee top shows scale. Photo by Robert E. Criss.

Eight great floods (site stage >11 m) occurred at Eureka since 1915. For the six that occurred prior to 1995, the local stage at Valley Park was 0.96 to 1.40 m lower (avg. 1.20 m) than the local stage at Eureka. Only two >11 m floods occurred at Eureka since, in 2008 and 2015, and for those the local stage at Valley Park was only 0.68 and 0.59 m lower than that at Eureka. These relative differences clearly indicate that the stages of large floods at Valley Park have recently increased, relative to stages at Eureka, by about 0.8±0.5 m. New developments such as the 2005 Valley Park levee are the probable cause for this large difference.

4 THE JANUARY 2016 FLOOD ON THE MIDDLE MISSISSIPPI RIVER

Only a day after the peak flooding on the lower Meramec River, water levels on the Mississippi River at St. Louis were the 3rd highest ever recorded, and only a few days later, record stages were set downstream at Cape Girardeau and Thebes (Fig. 6). This flood is truly remarkable in several respects.

First, the Mississippi River at St. Louis was above flood stage for only 11 days during this recent flood, compared to 104 successive days in 1993 and 77 days in 1973, the only years with higher floods at St. Louis. We have found a good trend between peak stage and flood duration, with the greatest anomaly being this recent flood, and the next greatest being the brief 2013 flood which ranks 7th. Clearly, during January 2016 the middle Mississippi River experienced what might be considered a flash flood, as it exhibited a response similar to rivers whose basins are a hundred times smaller.

Second, the January 2016 flood occurred at the wrong time of year. Great floods on large midwestern rivers have historically occurred during spring, when heavy precipitation is

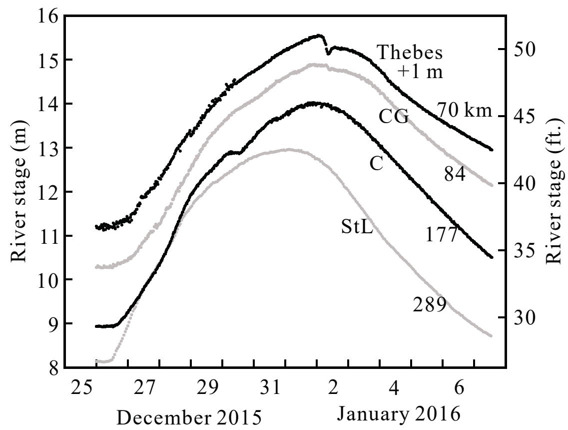

Figure 6. Stage hydrographs at St. Louis (StL), Chester (C), Cape Girardeau (CG) and Thebes, showing propagation of the 2015–2016 flood wave down the middle Mississippi River (cf. Fig. 2). The official stages depicted for each station are relative to its local datum, except that 1 m was added to the data at Thebes (top curve) for clarity. Numbers on curves are distance in kilometers above the Ohio River. The effect of a downstream levee being overtopped is evident near the flood crest at Thebes. This flood is remarkable for its short duration, time of year, and for the new record levels set at Cape Girardeau and Thebes. Data from USGS (2016).

added to rivers swollen with snowmelt. A partial exception was the August 1 peak of the great 1993 flood, but the protracted period of flooding was initiated during late spring. The other significant exception was the 10th highest flood at St. Louis, which occurred on December 7, 1982. Just like the current event, the 1982 flood peak on the Mississippi at St. Louis occurred only one day after the lower Meramec flood peak of December 6, 1982, discussed above. Ehlmann and Criss (2006) proved that the lower Missouri and middle Mississippi Rivers are becoming more chaotic and unpredictable in their time of flooding, height of flooding, and magnitude of their daily changes in stage. This chaotic behavior is primarily the result of extreme channelization of the river, and its isolation from its floodplain by levees (e.g., Criss and Shock, 2001; GAO, 1995; Belt, 1975). The channels of the lower Missouri and middle Mississippi Rivers are only half as wide as they were historically, along a combined reach exceeding 1 500 km, as clearly shown by comparison of modern and historical maps (e.g., Funk and Robinson, 1974).

Third, while the area of extreme precipitation during December 26–28, 2015 spanned the entire Meramec Basin, only 5% of the gigantic watershed of the Mississippi River above St. Louis experienced 7-day rainfall greater than 10 cm (Fig. 1). Nevertheless, because the Mississippi and Missouri rivers are so channelized and leveed proximal to St. Louis, the rainfall that was rapidly delivered to the nearby part of the watershed had nowhere to go, so river levels surged. Downstream, river stages were even higher because of the addition of floodwaters from Meramec River, affecting Chester, and then from the addition of Kaskaskia River, affecting the narrow Mississippi at Cape Girardeau and Thebes. For these sites, the fraction of their upstream watersheds affected by great December precipitation was only slightly larger than for St. Louis.

Finally, the record high water levels just set at Cape Girardeau and Thebes would have been even higher, but for the damaging surge of overbank floodwater that followed the overtopping of the Len Small Levee north of Cairo. The stage hydrograph for Thebes clearly shows that a sharp, 0.5 m reduction occurred when the water was still rising (Fig. 6), so the stage recorded just prior to that drop underestimates what the peak level would have been. A smaller but similar effect occurred slightly later at Cape Girardeau.

5 DISCUSSION

The aftermath of storm Goliath provides another example in an accelerating succession of record floods, whose tragic effects have been greatly magnified by man. The heavy rainfall was probably related to El Nino, and possibly intensified by global warming. Heavy rainfall impacted the entire Meramec basin, which accordingly flooded. But new record stages were set only in areas that have undergone intense development, which is known to magnify floods and shorten their timescales.

The Mississippi River flood at St. Louis was the third highest ever, yet it occurred at the wrong time of year, and its brief, 11-day duration was truly anomalous. Basically, this great but highly channelized and leveed river exhibited the flashy response of a small river, and indeed resembled the response of Meramec River, whose watershed is smaller by 160×. Yet, only a few percent of the watershed above St. Louis received truly heavy rainfall during this event; the river rose sharply because the water simply had nowhere else to go.

Further downstream, new record stages on the middle Mississippi River were set. Those record stages would have been even higher, probably by as much as 0.25 m, had levees not failed and been overtopped. The sudden drop of the water level near the flood crest at Thebes clearly demonstrates how levees magnify floodwater levels. In this vein, it is very significant that the water levels on the lower Meramec River were highest, relative to prior floods, proximal to a new levee and other recent developments. Forthcoming calls for more river management, including higher levees and other structures, must be rejected. Additional "remediations" to this overbuilt system will only aggravate flooding in the middle Mississippi Valley (see Walker, 2016).

Finally, this event provides abundant new examples of greatly underestimated flood risk. During this event, water levels on the lower Meramec River were 1 to 2 m above the official "100-year" flood levels (e.g., FEMA, 1995), while those that at Cape Girardeau and Thebes were 0.5 and 0.7 m higher, respectively. New commercial and residential developments in floodplains are foolhardy.

6 CONCLUSIONS

The huge winter storm of Dec. 23–29, 2015 delivered heavy rainfall in a broad swath across the USA, with as much as 25 cm of rain falling on East-Central Missouri in three days. The entire 10 300 km^2 Meramec Basin received an average of ~20 cm of rain during this event, and the river responded with a dramatic pulse that grew as it propagated downstream at ~3 km/h. Record high water levels were set at several sites, all in areas where the floodplain was developed, runoff was accelerated, high levees were built, or the floodway was restricted. In particular, compared to the prior record flood of 1982 on the Meramec River, the highest relative stage (+1.3 m) was seen proximal to a landfill in the floodway and to a new levee and that restricted the effective width of the "100-year" water surface by as much as 65%.

In contrast, Goliath's extraordinary rainfall impacted only a tiny fraction of the huge, 1.8 million km^2 Mississippi River Basin above St. Louis, yet flooding occurred which was truly remarkable for the high water level, time of year, and brief duration. This continental-scale river exhibited the flashy response typical of a much smaller river such as the Meramec. This unnatural response is clearly consistent with the dramatic channelization of the middle Mississippi River and its isolation from its floodplain by levees, as clearly pointed out by Charles Belt more than 40 years ago. It is time for this effect to be accepted and for flood risk and river management to be reassessed.

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Attachment D

National Wildlife Federation Comments

Scoping Comments on Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement

Submitted October 15, 2018

A New Subsidence Map for Coastal Louisiana

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Coastal Louisiana has experienced catastrophic rates of wetland loss over the past century, equivalent in area to the state of Delaware. Land subsidence in the absence of rapid accretion is one of the key drivers of wetland loss. Accurate subsidence data should therefore form the basis for estimates of and adaptations to Louisiana's future. Recently, Jankowski et al. (2017) determined subsidence rates at 274 sites along the Louisiana coast. Based on these data we present a new subsidence map and calculate that, on average, coastal Louisiana is subsiding at 9 ± 1 mm yr^{-1}.

COASTAL SUBSIDENCE

Low-elevation coastal zones (LECZs) are among the most vulnerable landscapes within the context of climate-driven accelerated sea-level rise, often exacerbated by other human impacts as well as high subsidence rates. Predictions of rates of relative sea-level rise (RSLR) in such settings depend to a considerable extent on our ability to monitor present-day subsidence rates—including their spatial pattern—at the land surface. Obtaining such data is challenging; space-based techniques (e.g., InSAR) struggle in non-urbanized landscapes and to date only few of such studies have provided useful results (e.g., Strozzi et al., 2013). Here we combine recently published subsidence data, collected by different yet complementary methods, to produce a novel subsidence map for coastal Louisiana, one of the world's most vulnerable LECZs.

While a variety of factors have contributed to Louisiana's wetland loss problem, the fundamental culprit is the isolation of the sediment-delivery system (the Mississippi River) from its delta plain and the adjacent coastal zone due to the construction of flood-protection levees. As a result, the majority of the sediment carried by this system is funneled into the deep waters of the Gulf of Mexico, rather than offsetting the naturally occurring high subsidence rates. A landmark study (Blum and Roberts, 2009) has shown that this problem is likely to worsen in the future due to limited sediment loads and accelerated sea-level rise.

SUBSIDENCE DATA

Tide gauges are frequently used to obtain records of RLSR. However, tide gauges in coastal Louisiana, and likely many other LECZs, have major limitations because they typically measure RSLR with respect to benchmarks anchored tens of meters below the land surface. Subsidence rates are highest in the uppermost 5–10 m, but the average depth of the benchmarks associated with National Oceanic and Atmospheric Administration (NOAA) tide gauges in coastal Louisiana (*n* = 31) is ~23 m. Tide gauges therefore do not capture the component that accounts for 60%–85% of the total subsidence as observed at the land surface (Jankowski et al., 2017).

Our recent work (Jankowski et al., 2017) offers a novel approach to determining total subsidence rates at 274 sites along the Louisiana coast, based on data collected through the Coastwide Reference Monitoring System (CRMS) program. The centerpiece of this analysis consists of rod surface-elevation–marker horizon records, 6–10 years long, enabling us to calculate present-day shallow subsidence rates (i.e., shallow compaction) by subtracting the rate of surface-elevation change from the vertical accretion rate at each site (Cahoon, 2015). Recently published GPS time series (Karegar et al., 2015) complement this information; because these GPS stations (*n* = 13) are typically anchored >15 m below the land surface, they capture the "deep" subsidence component that includes glacial and sedimentary isostatic adjustment (Wolstencroft et al., 2014) plus compaction and faulting in deeper strata.

A NEW SUBSIDENCE MAP

Our subsidence map (Fig. 1) shows a spatially continuous pattern of subsidence rates as recorded at the land surface, based on the sum of the two data sources discussed above. While spatial variability between our discrete monitoring sites is high, the map shows that the expected average subsidence rate is relatively uniform across coastal Louisiana, with a mean rate of 9 mm yr^{-1} and a standard error of the mean of 1 mm yr^{-1}. It should be noted, however, that uncertainties at individual monitoring sites are significantly higher, and we therefore stress that both model (Fig. 1C) and data (Fig. 1D) uncertainties should be taken into account when estimating subsidence rates at specific localities, including those that coincide with CRMS sites. The map predicts slightly higher than average subsidence rates in the eastern Chenier Plain, the Atchafalaya and Wax Lake Deltas, and along the Mississippi River downstream of New Orleans. The lowest rates are found in the western portion of the Chenier Plain, the region with the lowest vertical accretion rates (Jankowski et al., 2017). These two findings are in all likelihood related;

GSA Today, v. 27, doi: 10.1130/GSATG337GW.1. Copyright 2017, The Geological Society of America.

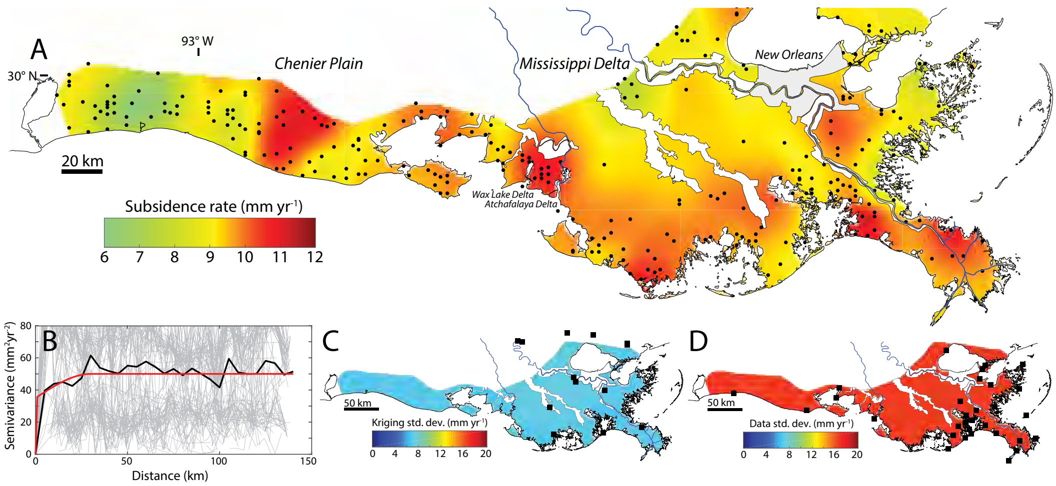

Figure 1. (A) Subsidence map for coastal Louisiana based on geostatistical interpolation (kriging) of 274 observations (black dots) of land-surface subsidence rates over the past 6–10 years. Areas in white and gray are agricultural and urban, respectively, and located outside of the wetlands. (B) Semivariogram of the data using 100 draws from different kriging options (gray), the data mean (black), and the kriging model (red). (C) Uncertainty (standard deviation) of the kriging estimate. Black squares show GPS stations. (D) Uncertainty (standard deviation) of the underlying data. Black squares show National Oceanic and Atmospheric Administration (NOAA) tide gauges. Note that the subsidence map can easily be converted into a relative sea-level rise map by adding the climate-driven sea-level component.

shallow compaction rates are known to be highly sensitive to overburden loading. The high subsidence rates in coastal Louisiana likely mostly reflect natural processes that have operated over the past millennia. Despite the associated high rates of RSLR, the abundant sediment supplied by the Mississippi River allowed its delta to evolve into one of the world's largest.

The new subsidence map should be considered a first step; substantial efforts are needed to refine this analysis. For example, our findings are not relevant for embanked urban settings with artificial drainage and localized groundwater extraction (Jones et al., 2016), most notably the New Orleans metropolitan area, as well as the agricultural land that occupies well-drained alluvial ridges. We omitted these areas from our subsidence map. Other caveats include the possibility of underestimated rates in the birdfoot delta around the mouth of the Mississippi River, which is known to exhibit anomalously high subsidence rates (Fisk et al., 1954). We also cannot rule out that active growth faults and hydrocarbon extraction may locally cause higher rates not captured by the GPS stations.

Our newly calculated present-day subsidence rates are considerably higher than what has been reported by recent studies that relied partly or entirely on tide gauges and that inferred rates of 1–6 mm yr^{-1} for the past few decades (Kolker et al., 2011; Karegar et al., 2015). As a result, "worst case scenarios" with subsidence rates of 8–10 mm yr^{-1} that have been used in predictions for the Mississippi Delta throughout the 21st century (Blum and Roberts, 2009; Kim et al., 2009) are in fact reflecting the conditions that exist in coastal Louisiana today. Perhaps worst case scenarios should be considered the new normal in other LECZs worldwide as well.

ACKNOWLEDGMENTS

This study would not have been possible without funding from the Coastal Wetland Planning, Protection, and Restoration Act (CWPPRA) Program and the State of Louisiana to support the Coastwide Reference Monitoring System (CRMS). The Coastal Protection and Restoration Authority of Louisiana and the United States Geological Survey jointly implement the CRMS Program on behalf of CWPPRA. Funding for this study was also provided by the National Science Foundation (EAR-1349311), the National Institute for Climatic Change Research Coastal Center of the Department of Energy, and The Water Institute of the Gulf. We would like to thank Marc Bierkens for his advice on spatial interpolation. We appreciate the constructive comments from Luigi Tosi and an anonymous reviewer.

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Revised manuscript received 15 May 2017
Manuscript accepted 16 May 2017

THE LITTLE RIVER DRAINAGE DISTRICT

FLOOD CONTROL & DRAINAGE
SINCE — 1907

October 15, 2018

U.S. Army Corps of Engineers, Memphis District
ATTN: Mr. Mike Thron, NEPA Coordinator
167 North Main Street, Room B-202
Memphis, TN 38103-1894

Re: Mississippi River & Tributaries Project, Mississippi River Levees Supplemental Environmental Impact Statement II

Dear Mr. Thron and Corps Team:

This statement is presented as part of the U.S. Army Corps of Engineers (Corps) preparation of Supplement II to the Final Environmental Impact Statement (SEIS II) for the Mississippi River Mainline Levees of the MR&T Project.

Considering the information following and attached and the current direction and intent of the Congress and the Administration we request that the Corps complete the subject SEIS II within 18 months.

Since 1998 the Corps and the local Levee Boards have partnered to enlarge the deficient levees using "avoid and minimize" design techniques. These levee enlargement projects provide critical flood control, flood protection and environmental gains in all categories.

We request that the Corps expeditiously complete the design and enlargement of the remaining deficient Mainline Mississippi River Levee. We ask that the Corps use an engineering practitioners approach considering the relevant conditions of the local area and conditions for the design criteria and to avoid and minimize environmental considerations that have been used for 20 years. Expediency is imperative for the local landowners who provide their land for the construction of the projects that benefit the federal flood control system. The local land owners and local sponsors must continue to have input into the design process and the location of borrow areas. We cannot over emphasize that the local people are giving up their land for the comprehensive federal project.

The Levee Enlargement & Berms Projects need to move to completion because our Mainline Mississippi River Levee is not currently built to the federally authorized project design and will be overpowered and/or overtopped during a Project Design Flood (PDF). If the levee overtops and/or fails because it is not completed, millions of acres are subject to flooding, millions of people will be displaced, homes, interstates and roads, airports, petroleum refineries, power generation facilities, farms, regionally and other significant regional and national infrastructure along with wildlife and their essential habitat will be impacted, resulting in hundreds of billions of dollars of damages and an environmental catastrophe.

We value our 90-years of work and partnership with the Corps and we appreciate the opportunity to make this statement in support of the SEIS II and the completion of the remaining federally authorized work for the Mississippi River Levees of the Mississippi River & Tributaries Project. The longer it takes to build the project to its authorized federal design ... the longer the inner-coast of the United States is exposed to extreme economic, life safety risks, and adverse environmental impacts.

Thank you for what you do every day to help provide the protection and productivity of the local people along the God-given Alluvial Valley known as the Mississippi River Watershed. Our nation's interests' and future productivity are at stake.

If you have questions or comments, please contact our office.

Yours,

W. Dustin Boatwright

W. Dustin Boatwright, PE
Chief Engineer

WDB:rh
Enclosure
CC: MG Kaiser (MVD), COL Clancy (MVN), COL Derosier (MVK), COL Ellicott (MVM), COL Sizemore (MVS)

Via e-mail: MRL-SEIS-2@usace.army.mil; John.M.Thron@usace.army.mil; Daniel.C.Sumerall@usace.army.mil

Information Paper

Mississippi River & Tributaries Project, Mississippi River Levees
Supplemental Environmental Impact Statement II

The Nation can realize the extreme benefits of building the MR&T project to design by 2028, within 10 years, the 100th anniversary of the 1928 Flood Control Act that authorized the project known as the greatest "public works" undertaking in America. In order for this to happen the SEIS II would have to be completed in 18 months and we would need to secure the funding (~$7B) within 3 years to build to design.

When the SEIS II is completed in 18 months then the design of the deficient parts of the system and the concurrent building of the system would require 5 to 7 years at best while local sponsors secure right-of-way, borrow material and other land agreements. This requires focused energy to have the funding in place to efficiently and effectively pursue the work.

When Congress directs a date certain -- as they did for the Red River Waterway Navigation project currently known as the J. Bennett Johnston Waterway ($2B, Dec 1994) – it happens.

When the Corps directs a date certain – as it did for assuring a flood protection date for Greater New Orleans ($14B, Sep 2011) – it happens.

Targeted water infrastructure investments like the MR&T and the ones described don't just happen, leaders set the conditions for them and focused responsive professionals are able to proudly deliver them for the public good, national security, and global economic gain. We must assure that our Nation realizes the impressive benefits of more than 70 to 1 return on investment in the MR&T by building it to design by May 15, 2028. Let's do this before an overpowering of the system occurs.

A brief synopsis of the MR&T EIS/SEIS: Following the devastating 1927 Flood, Congress passed the 1928 Flood Control Act which established the Mississippi River & Tributaries (MR&T) Project and set the Corps up to design and construct levee enlargement projects. The local Levee Boards are the local sponsors and provide right-of-way and maintenance for completed levee projects based on legally binding signed Levee Assurances.

Following the 1973 Flood, the Corps evaluated the performance of the Mainline Mississippi River Levee system and discovered that there were areas along the levee system that were deficient in grade and section. The Corps performed an Environmental Impact Statement (EIS) in 1976. In 1998 the Corps performed a Supplemental Environmental Impact Statement (SEIS) for the Mainline Mississippi River Levee Enlargement and Berms Project. The riverside batture land includes significant and important habitat for waterfowl, fisheries and wildlife. As part of the 1998 SEIS the Corps adopted "avoid & minimize" criteria within the design parameters in an effort to help eliminate and lessen impacts to the environment.

From:	Lambert, Edward P CIV USARMY CEMVN (US)
To:	Thron, John M (Mike) CIV USARMY CEMVN (US); Parrish, Kenneth D Jr CIV USARMY CEMVK (US); Sumerall, Daniel C CIV CEMVK CEMVD (US); Lauritzen, Shane T CIV USARMY CEMVK (US)
Subject:	FW: SEIS MR&T
Date:	Thursday, October 18, 2018 2:38:51 PM
Attachments:	image001.png

Fyi

From: Gretchen Benjamin [mailto:gbenjamin@TNC.ORG]
Sent: Thursday, October 18, 2018 1:53 PM
To: Lambert, Edward P CIV USARMY CEMVN (US) <Edward.P.Lambert@usace.army.mil>
Subject: [Non-DoD Source] SEIS MR&T

Hello Ed,

How are you doing, it's been a while. I'm sure you noticed the LMR Feasibility Study in the most recent WRDA so I expect we will be seeing each again on more regular basis.

I messed up and did not get TNC letter on the scoping process for the SEIS for MR&T to you on time. I wanted to let you know that TNC has a keen interest in this process and would like to be included in stakeholder distribution list and appropriate meetings that will held during the scoping/writing process for the preparation of the SEIS.

As you well know, The Nature Conservancy has partnered extensively with the Corps to advance policies and projects that can effectively and efficiently deliver environmental benefits while meeting the needs of people. Within WRDA 2016 there is the language from Congress directing the Corps to consider natural and nature-based features, alone or in combination with "grey" infrastructure, when studying the feasibility of flood risk management, storm damage reduction, and ecosystem restoration projects. The framework to the Prepare Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement provides a strategic opportunity to include co-benefits of nature-based approaches with traditional gray infrastructure elements to improve flood risk management while protecting our natural resources, supporting economic and recreational opportunities, and enhancing community resilience for future generations. TNC would like to be a trusted partner during the SEIS drafting to expand options for the benefit of people and nature during this important process.

Ed, I look forward to reengaging with you and your Team.

Best Regards,

Please consider the environment before printing this email.

Gretchen Benjamin

Large River Specialist

gbenjamin@tnc.org

608-397-1140

nature.org <Blockedhttp://nature.org/>

The Nature Conservancy

La Crosse Home Office

La Crosse, Wisconsin

From:	Thron, John M (Mike) CIV USARMY CEMVN (US)
To:	"Wobig, Loren"
Cc:	Sullivan, Shawn F CIV USARMY CEMVS (US); Whitney, Scott D CIV USARMY CEMVR (US); Pohlman, Rick; Altman, Steve
Subject:	RE: USACE - Public Scoping Meetings - Mississippi River Mainline Levees Supplemental Environmental Impact Statement II
Date:	Friday, August 24, 2018 3:12:00 PM

Loren,

In Illinois it looks like the following work will be investigated:

-We will look at potential replacement of over 2 miles of the floodwall in Cairo.
-Several segments of the levee between Mound City and Cairo have grade deficiencies of ~1-2 ft. in height.
-There are grade deficiencies where the levee ties into Hwy. 51 at Cairo where we will investigate solutions.
-There is a seepage issue inside the North Mound City sump to the pump station where we may look at installing a couple relief wells.

There is a potential for some modifications as we get further along in the study, but this is a quick summary of the problem areas. Just let me know if you have any more questions.

Thanks,
Mike Thron
Upper Delta Environmental Compliance Section
Regional Planning and Environmental Division South, USACE
167 N. Main St., Rm-B202
Memphis, TN 38103
Office: (901) 544-0708
Email: john.m.thron@usace.army.mil

-----Original Message-----
From: Wobig, Loren [mailto:Loren.Wobig@Illinois.gov]
Sent: Friday, August 24, 2018 11:27 AM
To: Thron, John M (Mike) CIV USARMY CEMVN (US) <John.M.Thron@usace.army.mil>
Cc: Sullivan, Shawn F CIV USARMY CEMVS (US) <Shawn.F.Sullivan@usace.army.mil>; Whitney, Scott D CIV USARMY CEMVR (US) <Scott.D.Whitney@usace.army.mil>; Pohlman, Rick <Rick.Pohlman@Illinois.gov>; Altman, Steve <Steve.Altman@illinois.gov>
Subject: [Non-DoD Source] FW: USACE - Public Scoping Meetings - Mississippi River Mainline Levees Supplemental Environmental Impact Statement II

Hi John

What details are available related to the actual levee work being performed in those reaches of the MR&T system along, adjacent and/or immediately downstream of Illinois?

Loren A. Wobig, P.E., CFM
Director
Office of Water Resources
217-782-9130
loren.wobig@illinois.gov

-----Original Message-----
From: Mauer, Paul
Sent: Friday, August 24, 2018 9:10 AM
To: Wobig, Loren <Loren.Wobig@Illinois.gov>; Altman, Steve <Steve.Altman@illinois.gov>

Subject: FW: USACE - Public Scoping Meetings - Mississippi River Mainline Levees Supplemental Environmental Impact Statement II

FYI

-----Original Message-----
From: Thron, John M (Mike) CIV USARMY CEMVN (US) <John.M.Thron@usace.army.mil>
Sent: Thursday, August 23, 2018 4:48 PM
Subject: [External] USACE - Public Scoping Meetings - Mississippi River Mainline Levees Supplemental Environmental Impact Statement II

The U.S. Army Corps of Engineers (USACE) will host four public scoping meetings for the preparation of a supplemental environmental impact statement to address the impacts associated with the construction of remaining authorized work on the Mississippi River mainline levees of the Mississippi River and Tributaries project, as detailed in the attached document. These scoping meetings will present information to the public followed by an opportunity to provide comments. All are invited to attend one of these meetings. Comments may also be submitted by regular mail or e-mail as described in the attachment. The scoping comment period will continue through October 15, 2018.

The four public meetings are scheduled from 7-9 p.m. as follows:

* Sept. 10: Holiday Inn Blytheville, 1121 East Main Street, Blytheville, Arkansas 72315
* Sept. 11: Vicksburg Convention Center, 1600 Mulberry Street, Vicksburg, Mississippi 39180
* Sept. 12: Louisiana Department of Environmental Quality, Room C111, 602 North 5th Street, Baton Rouge, Louisiana 70802
* Sept: 13: United States Army Corps of Engineers, New Orleans District Headquarters District Assembly Room, 7400 Leake Avenue, New Orleans, Louisiana 70118

More information about the project can be found at the following website:
Blockedhttp://www.mvk.usace.army.mil/MRLSEIS/. Feel free to contact me with any questions.

Thanks,
Mike Thron
Upper Delta Environmental Compliance Section Regional Planning and Environmental Division South, USACE
167 N. Main St., Rm-B202
Memphis, TN 38103
Office: (901) 544-0708
Email: john.m.thron@usace.army.mil

GULF RESTORATION NETWORK
healthygulf.org
UNITED FOR A HEALTHY GULF
1010 Common St, STE 902 New Orleans, LA 70112
Phone: 504.525.1528 Fax: 504.525.0833

October 15, 2018

US Army Corps of Engineers
ATTN: CEMVN-PDC-UDC
167 North Main Street
Room B-202
Memphis, TN 38103-1894
MRL-EIS-2@usace.army.mil

RE: Scoping Comments for Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS)

Dear US Corps of Engineers,

Please accept the following from comments on behalf of the Gulf Restoration Network regarding the Scoping for Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS). We are submitting these in addition to comments delivered by Matt Rota at the New Orleans public meeting held on September 13, 2018.

No wetlands should be utilized for borrow material for the this project

The USACE is charged with the protection of our nation's water resources, which includes wetlands. It would go against the mission of the USACE if wetlands were destroyed for this project if other sources of borrow are available. Precedent has been set for this, as, even under alternative NEPA arrangements, the repairs and construction of the Hurricane & Storm Damage Risk Reduction System (HSDRRS) after Hurricanes Katrina and Rita.

No additional wetlands should be enclosed by levees

Levees do not protect wetlands. Wetlands, however can protect levees. Wetlands should not be cut off from hydrologic flow because of this project. Cutting wetlands off from flows degrades the wetland, and creates a different "kind" of wetland, in the sense of in-kind mitigation. Wetland mitigation for impacts outside of levee systems should not be made inside of levee systems. Wetland mitigation for impacts inside of levee systems should be made inside of levee systems if there will be additional flood mitigation values (say, absorption of heavy rain within a polder) preserved.

Old River Control Structure improvements and operations should be addressed in this SEIS

The Old River Control structure, completed in 1963, currently is required to maintain a 70-30 percent flow division between the Mississippi and Atchafalaya Rivers. However, hydrographs show that while this may be maintained on a yearly basis, it is very inconsistent on monthly and daily time frames. Not only does this make flows unpredictable for crawfishermen and others dependant upon the Atchafalaya, but also can push more sediment into the Atchafalaya, which is silting up at an alarming rate.

This SEIS should include three issues regarding the Old River Control Structure:

1. Optimization to reduce sediment in the Atchafalaya and increase sediment in the Mississippi, thus reducing sedimentation in the Atchafalaya and increasing sediment in the Mississippi that could be used for coastal restoration.
2. Mechanical Removal of sediment north of Baton Rouge should be incentivised, as it is in the Bonnet Carre Spillway. Large scale Sediment traps should be evaluated for their environmental and cost saving qualities.
3. "Pulsing" of a diversion structure has been found to increase the sediment to water ratio in a diversion channel--And so accidental or purposeful "pulsing" of Old River Control must be avoided, as it aggravates the sediment issues in the lower River. The Operation of the structure must be planned to avoid "pulsing".
4. A reexamination of the 70-30 percent flow division to assess if this is appropriate for ecological and coastal restoration purposes.
5. There needs to be an assessment of the structural integrity of the Old River Control Structure.
6. The Corps must consider opening the Floodway levees with g`ates in ABFS west and east guide levees, in order to restore the natural flow and sediment patterns, and preserve the function of the ABFS.

The Corps must consider how structures like the Plaquemines Liquids Terminal add to the Corps' dredging costs by hindering land-building diversions like Mid-Barataria.

1. "Pulsing" of a diversion structure has been found to increase the sediment to water ratio in a diversion channel. Placing transportation like barge moorings and pilings is not only unsafe, it removes sediment from restoration projects, and reduces their environmental benefit. Removing that environmental benefit adds to the Corps' costs of dredging Southwest Pass and other ports south of RM 61.
2. The Corps must evaluate the additional costs to dredgin the MR&T by requiring that this be done for the Applicant for MVN 2012-0123, Port of Plaquemines Harbor and Terminal District.

Beneficial use of dredged sediment must be integrated into MR&T construction and operation

The sediment in the Mississippi River is an extremely valuable resource for coastal restoration in Louisiana, among other commercial uses. It is also a nuisance to navigation for large lengths of the river, destroying swamps of the Atchafalaya Basin, a dredging expense, and a risk to Old River Control. These costs must be assumed and evaluated by the Corps. By default, any sediment dredged during this process should be floated by barge to the coast for beneficial use, rather than merely re-suspended in the River, which will only add to the Corps' cost of dredging Southwest Pass. A Cost / Benefit Analysis that includes a quantitative analysis of the above costs must be done if the Corps is to avoid beneficial use of sediment.

Full mitigation must be completed concurrently with construction

We expect the Corps to abide by the hierarchy of Avoid, Minimize, and Mitigate when it comes to impacts to water resources, including wetlands. When mitigation is necessary, in order to fully replace wetland functions, mitigation should take place concurrently with construction, not after the project is complete.

Environmental justice must be evaluated

The MR&T project protects many citizens, but we are concerned that it may protect some and leave others out. THE USACE must perform a Block Group-level analysis of persons protected and impacted by the MR&T to show that it is being designed with all US residents in mind.

Climate change must be addressed

A changing climate is bringing new challenges and stresses to the MR&T. We are experiencing more extreme wet-weather events in the Mississippi River Basin. Since 2005, the Mississippi River Valley has sustained successive 100, 200, and 500-year rainfall events, a 50-year drought, Hurricane Katrina, Hurricane Rita, and Hurricane Isaac.[1] In fact, the Mississippi River is out of its banks as these comments are written (see photos below). While not in the MR&T, flooding this time of year is not typical, but may become so.

This EIS must include the fact that we will be seeing more rain and more droughts, which may overwhelm the design flow.

[1] 2016. Mississippi River Cities & Towns Initiative. 2016 Policy Platform of the Mayros along the Mississippi River.https://static1.squarespace.com/static/5845a70859cc6819f2dfdb9e/t/585c1af6d1758e618c86dc12/1482431226742/2016+Policy+Platform.pdf

Photo of Mississippi River out of its banks on October 11, 2018. Hannibal, MO. Photo credit: Robert Hoke.

Levee and river alignments should be considered

It appears that a large percentage of the levees south of New Orleans and St. Bernard suffer from a grade deficiency (see attachment). Costs of dredging Southwest Pass are considerable and increasing. This is an excellent opportunity to examine if the Corps should continue to maintain the current channel, or if other, shorter alignments could be considered. The Corps should consider a shortened channel, in order to avoid shipping and maintenance costs, restore land-building flows, and prepare for a changed climate.

Respectfully submitted,

Matt Rota
Senior Policy Director

Attachment

ST. LOUIS DISTRICT
MEMPHIS DISTRICT
VICKSBURG DISTRICT
NEW ORLEANS DISTRICT
N
Legend
Levee Work Items
Work Type
Floodwall Stability
Slope Stability
Slope Flattening
Grade Deficiency
Seepage
Existing Levee Centerlines
US Army Corps of Engineers
Mississippi Valley Division
Mississippi River and Tributaries Project
MR&T Mississippi River Levees Supplemental Environmental Impact Statement II
Proposed Work Items
Prepared under the Direction of the President of the Mississippi River Commission
Sheet 1 of 1
0 12.5 25 50 75 100
Miles

A21-3 U.S. Fish and Wildlife Service Planning Aid Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Louisiana Ecological Services
200 Dulles Drive
Lafayette, Louisiana 70506

March 5, 2019

Colonel Michael C. Derosier
District Engineer
U.S. Army Corps of Engineers
Vicksburg District
4155 Clay Street
Vicksburg, Mississippi, 39183

Dear Colonel Derosier:

The U.S. Fish and Wildlife Service (Service) has reviewed the Department of the Army, Corps of Engineers (USACE), Notice of Intent (NOI) to prepare a Draft Supplemental II Environmental Impact Statement (DSEIS II) that will address remaining work on the Mississippi River mainline levee feature (MRL). The NOI was published in the Federal Register (Volume 83, No. 135, pg. 32462) on July 13, 2018 (Department of Interior No. ER 2018-0330). Currently the MRL has sections that are structurally deficient to protect against the Project Design Flood (PDF). The Service submits the following comments to aid your project planning in accordance with the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 et seq.), the Migratory Bird Treaty Act (MBTA, 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

USACE goal for the SEIS II is to provide flood protection from the PDF and develop and environmentally sustainable project. Alternatives to restore the structural integrity of the project will include raising and widening levees, stabilizing floodwalls, and seepage control (e.g., berms, relief wells, and cutoff trenches). Other alternatives can be developed through the scoping process.

The most significant fish and wildlife related problem in the study area is the loss of forested habitat and the alteration of riverine process. The Mississippi Alluvial Valley (MAV) once supported approximately 24 million acres of floodplain forest, swamps, sloughs and riverine habitat. However, more than 75 percent of its forest has been lost since European settlement, mostly to agriculture, and much of the remnant forest occurs in small, isolated tracts with decreased conservation value. Cotton, soybeans, corn, winter wheat are common crops but rice, sorghum, and sugar cane are also cultivated. Although cleared of natural vegetation, flooded agricultural fields can provide important habitat for migrating shorebirds and wintering waterfowl.

Implementation of flood control measures and the resulting system of levees, dikes, diversions and canals have significantly altered the landscape. Much of the MAV has been isolated from the Mississippi River's natural flood cycles, which further impairs its ecological functions and also impacts the Gulf of Mexico and coastal ecosystems by altering hydrologic regimes and sediment budgets that sustain Gulf habitats.

The MAV is critically important as a major migration corridor for many bird species with more than 40 percent of the waterfowl that breed in North America using the MAV as migratory stopover, wintering or breeding habitat; the alluvial land located between the river at low-water stage and the levees (i.e., batture) is an important corridor for songbird migration. In addition, at least 107 species of landbirds breed in the MAV, with 70 of those depending upon bottomland hardwood forests for most or all of their life cycle. Furthermore, more than 100 species of fish occur in the Lower Mississippi River, and several threatened and endangered species (e.g. the pallid sturgeon, and the interior least tern) depend on these valuable habitats.

Restoration in the MAV has focused largely on the restoration of forested wetlands to benefit breeding landbirds, and consumptive wildlife recreation; hydrologic restoration of wetland habitats to support migrating shorebirds and wintering waterfowl; and modification of the flood control infrastructure along the mainstem river to benefit at-risk and threatened and endangered species.

The Lower Mississippi River Conservation Committee and the Service have cooperated extensively with state and other federal agencies (notably the USACE) in riverine restoration that would help implement restoration and recovery plans for the interior least tern, the fat pocketbook mussel and the pallid sturgeon. As these habitats are primarily instream and work on the MRL is typically farther from the river and often on the protected side of the levee, these habitats, species and restoration efforts will not be addressed within this document.

While the total acreage of potentially impacted habitats from the MRL work may not represent a significant acreage in relation to the overall size of the MAV, the cumulative loss of habitat could result in the continued decline of species dependent on those habitats; especially, those priority conservation species (e.g., at-risk, listed species, species of conservation concern). Therefore, the Service still has concerns about the long-tern potential adverse impacts to fish and wildlife resources, public lands, and ongoing species conservation and habitat restoration efforts within the project area. In order to address the above concerns the Service has identified the following resources/issues that should be addressed during planning efforts and within the SEIS.

<u>Public Lands and Lands Designated for Conservation</u>

The Service, state park and conservation agencies, and the Forest Service all have lands within the MAV that are in close proximity to the MRL feature. These lands have been purchased for the conservation of fish and wildlife habitats and resources and/or recreational enjoyment of those resources. The National Resource Conservation Service has undertaken habitat restoration in cooperation with landowners via the Wetland Reserve Enhancement Program and the Conservation Reserve Program. These programs focus on restoring native vegetation species. Avoiding and/or minimizing impacts to the above mentioned conservation lands should be a planning objective. If not feasible, USACE should establish and continue coordination with agencies managing public lands that may be impacted by a project feature until construction of that feature is complete and prior to any subsequent maintenance. If public lands are impacted, the Service recommends that such impacts be mitigated on the impacted public lands. If mitigation lands are purchased for inclusion within a managed area, those lands may need to meet certain requirements; therefore the proposed managing agency should be contacted early in the planning phase regarding any such requirements. If applicable, a General Plan should be developed by the Corps, the Service, and the managing natural resource agency in accordance with Section 3(b) of the FWCA for mitigation lands.

Threatened and Endangered Species

Below is a list of federally-listed threatened and endangered species that could potentially be affected by the MRL construction. Should the proposed action directly or indirectly affect any of the listed species further consultation with the Service will be necessary. Because construction details are not fully known at this time the Service recommends USACE address potential impacts in a programmatic manner until such time when actual impacts have been determined.

Species	Status
Interior least tern (*Sterna antillarum*)	Threatened
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered
Wood stork (*Mycteria Americana)*	Threatened
Fat pocket book mussel (*Potamilus capax)*	Endangered
Indiana bat (*Myotis sodalis*)	Endangered
Northern long eared bat (Myotis septentrionalis)	Threatened
Gray bat (*Myotis grisescens*)	Endangered

To ensure that any species listed or critical habitat designated after the date of this letter are addressed in future planning documents USACE should either coordinate with the local Service Office or consult the Service's website (https://ecos.fws.gov/ipac/) throughout the planning and construction phases.

At-Risk Species

The Service's Southeast Region has defined "at-risk species" as those that are:

1) Proposed for listing under the ESA by the Service;
2) Candidates for listing under the ESA, which means the species has a "warranted but precluded 12-month finding"; or
3) Petitioned for listing under the ESA, which means a citizen or group has requested that the Service add them to the list of protected species.

Petitioned species include those for which the Service has made a substantial 90-day finding as well as those that are under review for a 90-day finding. To the extent practicable, within 90 days after receiving a petition the Service is required to make a finding as to whether the petition presents substantial scientific and commercial information indicating that the petitioned action may be warranted.

A positive 90-day finding does not indicate that the results from a 12-month status review (i.e., finding) will likewise be positive. The final determination of whether a petitioned action is warranted is not made until the Service has completed a thorough status review of the species. Thus, while petitioned species are designated as at-risk species, the biological status may or may not warrant listing the species as federally threatened or endangered and affording protections under the ESA.

The Service's goal is to work with private and public entities to proactively conserve at-risk species in an effort to improve conservation status and preclude the need to federally list as many at-risk species as possible. In developing proactive conservation strategies with partners for at-risk species, the states' Species of Greatest Conservation Need (defined as species with low or declining populations) may also be considered and included in our conservation recommendations under the FWCA.

Discussed below are species currently designated as "at-risk" that may occur within the project area.

Eastern Black Rail

The eastern black rail (*Laterallus jamaicensis ssp.*), an at-risk species, is the smallest of North America's rail species. It has a broad distribution inhabiting higher elevations of tidal marshes and freshwater wetlands throughout the Americas. The eastern black rail breeds from New York to Florida along the Atlantic Coast and in Florida and Texas along the Gulf Coast. There is little known about the spring and fall migration as well as wintering distribution of the eastern black rail, but it has been documented to winter on the Gulf Coast from southeast Texas to Florida. The black rail is believed to use habitats within the MAV during migration.

On October 9, 2018, the Service announced a proposal to list the Eastern black rail as a threatened species and to provide measures under section 4(d) of the ESA that are tailored to our current understanding of the conservation needs of the eastern black rail. Section 7(a)(4) of the ESA provides a mechanism for identifying and resolving potential conflicts between a proposed Federal action and proposed species or proposed critical habitat at an early planning stage. A conference is required if a proposed action is likely to jeopardize the continued existence of a proposed species, or adversely modify or destroy proposed critical habitat; however Federal action agencies may request a conference on any proposed action that may affect proposed species or proposed critical habitat to ensure the conservation of that species. In the interest of conserving the Eastern black rail, we encourage the Corps, in coordination with the Service, to implement identified conservation measures that would minimize impacts to this proposed species.

Alligator Snapping Turtle

The alligator snapping turtle (*Macrochelys temminckii*) may be found in large rivers, canals, lakes, oxbows, and swamps adjacent to large rivers. It is most common in freshwater lakes and bayous, but also found in coastal marshes and sometimes in brackish waters near river mouths. Typical habitat is mud bottomed waterbodies having some aquatic vegetation. The alligator snapping turtle is slow growing and long lived. Sexual maturity is reached at 11 to 13 year of age (Ernst et al. 1994). Because of this and its low fecundity, loss of breeding females is thought to be the primary threat to the species.

Golden-Winged Warbler

The golden-winged warbler breeds in higher elevations of the Appalachian Mountains and northeastern and north-central U.S. with a disjunct population occurring from southeastern Ontario and adjacent Quebec northwest to Minnesota and Manitoba. Wintering populations occur in Central and South America. The loss of wintering habitat in Central and South America and migratory habitat may also contribute to its decline. The golden-winged warbler is also known to hybridize with the blue-winged warbler (*Vermivora cyanoptera*).

This species may be found in forested habitats throughout the MAV during spring and fall migrations. This imperiled songbird depend on forested habitats to provide food and water resources before and after trans-Gulf and circum-Gulf migration. Population declines correlate with both loss of habitat owing to succession and reforestation and with expansion of the blue-winged warbler into the breeding range of the golden-winged warbler.

Monarch Butterfly

On June 20, 2014, President Obama signed a Presidential Memorandum, "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators," outlining an expedited agenda to address the devastating declines in honey bees and native pollinators, including the monarch butterfly (*Danaus plexippus plexippus*). Recent research has shown dramatic declines in monarchs and their habitats leading conservation groups to petition the Service to list the species under Endangered Species Act (ESA). Ensuring adequate and sustainable habitats, meeting all the life history needs of these species is of paramount importance. The Service and its partners are taking immediate actions to replace and restore monarch and pollinator habitat on both public and private lands across the U.S. landscape. Therefore, we recommend revegetation of disturbed grassland areas with native plant species, including species of nectar-producing plants and milkweed endemic to the area, we recommend consultation with Service and conservation agency botanists to determine appropriate species where possible.

Migratory Birds

Bird nesting colonies are present in the project area; we recommend that a qualified biologist inspect proposed work sites for the presence of undocumented nesting colonies during the nesting season. Avoidance of nesting sites should be identified as a planning objective. In addition, we recommend that during construction, on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season. We recommend that you coordinate with the Service's state offices and state conservation agencies early in the planning phase to avoid and minimize impacts to nesting bird habitat and ensure that potential constraints with nesting birds are considered in the design of the project and unnecessary delays are avoided. The Service is willing to help identify additional measures that could be incorporated in the project design and construction timeline to minimize impacts to nesting birds while also avoiding impacts to the project construction sequence and timeline.

In addition to the direct loss of grassland and forested habitat, the proposed project may indirectly impact migratory birds of conservation concern because construction of projects within forested habitats typically results in habitat fragmentation. Forest fragmentation may contribute to population declines in some avian species because fragmentation reduces avian reproductive success (Robinson et al. 1995). Fragmentation can alter the species composition in a given community because biophysical conditions near the forest edge can significantly differ from those found in the center of a forest. As a result, edge species could recruit to the fragmented area and species that occupy interior habitats could be displaced. The fragmentation of intact forests could have long-term adverse impacts on some forest interior bird species. To help minimize impacts to migratory birds, forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory bird habitat, when practicable.

Bald Eagle

The proposed project area may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species as of August 8, 2007. However, the bald eagle remains protected under the MBTA and BGEPA. Comprehensive bald eagle survey data have not been collected by the Louisiana Department of Wildlife and Fisheries (LDWF) since 2008, and new active, inactive, or alternate nests may have been constructed within the proposed project area since that time.

Bald eagles typically nest in large trees located near coastlines, rivers, or lakes that support adequate foraging from October through mid-May. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants. Furthermore, bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during these periods may lead to nest abandonment, cracked and chilled eggs, and exposure of small young to the elements. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest tree, thus reducing their chance of survival.

The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf. T hose Guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. During any project construction, on-site personnel should be informed of the possible presence of nesting bald eagles in the vicinity of the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within 660 feet of the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary.

On September 11, 2009, the Service published two federal regulations establishing the authority to issue permits for non-purposeful bald eagle take (typically disturbance) and eagle nest take when recommendations of the NBEM Guidelines cannot be achieved. Permits may be issued for nest take only under the following circumstances where: 1) necessary to alleviate a safety emergency to people or eagles, 2) necessary to ensure public health and safety, 3) the nest prevents the use of a human-engineered structure, or 4) the activity or mitigation for the activity will provide a net benefit to eagles. Except in emergencies, only inactive nests may be permitted to be taken. The Division of Migratory Birds for the Southeast Region (i.e. Louisiana Mississippi, Arkansas, Tennessee, and Kentucky) of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting consultations and issuance of permits Should you need further assistance interpreting the guidelines, avoidance measures, or performing an on-line project evaluation, please contact Ulgonda Kirkpatrick (phone: 321/972-9089, e-mail: ulgonda_kirkpatrick@fws.gov). For the states of Illinois and Missouri in our Midwest region please contact Mr. Ryan Anthony (phone: 309-757-5800 Ext. 205, e-mail: ryan_anthony@fws.gov).

Fish and Wildlife Conservation Measures

The President's Council on Environmental Quality regulations for implementing the National Environmental Policy Act define mitigation to include: (1) avoiding the impact; (2) minimizing the impact; (3) rectifying the impact; (4) reducing or eliminating the impact over time; and (5) compensating for impacts. The Service supports and adopts this definition and considers the specific elements to represent the desirable sequence of steps in the mitigation planning process. Through this process, the Service strives to make the project's hurricane protection goals co-equal to fish and wildlife resource conservation.

The Service's Mitigation Policy (Federal Register, Vol. 46, pp. 7644-7663, January 23, 1981) has designated four resource categories which are used to ensure that the level of mitigation recommended will be consistent with the fish and wildlife resources involved. The mitigation planning goals and associated Service recommendations should be based on those four categories, as follows:

> Resource Category 1 - Habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the ecoregion section. The mitigation goal for this Resource Category is that there should be no loss of existing habitat value.
>
> Resource Category 2 - Habitat to be impacted is of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the ecoregion section. The mitigation goal for habitat placed in this category is that there should be no net loss of in-kind habitat value.
>
> Resource Category 3 - Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant on a national basis. The Service's mitigation goal here is that there be no net loss of habitat value while minimizing loss of in-kind habitat value.

Resource Category 4 - Habitat to be impacted is of medium to low value for evaluation species. The mitigation goal is to minimize loss of habitat value.

Considering the high value of forested wetlands and marsh for fish and wildlife and the relative scarcity of that habitat type, those habitat types are designated as Resource Category 2, the mitigation goal for which is no net loss of in-kind habitat value. Non-wetland forests would also be considered Resource Category 2. Scrub-shrub habitat that may be impacted, however, is a Resource Category 3 due to their reduced value to wildlife, fisheries and often reduced wetland functions. The mitigation goal for Resource Category 3 habitats is no net loss of habitat value.

To achieve fish and wildlife resource conservation and help the Corps address the above concerns the Service recommends the Corps adopt the following planning to guide future project planning efforts.

1. Avoid and/or minimize impacts to wetlands in the project area.

2. Avoid and/or minimize impacts to public lands and conservation/habitat restoration lands in the project area.

3. Avoid impacts to endangered or threatened species and their habitats within the study area, when feasible project features (including mitigation) should be located and/or include measures that would aid in the conservation of listed species.

4. Avoid or minimize impacts to migratory bird habitat to the extent feasible.

5. Avoid or minimize impacts to at-risk species and species of concern and their habitats. When feasible project features (including mitigation) should be located and/or include measures that would aid in the conservation of such species.

6. Coordinate with the Service and other conservation resource agencies in planning borrow areas and techniques and assessment of impacts and mitigation.

7. Coordinate further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) with the Service, the respective state wildlife agencies and the Environmental Protection Agency (EPA). The Service shall be provided an opportunity to review and submit recommendations on the all work addressed in those reports.

Borrow Area Considerations

In the previous SEIS a single hierarchy for identifying borrow areas was used for the entire MRL, however, in recent discussions with USACE the Service agrees that use of more than one hierarchy to address locality differences in the habitat value of lands located on the protected side versus the floodside of the levees. The Service is willing to discuss the development of additional geographically specific borrow area hierarchies. Also in the previous SEIS environmental features were recommended for inclusion within borrow sites (e.g., sloping shorelines); the Service still recommends that such features be included in the design of borrow pits. Ongoing studies by the Engineering Development and Research Center regarding borrow pits associated with the MRL project may identify borrow pit environmental features or characteristics that promote the existence of exotic carp within the river. Therefore, revisions to the proposed borrow pit environmental features may be necessary later in the study or during project implementation.

Klimas (1987) determined that a 300-foot-wide forest buffer would sufficiently reduce floodwater velocities to protect adjacent levees from erosive water flows. Dwyer, et al. (1997) reported that a 300-foot-wide forested corridor between the Missouri River and the adjacent levees reduced the chance of levee failure during flood events. Allen et al. (2003) determined that during the 1993 flood 83 percent of levee failures occurred where the forest corridor was less than 500-feet-wide and that the median length of levee failures was significantly wider along the riverbanks that had no forested corridor. Geyer, et al. (2000) concluded that forested buffers along the Kansas River were highly beneficial in protecting the riverbank from erosion during that same flood. U.S. Army, Corps of Engineers, Engineers Manual (EM) 1110-2-1913 Section 7-6(3) Protection of Riverside Slopes states, "The riverside slope may be shielded from severe wave attack and currents by timber stands and wide space between the riverbank and the levee." A forested buffer can reduce the need for structural levee slope protection and is consistent with Implementation Guidance for Section 1184 of the Water Resources Development Act of 2016. In order to reduce the floodside slope protection needed on some levee reaches the Service recommends that the Corps investigate the use of forested buffers; this would help maintain additional forested areas and grassed areas for wildlife species. Grassed areas, especially if seeded with native species, could help provide foraging areas for grassland birds species as well as pollinators.

Mitigation Planning for Unavoidable Habitat Impacts

Project features should be located and designed to avoid impacts to wetlands and non-wetland forested habitat. Should unavoidable impacts occur, those impacts should be minimized to the greatest extent possible. Any remaining unavoidable impacts must then be mitigated. Mitigation planning, including site selection and design, should be closely coordinated with the Service and other interested natural resource agencies. Full, in-kind compensation should be quantified and should be provided for unavoidable net adverse impacts on forested areas, wetlands, marsh, and associated submerged aquatic vegetation. Mitigation measures that would provide habitat for at-risk species in the project area should be included in any mitigation plan and project features; the Service can assist in development of such measures.

Mitigation measures should be constructed concurrently with the features that they are mitigating (i.e., mitigation should be completed no later than 18 months after levee construction has begun). If mitigation is provided via an in-lieu fee program or mitigation bank, completed mitigation would be achieved when credits were purchased from either source. If mitigation is not implemented concurrent with levee construction, the amount of mitigation needed should be reassessed and adjusted to offset temporal habitat losses. The Service may elect to assess impacts utilizing recently completed local/regional habitat models; while the Service recognizes that USACE must use models they have certified, those models may not fully capture all aspects of impacts or local/regional mitigation needs. Currently, USACE has mitigated most of the anticipated impacts determined for the previous SEIS with some mitigation occurring prior to the impacts, however, there still remains some mitigation required. The Service recommends that completion of the previous SEIS required mitigation be made a priority.

For the last SEIS the Service recommended that mitigation areas contain a high proportion (i.e., 75%) of red oaks to fully offset lost wintering waterfowl habitat (i.e., duck use days). While the Service maintains its concern about the loss of feeding habitat for wintering waterfowl, the Service no longer recommends that high proportion of red oaks but recommends an adequate mixture of varying hard mast species suited to the mitigation site based on soils and hydrology. For projects within Louisiana the Service recommends a minimum of 50 percent hardmast species.

In coordination with the Service and other fish and wildlife conservation agencies, the Corps should address the Environmental Protection Agency's and the Corps of Engineers' 12 requirements for each mitigation measure (Attachment).

We look forward to assisting the USACE in the assessment of impacts and the development of mitigative measures and alternatives. Should you have any questions regarding our comments, please contact David Walther (337/291-3122) of this office.

Sincerely,

Joseph A. Ranson
Field Supervisor
Louisiana Ecological Services Office

Attachment

cc: DOI, OEPC, Washington, D.C. (Attn.: Lisa Treichel)
DOI, OEPC, Albuquerque, NM (Attn.: Steven Spencer)
FWS, BAP & HC (ERT), Arlington, VA (Attn.: Stefanie Nash)
FWS, Atlanta, GA (Attn.: Christine Willis)
FWS, ES, Jackson, MS
FWS, ES, Columbia, MO
FWS, ES, Conway, AK
FWS, ES, Cookeville, TN
FWS, ES, Frankfort, KY
FWS, ES, Marion, IL

TWELVE REQUIRMENTS FOR MITIGATION PLANNING (from the U.S. Army Corps of Engineers & EPA 2008 Final Mitigation Rule in the FEDERAL REGISTER Vol. 73, No. 70, April 10, 2008)

Twelve Requirements for a Compensatory Mitigation Plan

1. Objectives. A description of the resource type(s) and amount(s) that will be provided, the method of compensation (restoration, establishment, preservation etc.), and how the anticipated functions of the mitigation project will address watershed needs.

2. Site selection. A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the mitigation project site.

3. Site protection instrument. A description of the legal arrangements and instrument including site ownership, that will be used to ensure the long-term protection of the mitigation project site.

4. Baseline information. A description of the ecological characteristics of the proposed mitigation project site, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other characteristics appropriate to the type of resource proposed as compensation. The baseline information should include a delineation of waters of the United States on the proposed mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site.

5. Determination of credits. A description of the number of credits to be provided including a brief explanation of the rationale for this determination.
    - For permittee-responsible mitigation, this should include an explanation of how the mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity.
    - For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the number and resource type of credits to be secured and how these were determined.

6. Mitigation work plan. Detailed written specifications and work descriptions for the mitigation project, including: the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water; methods for establishing the desired plant community; plans to control invasive plant species; proposed grading plan; soil management; and erosion control measures. For stream mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings.

7. Maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

8. Performance standards. Ecologically-based standards that will be used to determine whether the mitigation project is achieving its objectives.

9. Monitoring requirements. A description of parameters monitored to determine whether the mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting monitoring results to the DE must be included.

10. Long-term management plan. A description of how the mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management.

11. Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other components of the mitigation project, including the party or parties responsible for implementing adaptive management measures.

12. Financial assurances. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

Other information. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

A21-4 BROCHURE - ENVIROMENTAL DESIGN OF BORROW AREAS

RECOMMENDATIONS FOR PRIVATE LANDOWNERS

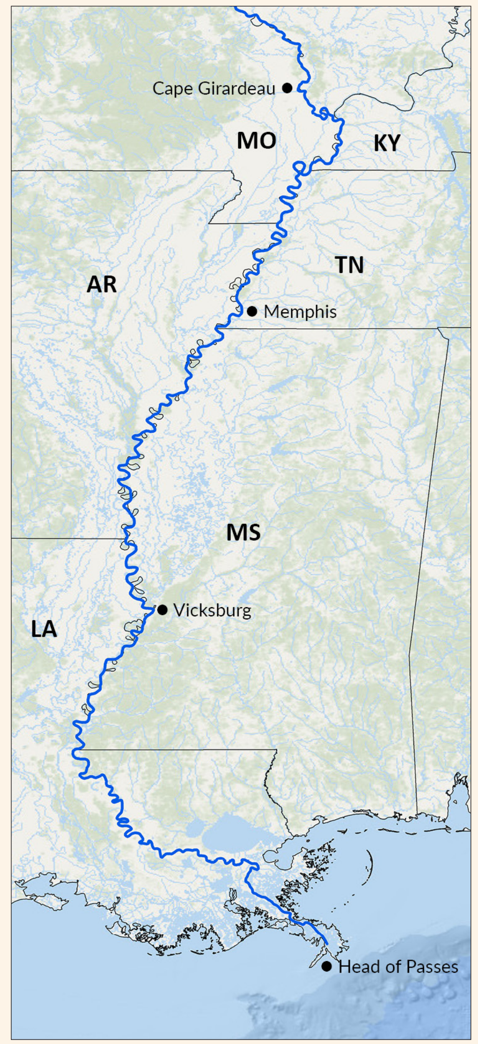
LEVEES ANCHOR FLOOD CONTROL

More than 100 levee construction projects are planned.

Foremost among the flood-control works along the Lower Mississippi River is the 3,500-mile-long Mississippi River and Tributaries (MR&T) levee system. MR&T levees, which are constructed of compacted soil and clay, protect more than 4 million residents, 1.5 million homes, 33,000 farms, and vital transportation routes from destructive floods. The levees are designed to protect the Mississippi River valley against the maximum probable flood by confining flow to the channel and the river's 2-million-acre, leveed floodplain, except where it enters the natural backwater areas or is diverted purposely into floodway areas. The main stem levee system — levees, floodwalls and various control structures — is 2,203 miles long. Some 1,607 miles lie along the Mississippi River and 596 miles lie along the south banks of the Arkansas and Red rivers and in the Atchafalaya Basin. The levees are built by the federal government and are maintained by local interests, except when federal assistance is provided during major floods. Periodic inspections of levees and other flood-control works are made by personnel from the Corps and local levee and drainage districts.

PROJECT AREA

- Extends from Cape Girardeau, Missouri to the Gulf of Mexico.
- More than 100 levee construction and seepage-control projects planned.



This document was produced by the U.S. Army Corps of Engineers Memphis, Vicksburg and New Orleans districts; the Engineer Research and Development Center; and the Lower Mississippi River Conservation Committee.

US Army Corps of Engineers

ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

LOWER MISSISSIPPI RIVER CONSERVATION COMMITTEE
LMRCC

ENVIRONMENTAL DESIGN OF MISSISSIPPI RIVER LEVEE BORROW AREAS

RECOMMENDATIONS FOR PRIVATE LANDOWNERS

LEVEE WORK IMPACT STUDY

Raising a levee with new fill.

The U.S. Army Corps of Engineers has prepared a supplemental environmental impact statement to address the impacts associated with the construction of remaining authorized work on the Mississippi River mainline levees between Cape Girardeau, Missouri, and Head of Passes in Louisiana, where the river meets the Gulf of Mexico. Remaining work includes raising and widening portions of the levee using material from borrow areas and managing seepage to protect levee foundations. More than 100 new borrow areas are planned. The Corps is studying ways to minimize the environmental impacts of borrow area construction, as well as ways of designing new borrow areas so they harbor more fish and wildlife.

FROM PIT TO AQUATIC HABITAT

Sport fish such as White Crappie are common in borrow areas.

The Corps has conducted extensive biological studies of borrow areas along the Lower Mississippi River. Biologists have studied use of borrow areas by fish, migratory waterfowl, wading birds, forest birds, turtles, frogs and, other wildlife. Biologists also have studied the shape, depth, water quality, degree of river flooding, and other characteristics of borrow areas that influence what species of fish and other wildlife will inhabit them. River side borrow areas, or those on the unprotected side of the levee, may be occupied by up to 75 species of fish all or part of the year. The research has also shown that incorporating environmental design features in newly constructed borrow areas can greatly enhance the diversity of fish and other wildlife that inhabit them. Those features include making them mostly bowl-shaped, with deeper areas of up to 10 feet and shallower areas of less than 5 feet; creating sinuous, or curved, shorelines; planting native trees along shorelines; and creating islands. Private landowners can request that the Corps and local levee boards incorporate environment designs features when constructing borrow areas on their property.

BUILDING A BORROW AREA

The U.S. Army Corps of Engineers receives funding for a levee construction project, and project-specific planning and design work begins.

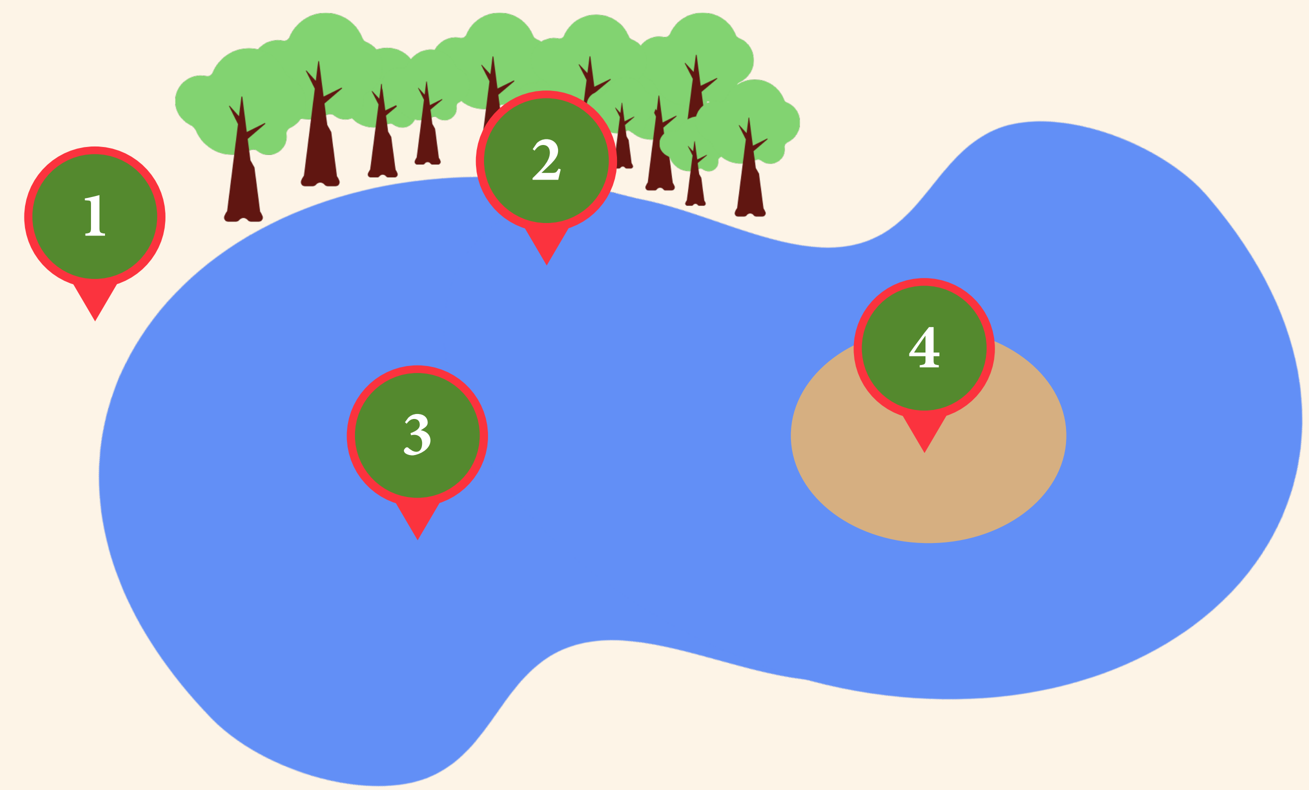
The Corps requests right-of-entry from a private landowner — through a non-federal sponsor such as a local levee district — where a borrow area and associated features are planned. Soil surveys and other preliminary work begins to determine soil suitability and embankment quantities required. During project design efforts, the Corps and non-federal sponsors will work with landowners to facilitate property goals and incorporate environmental features, where appropriate.

Upon design completion, the Corps requests that the non-federal sponsor acquire the necessary right-of-way for the project. The Corps will incorporate environmental features into the construction contract. Levee construction projects, including borrow area excavation, usually take two to three years to complete, but final acceptance of the project is not granted by the Corps until all project features are constructed and turf has been established on newly constructed levee features.

ENVIRONMENTAL DESIGN OF BORROW AREAS

1 Borrow areas can be constructed on the river side or land side of the levee. They can cover up to 20 acres or more.

2 Riparian buffers of native trees should border 50-75% of the periphery.

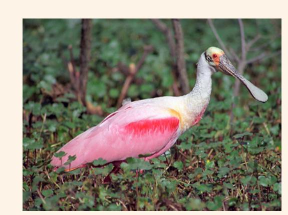


3 Should be bowl-shaped. Deep water (up to 10 feet, 1:3 slope) should cover up to 75%; shallow water (less than 5 feet, 1:10 slope) should cover 25%.

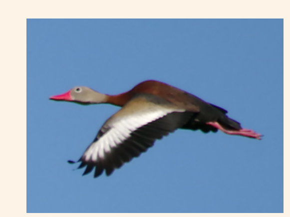
4 Islands and sinuous shorelines create varying depths and promote higher fish diversity.

FISH AND WILDLIFE INHABITING BORROW AREAS

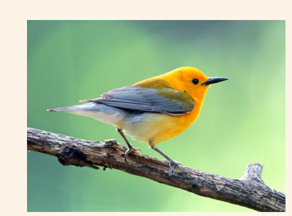
Up to 75 species of fish occur in borrow areas. Riverside borrow areas typically harbor more species.



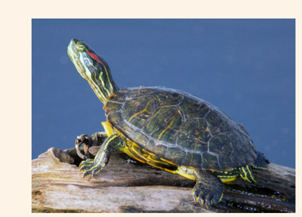
Wading birds such as Roseate Spoonbills, Wood Storks, and Great Egrets regularly feed in borrow areas.



Waterfowl such as Black-bellied Whistling Ducks, Wood Ducks, and Mallards feed and rest in borrow areas.



Forest and wetland birds such as Prothonotary Wablers frequent borrows areas with wooded shorelines.



Reptiles and amphibians such as the Red-eared Slider prefer still waters and woody debris for sunning.

A21-5 DRAFT SEIS II NOTICES OF AVAILABILTY

Public Hearing''. The RA may deny frivolous or insubstantial requests for a hearing. If a substantial request for a public hearing is made by September 28, 2020, EPA Region 9 will hold a public hearing. Any request for a public hearing shall include the following information: (1) The name, address, and telephone number of the individual, organization, or other entity requesting a hearing; (2) a brief statement of the requesting person's or organization's interest in the RA's determination and a brief statement of the information that the requesting person intends to submit at such hearing; and (3) the signature of the individual making the request, or, if the request is made on behalf of an organization or other entity, the signature of a responsible official of the organization or other entity.

If EPA Region 9 does not receive a timely and substantive request for a hearing and the RA does not elect to hold a hearing on his own motion, the determination at issue in this notice, the EPA's approval shall become final and effective on September 28, 2020, and no further public notice will be issued. EPA Region 9 will provide public notice of any public hearing held pursuant to a request submitted by an interested person or on EPA's own motion. If a public hearing is held, EPA Region 9 will issue an order either affirming or rescinding the determination. If EPA Region 9 affirms the determination, it will become effective as of the date of the order.

Authority: Section 1413 of the Safe Drinking Water Act, 42 U.S.C. 300g–2 (1996), and 40 CFR part 142 of the National Primary Drinking Water Regulations.

Dated: August 19, 2020.

John W. Busterud,

Regional Administrator, EPA Region 9.

[FR Doc. 2020–19005 Filed 8–27–20; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–9052–5]

Environmental Impact Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information 202–564–5632 or *https://www.epa.gov/nepa.*

Weekly receipt of Environmental Impact Statements (EIS).

Filed August 17, 2020, 10 a.m. EST Through August 24, 2020, 10 a.m. EST.

Pursuant to 40 CFR 1506.9.

Notice

Section 309(a) of the Clean Air Act requires that EPA make public its comments on EISs issued by other Federal agencies. EPA's comment letters on EISs are available at: *https://cdxnodengn.epa.gov/cdx-enepa-public/action/eis/search.*

EIS No. 20200172, Final, UDOT, UT, Parley's Interchange; I–80/I–215 Eastside, Contact: Naomi Kisen 801–965–4000.

Pursuant to 23 U.S.C. 139(n)(2), UDOT has issued a single FEIS and ROD. Therefore, the 30-day wait/review period under NEPA does not apply to this action.

EIS No. 20200173, Final Supplement, GSA, DC, St. Elizabeth's Master Plan Amendment 2, Review Period Ends: 09/28/2020, Contact: Paul Gyamfi 202–440–3405.

EIS No. 20200174, Draft, USDA, MT, Mid-Swan Landscape Restoration and Wildland Urban Interface Project, Comment Period Ends: 10/13/2020, Contact: Joseph Krueger 406–758–5243.

EIS No. 20200175, Second Draft Supplement, USACE, MS, Draft Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (1998 SEIS), Comment Period Ends: 10/13/2020, Contact: Mike Thron 901–544–0708.

EIS No. 20200176, Final, USACE, FL, Lake Okeechobee Watershed Restoration Project, Review Period Ends: 09/28/2020, Contact: Dr. Gretchen Ehlinger 904–232–1682.

Amended Notice

EIS No. 20200067, Draft, NRC, NM, Holtec International's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel and High Level Waste, Comment Period Ends: 09/22/2020, Contact: Jill Caverly 301–415–7674. Revision to FR Notice Published 3/20/2020; Extending the Comment Period from 5/22/2020 to 9/22/2020.

EIS No. 20200169, Final, USAF, TX, F–35A Operational Beddown—Air Force Reserve Command, Review Period Ends: 09/21/2020, Contact: Mr. Hamid Kamalpour 210–925–2738. Revision to FR Notice Published 08/21/2020; Correction to Lead Agency Contact Phone Number from 210–925–273 to 210–925–2738.

Dated: August 25, 2020.

Candi Schaedle,

Acting Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 2020–18984 Filed 8–27–20; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[EPA–R05–OAR–2014–0280; FRL–10013–84–Region 5]

Clean Air Act Operating Permit Program; Notice of Issuance of Title V Federal Operating Permit to Veolia ES Technical Solutions, LLC

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of final action.

SUMMARY: This notice announces that the Environmental Protection Agency issued a final permit decision under Title V of the Clean Air Act (CAA) to Veolia ES Technical Solutions, LLC (Veolia) for the operation of Veolia's Sauget, Illinois, hazardous waste treatment, storage and disposal facility.

DATES: EPA issued Title V Permit to Operate No. V–IL–1716300103–2014–10 to Veolia on June 17, 2019 under 40 CFR part 71. EPA issued the final permit decision as to the contested portions of this permit on August 10, 2020. Pursuant to section 307(b)(1) of the CAA, judicial review of EPA's final permit decision, to the extent it is available, may be sought by filing a petition for review in the United States Court of Appeals for the Seventh Circuit by October 27, 2020.

FOR FURTHER INFORMATION CONTACT: David Ogulei, Environmental Engineer, Air Permits Section, Air Programs Branch (AR–18J), Environmental Protection Agency, Region 5, 77 West Jackson Boulevard, Chicago, Illinois 60604, (312) 353–0987, *Ogulei.david@epa.gov.*

SUPPLEMENTARY INFORMATION: Throughout this document whenever ''we,'' ''us,'' or ''our'' is used, we mean EPA. This supplementary information section is arranged as follows:

I. How can I get copies of this document and other related information?

Docket. EPA has established a docket for this action under Docket ID No. EPA–R05–OAR–2014–0280. Publicly available docket materials are available either electronically through *www.regulations.gov* or in hard copy at

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, VICKSBURG DISTRICT
4155 CLAY STREET
VICKSBURG, MS 39138-3435

August 28, 2020

NOTICE OF AVAILABILITY

The U.S. Army Corps of Engineers (USACE) has prepared a Draft Supplement II (Draft SEIS II) to the 1976 Final Environmental Impact Statement (FEIS), Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees (MRL).

Through evaluation of information and data obtained from levee inspections, seepage analyses, research, studies, and engineering assessments, the USACE Memphis, Vicksburg, and New Orleans districts have collectively identified a total of 143 additional Work Items along various reaches of the MRL feature of the MR&T project. These Work Items are required to control seepage and/or raise and stabilize deficient sections of the existing levees and floodwalls to maintain the structural integrity and stability of the MRL system. The 143 Work Items constitute the proposed action for this Draft SEIS II and are located across portions of seven states: Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana. This document is intended to supplement and, as necessary, augment the 1976 FEIS and 1998 Supplemental EIS (SEIS I) to achieve USACE's primary goals for the MR&T: (1) providing flood risk reduction from the Project Design Flood; and (2) being an environmentally sustainable project.

The general public, interested parties and stakeholders are invited to comment on the Draft SEIS II. The draft report contains a description of the project, an evaluation of the alternatives under consideration and an analysis of potential environmental impacts. All public comments received will be addressed and considered as part of the USACE's decision-making process. The Draft SEIS II is available online at the USACE, Vicksburg District website at: *http://www.mvk.usace.army.mil/MRLSEIS/.*

Due to COVID-19, USACE will host virtual public meetings to provide information on the project and to receive verbal public comments; times and meeting details to follow in subsequent media release and advertisements. USACE will accept written comments through **October 13, 2020**.

Comments on the Draft SEIS II should be sent by mail to the District Engineer, USACE, Vicksburg District, 4155 Clay Street, Vicksburg, Mississippi 39138-3435 or by e-mail to MRL-SEIS-2@usace.army.mil. For further information, please contact Mr. Mike Thron via e-mail at John.M.Thron@usace.army.mil or telephone at (901) 544-0708.

Edward P. Lambert

Edward P. Lambert
Chief, Environmental Compliance Branch

A21-6 DRAFT SEIS II PUBLIC MEETING INFORMATION

NEWS RELEASE

U.S. ARMY CORPS OF ENGINEERS

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FOR IMMEDIATE RELEASE

Contact: Jessica Dulaney
Phone: 601-631-5818
Email: Jessica.L.Dulaney@usace.army.mil

Mississippi River mainline levees Draft Supplemental Environmental Impact Statement virtual public meetings scheduled

VICKSBURG, Miss. – The U.S. Army Corps of Engineers (USACE) scheduled two virtual public meetings for its Draft Supplement II (Draft SEIS II) to the 1976 Final Environmental Impact Statement (FEIS), Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees (MRL).

The meetings will be streamed on the following dates on the USACE New Orleans District's Facebook page at: https://www.facebook.com/usacenola/

Wednesday, Sept. 30, 2020 at 9 a.m.

Thursday, Oct. 1, 2020 at 6 p.m.

The general public, interested parties and stakeholders are invited to comment on the Draft SEIS II. The draft report contains a description of the project, an evaluation of the alternatives under consideration and an analysis of potential environmental impacts. All public comments received will be addressed and considered as part of USACE's decision-making process. Comments will be accepted through Oct. 13, 2020, when the comment period ends.

The Draft SEIS II and additional meeting details are available online at the project website: *http://www.mvk.usace.army.mil/MRLSEIS/*.

During the virtual meeting, USACE will accept comments through Facebook or by calling or texting (601) 392-2237. Written comments on the Draft SEIS II should be sent by e-mail to MRL-SEIS-2@usace.army.mil or by mail to the following address:

District Engineer
U.S. Army Corps of Engineers
Vicksburg District
4155 Clay Street
Vicksburg, Mississippi 39138-3435

The Draft SEIS was developed in collaboration between the USACE Memphis, Vicksburg and New Orleans districts.

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MR&T MISSISSIPPI RIVER LEVEES DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (SEIS) II PUBLIC MEETING
Project Overview
Daniel Sumerall
Project Manager, USACE
30 Sept - 1 Oct, 2020
U.S. ARMY
US Army Corps of Engineers®
MISSISSIPPI VALLEY DIVISION
US ARMY CORPS OF ENGINEERS
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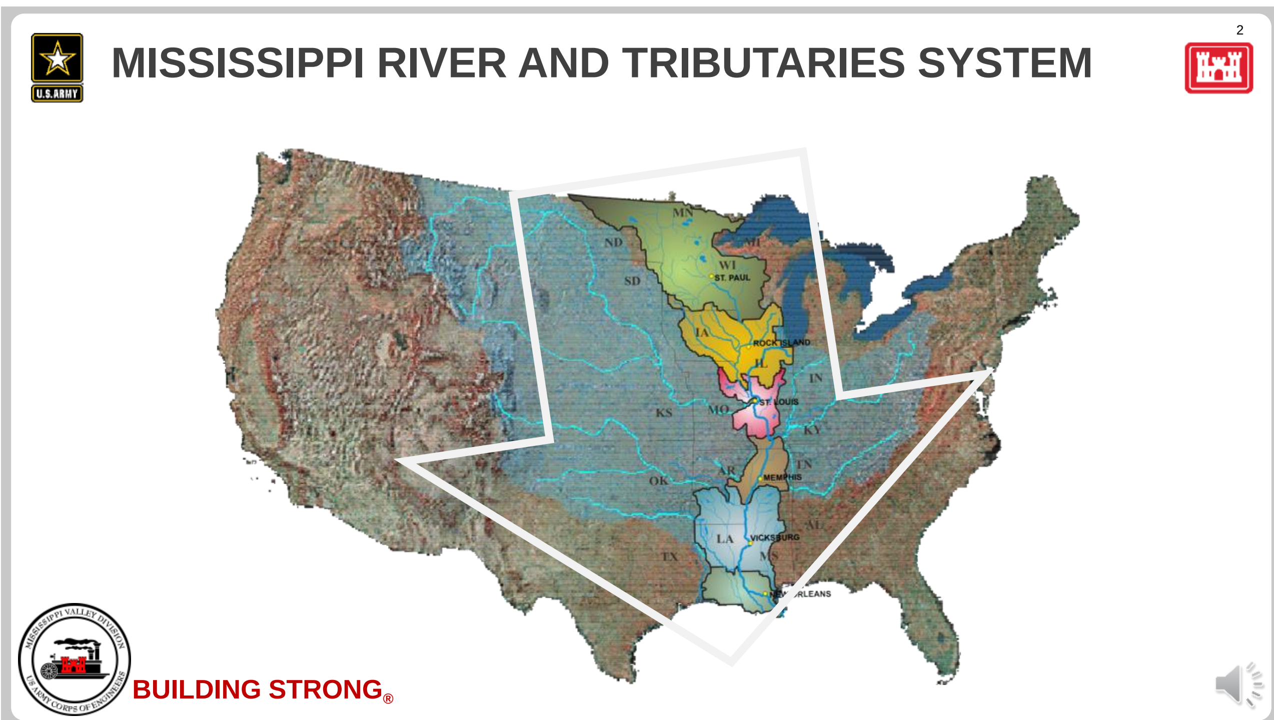
MISSISSIPPI RIVER AND TRIBUTARIES SYSTEM
2
U.S. ARMY
MN
ND
SD
WI
ST. PAUL
IA
ROCK ISLAND
IN
ST LOUIS
KS
MO
KY
OK
AR
TN
MEMPHIS
AL
LA
VICKSBURG
MS
TX
MISSISSIPPI VALLEY DIVISION
US ARMY CORPS OF ENGINEERS
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MISSISSIPPI RIVER AND TRIBUTARIES PROJECT

An Integrated System

- **Consists of measures to**
  - **Reduce Flood Risk**
  - **Facilitate Navigation**
  - **Restore Damaged Ecosystems**
- **One of the Nations most comprehensive and successful Civil Works Projects**
  - **$16 Billion invested**
  - **$1.5 Trillion in flood damages prevented**
  - **96 to 1 return on investment**
  - **$250 billion in flood damages prevented in 2019**
  - **7.2 million people protected**

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MISSISSIPPI RIVER LEVEES

The Mainline Mississippi River Levee System (MRL) extends from Cape Girardeau, MO to Head of Passes, LA and is approximately 1,610 miles in length.

Construction of the MRL is approximately 83% complete. Continued assessment and maintenance will be required to ensure the integrity of the MRL after the project is completed.

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MISSISSIPPI RIVER LEVEES - PDF

Station	2011	1927 [6/]	1937 [6/]	1973	PDF [5/]
Cairo, IL [1/]	2,100,000 [c/2/3/]	1,626,000	2,010,000 [4/]	1,536,000	2,360,000 [4]
Memphis, TN	2,213,000 [c]	N/A	2,020,000	1,633,000	2,410,000
Helena, AR	2,130,000 [c]	1,756,000	1,968,000	1,627,000	2,490,000
Arkansas City, AR	2,293,000 [c]	1,712,000	2,159,000	1,879,000	2,890,000
Vicksburg, MS	2,320,000 [c]	1,806,000	2,060,000	1,962,000	2,710,000
Natchez, MS	2,260,000 [c]	N/A	2,046,000	2,024,000	2,720,000
Red River Landing, LA	1,641,000 [c]	1,461,000	1,467,000	1,498,000	2,100,000
Baton Rouge, LA	1,436,000 [c]	N/A	1,400,000	1,381,000	1,500,000
N. Orleans, LA	1,230,000 [c/8/]	1,360,000	1,342,000	1,248,000	1,250,000
Morgan City, LA [7/]	512,000 [c]	741,000	493,000	692,000	920,000
Wax Lake Outlet, LA [7/]	323,000 [c]	N/A	N/A	292,000	580,000

C - Peak Discharge, Provisional
1/ Discharge Range at Hickman, KY
2/ Total Confluence Flow of 1,936,000 cfs measured at approximate mile 950.8 at 1400 CDT 5/02/2011 near Wickliffe, KY, prior to operation of Birds Point-New Madrid
3/ Peak Flow Measured 4 May 2011 = 1,730,000 cfs at Hickman plus 370,000 cfs flow through Birds Point-New Madrid Floodway
4/ Includes flow through Birds Point-New Madrid Floodway
5/ Project Design Flood (PDF) provides design flows for MR&T project. Prior to 2011 Flood, MR&T Project was 89% complete. 2011 Flood Flows ~ 80-85% of MR&T PDF Flows.
6/ Reference - "Annual Maximum, Minimum, and Mean Discharges of the Mississippi River and Its Outlets and Tributaries to 1963"
7/ Wax Lake Outlet was constructed from 1937-1942. Prior to that, Lower Atchafalaya River was the major outlet.
8/ New Orleans Mean Daily Flow Measured at Belle Chasse in 2011, Readings at this site are tidally influenced. An instantaneous measurement of 1,320,000 cfs was made on 17 May 2012

Revised 27 Jan 2012

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MISSISSIPPI RIVER LEVEES NEPA HISTORY

As required by the National Environmental Policy Act (NEPA), an Environmental Impact Statement (EIS) was completed in 1976.

In the 1990's, concerns about the environmental effects and compensatory mitigation for MRL construction activities lead to the completion of a Supplemental Environmental Impact Statement (SEIS) in 1998.

In November 2017, USACE completed an engineering evaluation for authorized remaining work needed to complete the MRL. USACE determined in March 2018 that a new SEIS would be required to address these additional items.

A Notice of Intent was issued in the Federal Register on 13 July 2018.

Description of Recommended Plan
1998 SEIS

District	Work Items	Miles of Enlargement	Miles of Seepage Control Construction
Memphis	31	31.8	74.3
Vicksburg	85	216.8	57.4
New Orleans	12	14.2	0.1
Total	128	262.8	131.8

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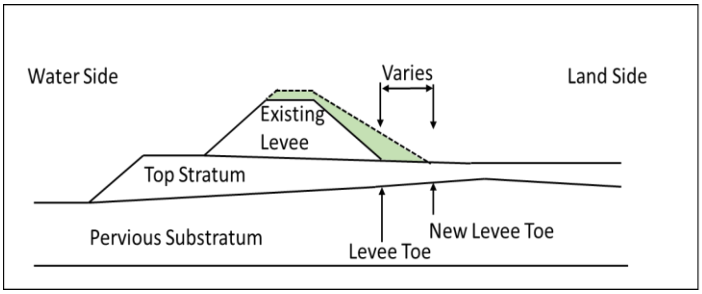
OVERTOPPING - LEVEE ENLARGEMENT

Levee enlargements are conducted in locations where the existing levee is not at the authorized grade. Depending on the location of the project, these raises may occur on the landside, riverside, or straddle the existing levee section.



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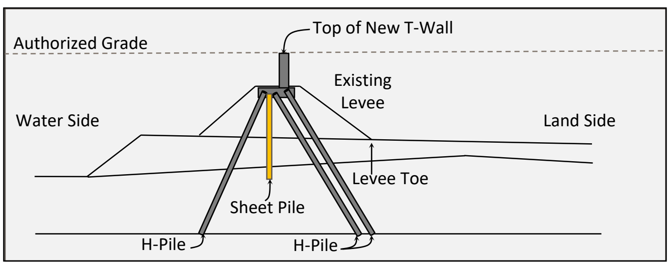
OVERTOPPING - FLOODWALL DEFICIENCIES

Urban areas typically require floodwalls rather than levees to reduce impacts to residences and businesses. These floodwalls can have stability concerns or height deficiencies that must be addressed.



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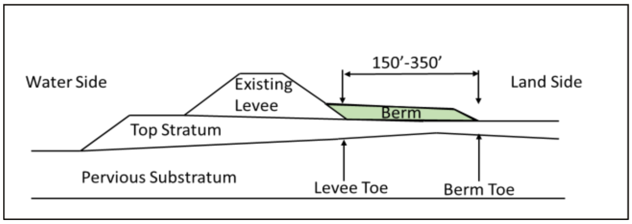
UNDERSEEPAGE - SEEPAGE BERMS

9

Seepage berms are constructed on the landside of the levee using impervious soils to reinforce existing top stratum and to reduce underseepage pressure near the toe of the levee. Upon construction, berms are turfed and mowed to prevent erosion or encroachment of undesired vegetation.



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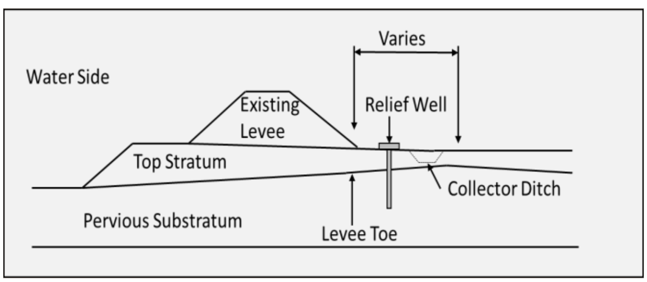
UNDERSEEPAGE - RELIEF WELLS

10

Relief wells are vertically installed wells consisting of a well screen surrounded by a filter material designed to prevent in-wash of foundation materials into the well. Relief wells intercept underseepage and provide a controlled outlet for the water while minimizing material transport underneath the levee.



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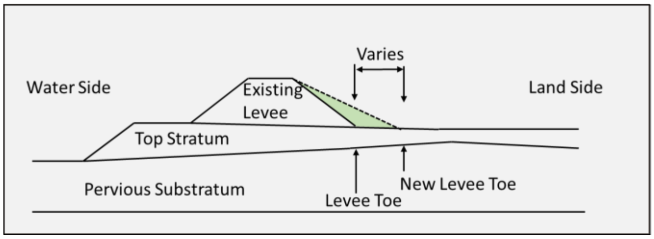
SLOPE FLATTENING

Areas with recurring levee slides require measures beyond ordinary O&M repairs. In these locations, the slopes of the levee will be flattened to reduce the chances of slide recurrence.



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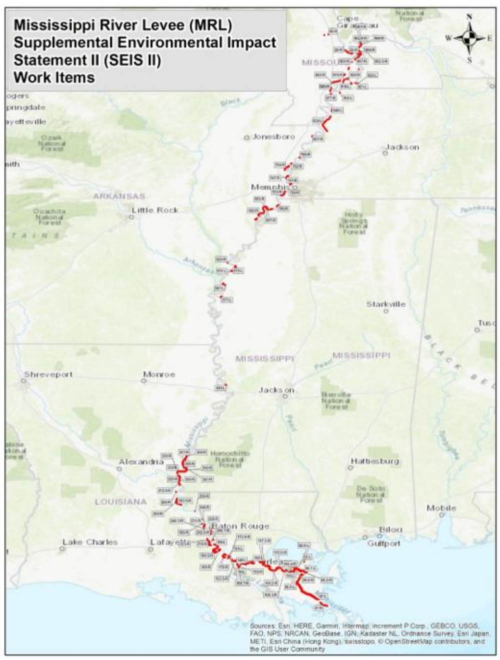
WORK ITEMS

WORK TYPE	DISTRICT	# of Work Items
Grade Deficiency	MVM	21
	MVK	7
	MVN	73
Seepage*	MVM	6
	MVK	13
	MVN	5
Slope Flattening	MVM	7
	MVK	0
	MVN	0
Floodwall	MVM	1
	MVK	0
	MVN**	21
TOTAL	ALL DISTRICTS	**143**

*some seepage issues are co-located with grade deficiency work items.
**some floodwalls in MVN are listed as enlargements OR floodwalls



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MR&T MISSISSIPPI RIVER LEVEES DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (SEIS) II PUBLIC MEETING

Mike Thron
NEPA Coordinator, USACE

September 30 – October 1, 2020

U.S.ARMY

US Army Corps of Engineers®

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INTRODUCTION

- Purpose of the Meeting: Discuss findings and solicit comments on the proposed plan
- Notice of Availability published in the Federal Register August 28, 2020
- Comment Period open through October 13, 2020

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT
MISSISSIPPI RIVER MAINLINE LEVEES

DRAFT SUPPLEMENT II TO THE FINAL
ENVIRONMENTAL IMPACT STATEMENT

August 2020

MEMPHIS DISTRICT
MEMPHIS, TENNESSEE

VICKSBURG DISTRICT
VICKSBURG, MISSISSIPPI

NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

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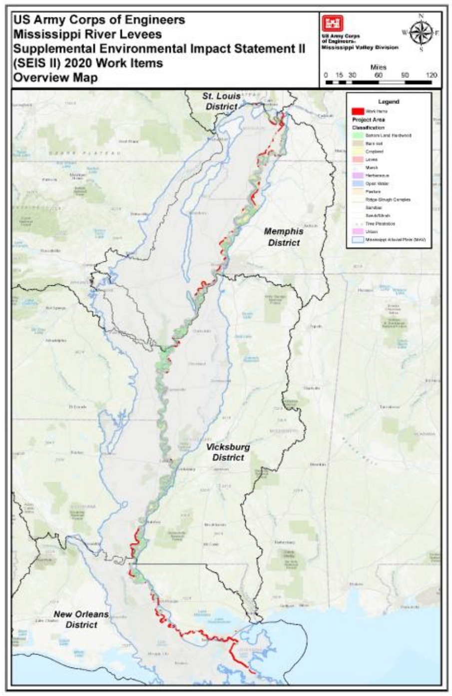
PURPOSE AND NEED

- 143 Work Items in need of remedial measures necessary to control seepage and/or raise and stabilize deficient sections of levees and floodwalls
- Provide protection up to the congressionally-authorized level of the Project Design Flood
- Reduce flood risk in the Mississippi River alluvial valley between Cape Girardeau, Missouri and the Head of Passes, Louisiana



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ALTERNATIVES

- Alternative 1 - No Action Alternative
- Alternative 2 - Borrow Sources Selected Based on Most Cost Efficient Means (Traditional Construction Alternative)
- Alternative 3 - Borrow Sources Selected based on Avoid and Minimize Site Ranking Process (Avoid and Minimize Alternative)

Carried forward for detailed analyses

- Alternative 4 – Nonstructural alternative
- Alternative 5 – Nature-Based Alternative
- Alternative 6 – Levee Setback Alternative

Not carried forward for detailed analyses

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ALTERNATIVE 3 – PREFERRED ALTERNATIVE

Alternative 3 (Avoid and Minimize) *Preferred Alternative*
Most Preferable
Riverside prior-converted cropland
Landside cropland from willing sellers
Riverside farmed wetlands (cropland)
Riverside farmed wetlands (cropland)
Riverside farmed wetlands (pasture)
Riverside herbaceous wetlands not in federal conservation programs
Riverside forested non-wetlands not in federal conservation programs
Riverside forested wetlands not in federal conservation programs
Landside/Riverside cropland condemnation
Least Preferable

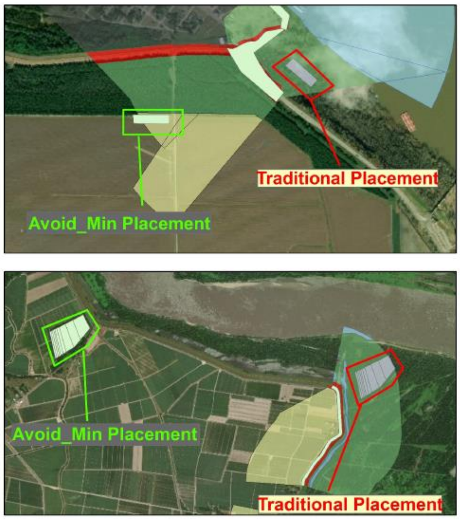

Figure A10-6. Examples comparing Alternative 2 - Traditional Construction with Alternative 3 - Avoid and Minimize at two levee Work Item locations. Note that in both cases, the location of borrow pits were shifted from forested areas on the riverside of the levee to agricultural areas on the landside of the levee. This shift resulted in a decrease in impacts to wetland resources.

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PREFERRED ALTERNATIVE (CONT.)

- Environmental Features
  - Sinuous shorelines
  - Islands
  - Buffers
- Explored with willing landowners and non-Federal sponsors during project design

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PROGRAMMATIC FRAMEWORKS

- Programmatic Agreement
  - 34 federally-recognized Tribes
  - State Historic Preservation Officers (SHPO) – AR, IL, KY, LA, MO, MS, TN
  - Advisory Council on Historic Preservation
  - National Park Service
- Endangered Species Act
- State Water Quality Certification
- HTRW
- Farmland Conversion Impact Ratings

10th DRAFT (Final)

PROGRAMMATIC AGREEMENT

AMONG THE
U.S. ARMY CORPS OF ENGINEERS (USACE), MEMPHIS, NEW ORLEANS, AND VICKSBURG DISTRICTS
THE CHICKASAW NATION;
THE CHOCTAW NATION OF OKLAHOMA;
THE OSAGE NATION;
THE QUAPAW NATION;
THE ARKANSAS STATE HISTORIC PRESERVATION OFFICER;
THE ILLINOIS STATE HISTORIC PRESERVATION OFFICER;
THE KENTUCKY STATE HISTORIC PRESERVATION OFFICER;
THE LOUISIANA STATE HISTORIC PRESERVATION OFFICER;
THE MISSISSIPPI STATE HISTORIC PRESERVATION OFFICER;
THE MISSOURI STATE HISTORIC PRESERVATION OFFICER;
THE TENNESSEE STATE HISTORIC PRESERVATION OFFICER;
AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
THE MISSISSIPPI RIVER AND TRIBUTARIES PROJECT:
MISSISSIPPI RIVER LEVEE FEATURES

PREAMBLE

WHEREAS, the mission of the U.S. Army Corps of Engineers (USACE), Memphis District (MVM), Vicksburg District (MVK), and New Orleans District (MVN), is to deliver vital public and military engineering services; partnering in peace and war to strengthen our Nation's security, energize the economy, and reduce risks from disasters; and

WHEREAS, the Mississippi River and Tributaries (MR&T) Project, authorized by the Flood Control Act of 1928, as amended, is designed to reduce flood risk in the Mississippi River alluvial valley for approximately 1,610 miles between Cape Girardeau, Missouri and the Head of Passes, Louisiana from the Project Design Flood (PDF); and

WHEREAS, the MR&T Project, including the Mississippi River Levee (MRL) feature assists in protecting the 36,000 square-mile Lower Mississippi River Valley from periodic overflows of the Mississippi River with a Project area in the alluvial valley that encompasses parts of the seven states of Missouri, Illinois, Kentucky, Tennessee, Arkansas, Mississippi, and Louisiana; and

WHEREAS, the MRL feature (levees and floodwalls) extends for nearly 1,610 miles along the Mississippi River beginning at the head of the alluvial valley near Cape Girardeau, Missouri and continues to approximately 10 miles above Head of Passes near the Gulf of Mexico and is considered the backbone of the MR&T flood risk management system; and

WHEREAS, there is an urgent need to design, build, maintain, operate, and repair the mainline MRL system to ensure that the MRL system provides protection up to the level of the PDF. A catastrophic failure of the MRL, at any point, would likely cause grievous loss of life and personal injury, extensive damage to property and natural resources, serious harm to river navigation, and significant and long-lasting economic and social upheaval; and

WHEREAS, the MR& T Project has four major elements 1) levees and floodwalls to contain flood flows; 2) floodways to pass excess flows past critical Mississippi River reaches; 3) channel improvement and

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8

SIGNIFICANT RESOURCES

- **Waterfowl**
- **Terrestrial Habitat**
- Bats
- Migratory Birds
- Threatened and Endangered Species
- **Wetlands**
- **Aquatics**
- Water Quality
- Air Quality
- Cultural Resources
- Socioeconomic Resources
- Environmental Justice
- Agricultural Lands/Prime Farmland
- Hazardous, Toxic and Radioactive Waste (HTRW)
- Recreation
- Aesthetics
- Noise

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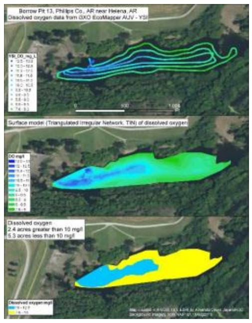
HABITAT ASSESSMENTS



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RESULTS

Table S-1. Summary of impacts and required compensatory mitigation from quantitative assessments of Alternatives 2 and 3 by USACE District.

District	Impacts with Alternative 2 (Traditional Construction)					Impacts with Alternative 3 (Avoid and Minimize)				
	Wtlnd FCU/ HSU [1]	Wtrfwl DUD[2]	Terrest. Wildlife AAHU[3]	Aquatic HU[4]	Req. Comp. Mit. (acres)	Wtlnd FCU/ HSU [1]	Wtrfwl (DUD)[2]	Terrest. Wildlife AAHU[3]	Aquatic HU[4]	Req. Comp. Mit. (acres)
MVM	-37,338	-141,330	-1643	295	795	-23,924	-99,029	-540.3	379	673
MVK	-24,141	-550,069	-1108	367	724	-20,386	-545,676	-867.9	347	614
MVN	-8,055	-92,411	-325	174	257	-4,983	-18,246	-197.8	140	160
TOTAL	-69,534	-783,810	-3,076	835	**1,776**	-49,293	-662,913	-1,606	866	**1,447**

[1] Functional Capacity Units calculated from Hydrogeomorphic Manual (HGM) and Habitat Suitability Units from Wetland Value Assessment (WVA) analyses.
[2] Duck-Use-Days (DUD) calculated from waterfowl analyses. DUD is not comparable to other units of measure (FCU, HU, etc.).
[3] Average Annual Habitat Units calculated using Habitat Evaluation Procedures (HEP) analyses on wildlife.
[4] Habitat Units calculated from Borrow Area Habitat Suitability Index Fish Diversity Model (aquatic HUs were gains due to addition of open water associated with borrow areas).

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KEY MILESTONES

Milestone	Date
Notice of Intent Published	July 13, 2018
Cooperating Agency Kick-off Meeting	Aug. 30, 2018
Public Scoping Meetings	Sept. 10-13, 2018
Public Scoping Period Ends	Oct. 15, 2018
Draft Fish and Wildlife Coordination Act Report	July 27, 2020
Draft SEIS Released For Public/Agency Review – Comment Period Begins	Aug. 28, 2020
Draft SEIS Comment Period Ends	**Oct. 13, 2020**
Tentative Schedule - Final SEIS Publication	Oct./Nov. 2020
Tentative Schedule - Record of Decision	Dec. 2020

SUBMITTING COMMENTS

1) Send E-mail to: MRL-SEIS-2@usace.army.mil

2) Mail to:
District Engineer
U.S. Army Corps of Engineers
Vicksburg District
4155 Clay Street
Vicksburg, MS 39183-3435

Comment closing date is October 13, 2020.

3) Call or text: (601) 392-2237

For copies of the Draft SEIS II and additional information about the project, please visit the project website: http://www.mvk.usace.army.mil/MRLSEIS/.

Draft MRL-SEIS-II Virtual Public Meeting
Facebook Live - https://www.facebook.com/usacenola/
Meeting Transcript - 30 Sept. 2020

Ricky Boyett: Give me a beat, Matt. Good morning, I hope that everybody is doing well. I am Ricky Boyett, chief of public affairs for the New Orleans District for the Corps of Engineers, and on behalf of the New Orleans District, the Vicksburg District and the Memphis District, I welcome you to our first virtual Mississippi River levee supplemental environmental impact statement public meeting for the supplemental environmental impact statement. We'll also be using the terminology SEIS, they are the same thing. It's just what we tend to go with in conversation. I do feel I can speak for all of my teammates that we would all prefer the opportunity to meet with you face to face provided this information is important to so many of you that live along and behind the Mississippi River levees, and we also would like the opportunity to hear your feedback and and discussion with you directly. Unfortunately our current challenging environment we are unable to do so, so we have attempted to provide the best alternative that we can. I also feel that i can speak for our team when I say the success of doing this virtually will depend a lot on your participation to ensure that your questions and ideas are heard.

We have developed two methods for which you can submit questions to our team. First, you can ask a question through the chat function of this Facebook site, however, we do understand that you may be watching through Facebook but do not have a Facebook account or would just prefer to wish to submit that question some other way. You are also able to text or call our hotline at 601-392-2237. We will have team members on site and throughout the valley monitor both the chat function as well as the phone text options to ensure that your questions are included in this discussion. I do also want to take this moment to say that we are also in the public comment portion of our evaluation through the 13th of October. You can also submit comments to the hotline as well as the email address and physical addresses you will see repeatedly on the screen.

Today we are essentially going to hold this meeting in two segments. First, we have pre-recorded presentations on the project as well as the statement of where we are within our evaluation. Our intent is that for these presentations we'll provide you with the pertinent information on this critical life safety project as well as to prime the next portion of our meeting, a virtual discussion with you. The chat and the phone will be available to you at any time during the meeting so you do not have to wait to submit your questions or comments until the end of the presentations. You can submit them at any time.

After the pre-recorded messages, we're going to resume the live meeting and we will be there for this specific purpose, to talk with you, to hear your questions and comments. We have members of the project delivery team again here on site as well as virtually. We are monitoring all and all options we are monitoring the chat, we are monitoring the google throughout, and then we will have the right people there to answer the questions. You know, in addition to those that you'll see on camera, I do want to say we do understand that this project covers a lot of acreage. We're looking at north up river of Memphis to downriver of New Orleans and we know that your questions may range from an overall scope to something more local to a specific levee section. While I can't say we can answer every question you have, we do have people available from throughout the region to try and put us in the best position to do so. Again, thank you so much for giving us a couple of hours of your time. Now please allow me to begin our pre-recorded portion with a welcoming message from Colonel Robert Hilliard. He's the commander of the Vicksburg District who is the lead district for this effort.

Colonel Robert Hilliard: Hey good afternoon everyone, I'm Colonel Robert Hilliard, commander of the Vicksburg District, U.S. Army Corps of Engineers and I just appreciate you all being with us today for this MRL public meeting. I'm also happy to represent my fellow commanders, Colonel Zach Miller from Memphis and Colonel Steven Murphy from New Orleans as this is really a project that spans all three districts. Vicksburg is the lead for the program, but the other two are so heavily involved and with us today. Again, I appreciate you being with us on this very special project.

You know the MR&T, the Mississippi River and Tributaries project, is an incredibly important project and the Mississippi River itself is such a gem for our whole nation. That means inception the MR&T project has prevented over 1.5 trillion in damages protecting over 7 million people. Incredibly important not only to this region, but to the nation. And so we're here today to get your comments on the Mississippi River levees in addition to the supplemental environmental impact statement that will allow us to even do more work on this system. As with any system, it needs to be maintained each and every year. This is an important step in continuing that maintenance. But part of this is transparency and understanding your thoughts on this project as well. So our purpose today is to explain the findings of our current study, or current analysis, and then open it up to get your feedback. In the end our hope is that it will make this a better document. Of course we'd like to do this in person but given the current COVID environment, we are doing this virtually and I'm sure we'll make this work. And again, we just look forward to your feedback during this session and our other session that we're going to hold. Again, thank you for being here and we look forward to hearing from you. Take care.

Daniel Simone: Hello my name is Daniel Simon. I'm the senior project manager for the Vicksburg District U.S. Army Corps of Engineers. It has been my pleasure to lead the project delivery team responsible for completing the draft supplemental environmental impact statement number two for the Mississippi River levees project. Our project delivery team consists of over 100 team members from the Memphis, Vicksburg and New Orleans Districts, the Mississippi Valley Division Headquarters and the Engineering Research Development Center in Vicksburg, Mississippi. I would like to take a moment to echo Colonel Hilliard's thoughts and to welcome all of you to our public meeting. The public's participation and interest in our projects is critical to the NEPA process and making sure that it's working properly. We look forward to hearing your thoughts and answering any questions we can about our project. I'm going to give a brief overview of the Mississippi River levees project and how it fits underneath the umbrella of the Mississippi River and Tributaries program. After I'm done, I will pass things along to our environmental lead Mike Thron for a little more in-depth look at the findings discussed in SEIS number two and a description of how to continue commenting even once these meetings are done.

The Mississippi River is the world's third largest watershed draining 41 percent of the continental United States. The river and its alluvial valley support an enormous agricultural economy and continuous and safe navigation along the river are extremely important to our nation's commerce. Following the devastating flood of 1927, congress established the Mississippi River and Tributaries program, or MR&T, through the passage of the 1928 Flood Control Act. The MR&T was created to provide a comprehensive and unified system of public works that would provide the lower Mississippi River alluvial valley with flood protection and an efficient navigation channel.

Through the years since its inception, the MR&T has evolved into a four-pronged approach consisting of an expansive levee system along both the mainline Mississippi River and many of its tributaries, a channel stabilization and improvement program dedicated toward providing safe navigation along the river, a tributary improvement program for various tributaries of the river, and finally, floodways which act as a relief valve for the river when flows reach certain trigger points. Through the course of the project, over 16 billion dollars have been invested by our nation in the MR&T. However, over one and a half trillion dollars in flood damages have been prevented. That's a 96-to-1 return on investment for the nation's dedication to the MR&T. In just the 2019 flood alone, 250 billion dollars in flood damages were prevented.

There are 10 million acres of agricultural land behind the MR&T system and over 7.2 million people who live in the Mississippi alluvial valley. The mainline Mississippi River levees, or MRL, are the backbone of the MR&T program extending more than 1,600 miles from Cape Girardeau, Missouri to Head of Passes, Louisiana. The MRL is designed and constructed to withstand the project design flood, which is defined as the greatest flood having a reasonable probability of occurrence. To date, approximately 83 percent of the MRL is constructed to a point that it would withstand the project design flood. The remaining 17 percent, while in place, has deficiencies either in height, seepage remediation, or stability that require additional construction before we can say that it can withstand the project design flood. In November of 2017, the U.S. Army Corps of Engineers completed an analysis of these remaining items and have identified the 143 work items that are discussed in SEIS number two. Let's discuss the project design flood in additional detail.

The far right hand side of this table represents the project design flood for various stations along the Mississippi River in cubic feet per second. These numbers are the maximum flow rates that you would expect to see at each of these stations during the project design flood. The remaining columns in this table illustrate the maximum observed discharge rates that were observed during these historic flood events. Let's focus only on 2011 for a moment, as it was the flood a record for most of our system. You'll notice when comparing the discharge rates at these locations to the project design flood, that the 2011 event did not equal or surpass the project design flood discharge rates. In fact, for most of our stations, the flow rates observed during the 2011 event only represented about 80 to 90 percent of what we would expect to see during the project design flood. So with the higher discharge rates you would expect higher river stages and more pressure on the system. This diagram illustrates the importance of completing that remaining 17 percent of the MRL to the point that it could withstand the project design flood.

Construction of the MRL system has been ongoing since it was authorization in the 1928 Flood Control Act. In 1976, the Corps completed an environmental impact statement for the MR&T program. Construction continued until the 1990's when concerns about the environmental impacts and the compensatory mitigation for MRL construction activities necessitated the completion of the first supplemental environmental impact statement for the MRL project. The table on the right illustrates the findings from 1998's SEIS number one. In total, 128 work items scattered through the three districts discussed the need for over 262 miles of levee enlargement and 131 miles of seepage remediation. Construction on these work items continues to date and is subject to federal appropriation of funds. Past performance during flood events, updated survey data and other information have been analyzed since 1998 and the Corps has realized that additional items not discussed in SEIS number one were required to bring the entire MRL system up to the level that would withstand the project design flood.

In November of 2017, the Corps completed an engineering evaluation of all remaining authorized work on the MRL, and in March 2018, the Corps determined that an additional supplemental environmental impact statement would be necessary. A notice was published in the Federal Register on July the 13th of 2018 of the Corps' intent to complete SEIS number two. The 2017 engineering assessment revealed 143 reaches that require some sort of remedial construction activities before that particular reach is built to its authorized grade and is therefore able to withstand the project design flood. The remedial measures prescribed for each of these 143 work items will be described in more detail in the coming slides. We'll start out with levee enlargements.

For the vast majority of the MRL the levee consists of a mound of impervious earthen material that is built to withstand flood waters and through seepage of flood water. In areas where these levees are not tall enough we propose to go in and acquire additional earthen material to place on top of the levee to make it higher. When you're placing material on top of the levee though, you also have to expand the footprint, as illustrated in this diagram, to ensure that that section of levee is structurally sound and able to withstand the forces of flood waters pressing against it. Depending on the location of these projects, these levee raises may occur on the land side, which is illustrated here in this diagram, on the riverside which would be the opposite side of the levee, or they can even straddle the existing levee section. In urban areas, earthen levees are typically not a viable option. In these locations we typically see a concrete flood wall in lieu of a levee. In some of these areas, these flood walls may not have been built high enough or they may have stability concerns when loaded to the maximum levels during the project design flood. For these reaches, we propose to go in and construct taller flood walls or to do stabilization measures that will help fortify the existing flood walls that are in place.

Beyond height deficiencies, another major concern with our levee systems is the threat of under seepage. Under seepage occurs when during flood events high waters are able to find pressure releases in pervious substratums underneath the levee and that water actually moves underneath the levee rather than through or over it. This is a concern because often times when this water is moving underneath the levee, it can carry soils with it. If you have enough soil moved underneath the levee, you create a void and you run the risk of the entire levee settling at which time you would expect a major breach of the levee system. To combat this under seepage, one of our primary tactics employed is to build an earth and seepage berm as illustrated in this diagram. Typically, earth and seepage berms are built out of an impervious clay material that is harvested from a nearby location and is placed along the landside toe of the levee. Typically, our berms extend from 150 to 300 feet from the toe of the levee and basically you're not stopping that under seepage, but you're creating a situation where it has to go so far before it can find a relief that the the water loses a great deal of energy and is no longer a threat to the integrity of the levee. Oftentimes we'll have seepage concerns in areas where maybe residences or public infrastructure such as roads exist right along the landside toe of the levee.

And in areas where we don't have room to construct those seepage berms often we will employ relief wells in lieu of earth and seepage berms. Relief wells are simply a vertical well that are installed along the landside toe of the levee. They're constructed with a filter material and a well screen. They go down into the ground and intercept where that under seepage is coming through and provide a controlled outlet for that seepage water. Basically coming out of that relief well and that filter screen will prevent that seepage water from moving material with it, and it will provide a much more controlled outlet for that seepage water. Typically, relief wells also include some level of ditching to make sure that we tie into existing drainage, and that that seepage water does have somewhere to go and does not pond along the land side of the levee.

In addition to the height deficiency and under seepage concerns we also have various issue, reaches along the MRL where we're experiencing recurring levee slides. Levee slides occur when the embankment material on the levee side slopes become saturated during rain or flood events and then slough when gravitational forces pull that material down. The two pictures on the right illustrate what levee slides typically look like. Levee slides are a problem because they damage the side slope of the levee, they open up an area where you could get through seepage through the levee because the levee face is not as robust as it should be and they can also become a concern if they creep up to the crop crown of the levy and could jeopardize the the total height of the levee during a flood event as well. So what we have to do when we have these slides we have to go back in and and smooth out that dirt pull it back up and and reestablish the grass and these things take a lot of time and effort. So in areas where we continue to have to do these same repairs after our various flood seasons we're proposing to flatten these slopes which we hope will reduce the occurrence of these levee slides. So, rather than having a situation where we're raising the levee here, we're only going to be putting material on the side slope as evidenced in the diagram to reduce the slope of of the levee. This will hopefully again reduce the chances that we have recurring levee slides in the future.

We've discussed the history and the national significance of the Mississippi River and Tributaries program. We've also discussed the need and the importance of the MRL system as well as emphasized how important it is to continue to maintain and construct the MRL to its authorized grade and to ensure that it can withstand the project design flood. The table on the left breaks down the 143 proposed work items that are discussed in SEIS number two by both the work type and the district in which they will occur. The map on the right shows where these work items are located and gives you an idea of the overall scale of the project. For more information about these particular work items and their location, please visit appendix one of the SEIS. I would like to thank you for your time and your attendance at our meeting and I look very forward to hearing your questions and comments. I will now turn things over to the project's NEPA coordinator Mike Thron. Thank you.

Mike Thron: Thank you. My name is Mike Thron and I am the National Environmental Policy Act or NEPA coordinator for this supplemental environmental impact statement. Appreciate everyone's participation today, and I can assure you that any input we get from you will be valuable to us.

For a very brief background on NEPA, NEPA is the basic national charter for environmental protection and it requires federal agencies to prepare environmental assessments or environmental impact statements for most federal actions. NEPA also requires that environmental information be made available to the public. Since this work is considered a major federal action that significantly affects the quality of the human environment we have prepared a draft environmental impact statement for review and comment.

So again, we are holding this meeting to discuss the findings of our second draft supplemental environmental impact statement on the mainline Mississippi River levees, or MRL, system of the Mississippi River and tributaries, or MR&T, project. This is a joint effort of the U.S. Army Corps of Engineers Memphis, Vicksburg and New Orleans Districts. Vicksburg District was designated as the lead district in conducting this SEIS. We're soliciting your comments on the plan we have proposed. The notice of availability for this draft SEIS number two was published in the Federal Register on August 28, 2020, and the SEIS number two is available on our project website. We will show the link to this website on our closing slide which we will refer back to during the commenting portion of the meeting. The comment period for this draft SEIS is open through October 13th, so if you would rather not comment today you may continue to do so through this date.

Mississippi River mainline levees, or MRL, feature of the MR&T project is the subject of these investigations. They've been under construction since the authorization in 1928 and this system is designed to reduce flood risk in the Mississippi River alluvial valley, which you can see here outlined in blue, extending between Cape Girardeau, Missouri, and the Head of Passes, Louisiana. The purpose and need of this project is to address specific areas of the MRL feature, particularly levees and flood walls that are deficient, to ensure that the MRL system provides protection up to the congressionally authorized level of the project design flood, which again is defined as the greatest flood having a reasonable probability of occurrence.

In order to ensure reliability and resiliency of the system these specific areas of work are shown in red on this map and include those 143 work items that the earlier presentation provided some depth too. As you can see, there is a rather large project area comprising parts of seven states, including the Boot Hill, Missouri, Southern tip of Illinois, eastern Arkansas, western Kentucky, Tennessee and Mississippi, and portions of Louisiana. We considered several alternatives for this work, some of which were suggested during scoping for this SEIS. Some of these were eliminated from further analysis and others were carried forward. Because the majority of the work items require earth and borrow material for construction, this SEIS 2 evaluates the no action alternative as well as other alternatives for selecting borrow sources for the construction of the work items, and recommends a preferred alternative.

The no action alternative involves no levee or flood wall construction to address the known deficiencies, only normal maintenance and repair of the existing levees would occur. As with any of our alternatives, when the Mississippi River reaches flood stage, we would initiate flood flight activities which include monitoring performance of the features, surveying for new seepage, installing poly sheeting and ringing sand boils. It could also include temporary levee and flood wall raises using sandbags or other materials. These emergency measures are not as robust and reliable as the proposed relief wells firms and permanent levee floodwall raises at these locations, and the flood fighting teams would only have a limited time to get them in place during a flood event. The probability of failure in the levee system would likely be the highest at the areas identified as deficient. It is not likely that all the areas would fail during a flood, but a single failure at any point would result in catastrophic damages.

Alternative two would implement the proposed improvements and modifications using the most cost efficient means available. The 143 work items would be constructed to the design grade. Reaches of the MRL with seepage concerns would be addressed with berms or relief wells to lower risks of levee failure. Reaches of levee with stability concerns due to persistent levee slides would be addressed by flattening the side slopes of the levee. Reaches of flood walls with stability concerns would be replaced or repaired to lower the risks of failure. Most often, borrow areas for levee repairs would be located along the riverside toe of the levee adjacent to the proposed construction locations as that would require some of the shortest haul distances. Traditional mitigation measures to compensate for habitat losses would be included as required by law and policy. For the borrow areas themselves, no provisions would be made for drainage, reforestation or other environmental enhancement features.

Alternative 3 addresses public concerns identified during scoping regarding the locations of borrow areas, access routes and other ground disturbances. Construction for alternative 3 would be similar to alternative 2, except this alternative establishes a method for identifying and ranking potential borrow sources in terms of their land use and locations to avoid and minimize adverse environmental effects. This alternative would use an avoidant minimized approach to reduce impacts to bottomland hardwood forests to the extent practicable and would allow USACE to work with landowners and local sponsors to reduce impacts to them.

Alternative four addresses the public comments regarding the need to examine non-structural flow control. Section 73 of the Water Resources Development Act, or WORDA of 1974, directed federal agencies to consider non-structural flood control methods to prevent damages to structures. The MR&T project authorization predates WORDA of 1974, and this SEIS is not a planning study that is considering methods to provide flood control, optimize protection or maximize economic benefits. The flood control system is already in place and provides the level of protection for which it is authorized in some areas. The purpose and need of this project is again to ensure reliability and resiliency of the system in the specific areas that are deficient. Non-structural flood protection can include temporary features like sandbags, geotubes and deployable flood walls. These are all things that are currently used during flood fighting to supplement the structural system. The action of flood fighting is assumed to be part of every alternative and a separate non-structural alternative would not meet the purpose and need, so this alternative was eliminated from detailed analysis.

Alternative five considered nature-based features as recommended during scoping in lieu of traditional levee raises or seepage control actions. Section 1134 of WORDA 2016 requires USACE to consider nature-based alternatives during plan formulation of feasibility studies. Much like non-structural, the MR&T predates this requirement and this is not a planning study. As described in our notice of intent, this is not a reformulation of the overall MRL feature of the MR&T project. Section 1134 of WORDA 2016 defines nature-based features as those created by human design, engineering and construction that work in concert with natural processes or to mimic as closely as possible conditions which would occur in the area absent human changes to the landscape or hydrology in order to achieve study objectives. Natural features are defined as those that are created through the action of physical, geological, biological and chemical processes over time. Beaches and wetlands are examples of this. For instance, while healthy wetland ecosystems located on the riverside or flood side of the levees can locally attenuate small rises in the river, they do not provide protection against the project designed flood. Thus a separate nature-based alternative would not meet the purpose and need and was eliminated from detailed analysis. Although a separate nature-based alternative was not analyzed further, alternative three did include things such as borrow area design to the extent practicable to mimic natural features and minimize environmental impacts.

Alternative 6 considered relocating levees that are unstable or prone to seepage if other means were not available to address these issues. Engineering analysis determined proposed solutions to the deficiencies noted at each location. Thus it's anticipated that all can be addressed at a much lower cost than levee relocations would incur. Moving levees would create extensive ground disturbances and environmental impacts at the site of both the new levee and the existing levee if it were to be degraded. In addition, this would require extensive borrow areas. We could not have a significant lapse in flood protection, so we would need to maintain the protection afforded by the mainline levee while a setback was being constructed. Thus, alternative six did not undergo additional detailed analysis.

As we mentioned, alternatives one through three were carried forward for detailed analysis. Alternative three, our preferred alternative, used a prioritization criteria that you can see here on the left side of the screen that works to avoid minimized impacts to those sensitive resources identified during scoping. Whereas alternative two, our traditional construction alternative that is based on a more cost efficient design, would typically obtain borrow material within the forested batture or lands river side of the levee with a shorter haul distance. Using the prioritization criteria for alternative three, where practical we move the borrow areas to cleared lands with a perhaps slightly longer hall distance but with less impacts to forested wetlands. As you can see illustrated here on the right side of the screen.

In addition to minimizing impacts to forests and wetlands, another common theme revealed during scoping was the ability for landowners to have a voice in the design of borrow areas. Our non-federal sponsors worked with landowners to provide the lands for borrow thus we identified as part of alternative three environmental designs that could be incorporated into the borrow areas on their lands. In our aquatic assessment we show some of the benefits, things like a sinuous shoreline, islands and buffers in a borrow area can have on these water bodies. It's important to point out that the Corps of Engineers would have no rights or site protection instruments to these lands after construction and as such we did not use these environmental features to offset any of our impacts in terms of calculating compensatory mitigation requirements.

As part of alternative three, we will communicate these benefits and opportunities to the non-federal sponsors and landowners and we will work to take advantage of any of these opportunities as they present themselves during detailed design. Again, our agency would design and construct these features into the borrow areas, but would essentially walk away after construction. As was mentioned in the earlier presentation, funding for implementation of the 143 work items would be received through annual congressional appropriations. Based on traditional funding allocations, these phased work items would likely extend for decades, and as such, some programmatic frameworks are incorporated and outlined in this SEIS.

In 2019, we initiated the development of a programmatic agreement that would govern the section 106 review process for cultural resources for the series of undertakings. The consulting parties included 34 federally recognized tribes, the state historic preservation offices from the seven states, the advisory council on historic preservation, and the National Park Service. Similarly, section seven consultations with the U.S. Fish and Wildlife Service pursuant to the endangered species act, things like state 401 water quality certifications, site assessments for hazardous, toxic and radioactive waste, farmland conversion impact rating forms coordinated with the natural resources conservation service, or NRCS, and other environmental compliance items would be updated and or obtained after congressional appropriations are received while detailed engineering and construction plans are being developed.

The significant resources identified during scoping and analyzed in the SEIS are shown here. Waterfowl, terrestrial habitat, bats, migratory birds, threatened endangered species, wetlands, aquatics, water quality, air quality, cultural resources, socioeconomics, environmental justice, prime farmland, HTRW, recreation, aesthetics, and noise. The items in bold include those quantitative assessments we conducted to determine compensatory mitigation requirements using ecological models that were certified or approved by the Corps' Ecosystem Restoration National Planning Center of Expertise in accordance with our policy.

So our colleagues at the Corps' Engineer Research and Development Center conducted these quantitative assessments. The waterfowl assessment utilized the manual for calculating duck use days in the Mississippi alluvial valley developed by Dr. Mickey Heitmeyer. The wetland assessment utilized the regional guidebook for applying the hydrogeomorphic approach to assessing functions of forrested wetlands in the Mississippi alluvial valley, or HGM Manual, and the Wetland Value Assessment or WVA Manual. Impacts and benefits to the terrestrial environment were quantified using the Fish and Wildlife Services habitat evaluation procedures utilizing six different habitat suitability index models of various wildlife species. And finally, the aquatic assessment was conducted using the borrow area habitat suitability index fish diversity model. The field work for these was conducted in 2018 and 2019 and results were coordinated with our interagency team throughout the development of the SEIS.

This slide summarizes the results of these ecological assessments. Impacts from alternative to our traditional construction alternative could be offset by reforesting approximately 1776 acres of frequently flooded agricultural lands as opposed to 1447 acres required for alternative three. So we were able to reduce our compensatory mitigation by 329 acres for our preferred alternative. Breaking down the compensatory mitigation requirements by district, you can see that approximately 47 percent are for the 35 work items in the Memphis District, 42 for the 16 work items in the Vicksburg District, and 11 for the 92 work items in the New Orleans District.

Here, you can see the key milestones related to this SEIS. The notice of intent was published in the federal register on July 13, 2018. We held a cooperating agency meeting with the Environmental Protection Agency, the Osage nation, and the U.S. Fish and Wildlife Service, the cooperating agencies for this SEIS, the following month. Currently, the draft report is out for review with the comment period closing on October 13th. The final SEIS is scheduled to be distributed at the end of October for its 30-day review, followed by the signing of the record of decision scheduled for early December. So, this concludes the summary of our findings.

I would like to first thank everyone who assisted in this effort and encourage anyone interested to submit questions or comments either today or in writing through October 13th. The project website is also shown here for anyone that is interested in additional information. Again, thank you for participating today and we look forward to hearing from you.

Ricky Boyett: Thank you everyone, that was our our pre-recorded session of the event. We're going to transition into the next portion which would be Q and A, being able to talk with you directly. I if i can, I would like to go ahead and bring up the comment slide once again. That'll help, just an idea of how you can not only submit comments today through Facebook as well as through the Google text number, but also again, we are in the public comment period for this this evaluation and so it's very important to send yours in through the the means in which we can get your comments so that we can get them in the record. We can fully evaluate as they're going through. We have multiple options for these public comments. One is email to the MRL SEIS email address that you'll see.

You can also submit them to the district engineer the Vicksburg District through physical mail, or you can call or text the number that you see on the screen now. I do want to stress that the comment closing period is the 13th of October so we definitely want to get your comments in before that time. At this point we will transition again into the question and answer period. We have put in our some of our project delivery team leads who are here to really lead the question and answer session. They will periodically confer with others on the team but if I can, I'll go ahead and have them introduce themselves.

Daniel Sumerall: Good morning, my name is Daniel Sumerall. I'm a project manager at the Vicksburg District.

Jeff Varisco: Good morning I'm Jeff Varisco. I'm currently the acting chief of projects and restoration branch here at the Corps of Engineers, lead project management for New Orleans.

Mark Lahare: Good morning, my name is Mark Lahare. I am the New Orleans District national environmental policy act, or NEPA, environmental lead.

Jeff Varisco: All right so we'll get into the question and answer here. The first question was from Ms. Adler. She asked "What portion of the 1976 SEIS has not become outdated and why wasn't it completely new EIS prepared?" So it's actually a very complicated question and a very good one that actually we won't be able to answer it immediately today. We're gonna actually need some time with that but we obviously have logged it. We will respond to it formally and we'll get you a straight answer there. I think it's just important to note that yeah that we have in 1976 and then we had the 1998 SEIS and now we're here on the 2018 SEIS.

Question two, if we have it written. I hate to read behind me, just hang for one second all, so just how we're kind of pulling it in, just you can see behind the scenes, as we have a team sitting behind. They're pulling the information off of Facebook as well as the Google information and they'll be bringing it in through so there may be a little delay between receiving the questions and moving them forward. We just want to make sure that we are accurately capturing your question as well as ensuring that we have the right answers.

Okay number two, and I believe I think I saw when it was going through. I think this is Miss Renfro, asked this question, "Why is the focus only on levee construction improvement?" This supplemental environment impact statement 2 provides an opportunity to develop meaningful long-term flood damage reduction solutions for the Mississippi River and communities that actually address the underlying causes of increased flood risk and also help restore the river's hydrologic processes, including connection to floodplain and delta wetlands to minimize future flood risk, so that's an excellent question. Thank you Ms. Renfro. So the answer here from the team the flood control system is already in place and provides the level of protection for which it is authorized in some areas, but the purpose and the need of this project is to ensure reliability and resiliency of the system and the specific areas that we're outlining here in the supplemental environment impact statement, so we are deficient in some areas as described in the notice of intent and that's included in appendix 21 or appendices 21 of the the SEIS. This is not a reformulation of the overall MRL feature of the MR&T project.

I guess put another way, looking at alternatives to what's already in place for the MR&T is not the scope of this effort, so we do thank you for that question Ms. Renfro. Yeah exactly, this is a little addendum. I think it's almost what I just said, reformulation would require a new authorization approved by congress and I just you know on a personal note I am aware that congress has taken an active interest in the lower Mississippi River so there's always a possibility with any new water resource development act that that could occur, but it's, you know, it would require in order to look at what i think you're getting at, a more holistic system is going to require additional authorization for the Corps to consider that which you're talking about. Thank you for the question.

Sarah, question three, okay just pause here for a second, the question three is being looked at right now.

Ricky Boyett: Actually, as we are pulling the next question up, I do want to take this moment to reiterate and stress that we are looking for public comments. We're looking for questions today, but we're also looking for public comments for the the record. On the slide on the screen, you should see the different ways in which you can submit. Again, email, physical mail, and call or text the 601 number. Again, just to reiterate, the the public comment period itself is open until the 13th of October so we are looking for that information to come in too. We also do want to point that our all of the information that's being provided today will be available on the website so you'll be able to see the slides, you'll be able to see the video of this session, as we move in to later events, so that website is a good source to continue to visit as we move to a final SEIS. And again, while we're waiting, please do not hesitate to chat with Facebook, or submit a text or voicemail to the Google hotline, the 601-392-2237.

So thank you, just to read, or we do have questions coming, it's just taking a minute to transcribe and get them up to our PDT so I do apologize for the delay. It's just part of the making this work. We do ask for your patience. One day I'll get like really good monitors that i can just boom them right up but, not yet it's coming though.

As we're working on the question and the answering, I do I also want to take this opportunity to say that we will be doing this meeting again at 6 p.m. tomorrow. We're hoping to try and give multiple opportunities for people to attend. We urge everyone who is here if you're available to again tune in. The questions could be or the comments could be could be different so we're hoping that with these two meetings we'll be able to get as much information to you, but also get as much information from you as possible.

Jeff Varisco: Pardon me sorry, so we have question three, is from Ms. Renfro and it's another good one. "While the 2011 flood was far below the project design flood, flood frequency has been high in the last decade. Do any of the alternatives described in this update the SEIS II do anything to address the more frequent river floods?" The short answer is no. This is based on the project design flood. You can read more about the project design flood in section 1.4 of the SEIS, that's pages 11 through 14 of the report, so the short answer is, we are the the things that we are proposing to take action on are related to the project design flood and not based on frequency. Thank you again for that question. And we will we're now working towards question four, so thank you for your continued patience everyone. And Ricky you can do a song and dance maybe.

Ricky Boyett: And that's why we put Jeff in the center table. So we are working on, we've got a few more questions coming in. I do want to say hi to our our friends, residents and neighbors. We are looking at the SEIS, that is all of the lower Mississippi River mainline levees, and so we are looking at residents from Illinois and Arkansas, Tennessee, so it's, we're glad to see such a wide variety of regions being represented today as they're following us on Facebook. We will be just a moment as we go through. Again I think we have the slide up that shows how to submit comments, and so as you move forward into evaluating the study, we understand that for many of you this may be an introduction, so as you evaluate the study, please do not hesitate to send us your comments so that we consider for the record.

Jeff Varisco: All right so for question four is from Ms. Adler again. "With sea level rise as outlined in Army Corps Engineering pamphlet ep 1100-2-1 considered?" And so I'll go ahead, this actually goes back to the project design flood. Again, in the last paragraph on page 14 I'm going to read, because the paragraph actually completely answers this question, and says how we assess sea level rise. So beginning reading now from the report, the assessment also evaluated climate change and sea level rise. In terms of climate change after conducting a regional literature review and evaluating the currently available data for the Mississippi River basin, the assessment found that the meteorological and hydrological underpinnings of the MR&T PDF, PDF being the project design flood, are found to be adequate. The assessment evaluated the sensitivity of sea level rise through simulation of the high sea level rise scenario following the guidance of engineering regulation 1100-2-8162. The assessment demonstrated that the maximum expected influence of sea level rise under the high scenario would range from 0.1 feet at Baton Rouge to 1.1 feet in Venice. Additional information associated with sea level rise can be found in the results of the assesement, that's a USACE Publication from 2018. So again thank you Ms. Sadler for that question.

Daniel Sumerall: We had a question from Mr. Stokes regarding projects in the boot hill of Missouri. Mr. Stokes, you provided an email address, we'll certainly be happy to to send some information to you to drill down into those projects and the location in the document where you can find that information. Thank you.

Mark Lahare: Okay, so we have a question from Mr. Mike Erwin. The question is, "Have there been any considerations such as increased mitigation ratios for long-standing MRL compensatory deficits?" So to answer that question, the models that we use to evaluate and assess the compensatory mitigation for losses to specific types of wetlands, including bottomland hardwoods, essentially dictate the ratio for which the mitigation is at that level.

Basically saying that the hydrogeomorphic model that's used upriver in the wetlands value assessment model, specifically the bottom line hardwoods model, dictate those ratios, so as far as increased mitigation ratios, that's not how the models work. We are aware that there are long-standing MRL compensatory deficits. That is documented in a report that is submitted to congress annually by our by agency. As part of the new proposed 143 work items, those mitigation deficits in addition to the impacts that will occur as a result of the proposed bar sites and impacts, will be compensated for as part of this action.

Ricky Boyett: Guys we're working on the next questions. I do want to note that Ms. Adler did submit what we are receiving or we're viewing as as a comment. So I do want to read that. It says, "Please add mitigation measures to keep bike lanes open or rerouted safely during construction. The Mississippi River trail is a national bike corridor. Thanks for all the great work keeping us dry." So thank you ma'am we will enter that comment into the record. Again, there are multiple ways to submit comments or questions today so please continue to do so and we will stand by as we are waiting the next question to come in.

Hi, hi everyone it's me again. So it doesn't look like we have a question or a comment that's waiting to come in, so I do want to say you can provide your chat, your question through a chat function on Facebook, you can also call or text it in to our line and we will get through it. We do thank you all for joining us this morning. We hope that you did get good information and the avenues for, to receive additional information but we will continue to stay online for a little while as to give an opportunity for your questions to come in.

So, again, for those of you who do have to leave we completely understand that we do thank you for joining us this morning. We'll be again online tomorrow at 6 p.m. We'll be at the same location within the the New Orleans District Facebook page. So, like us, follow us. You can also follow us on Twitter, YouTube and Instagram. Had to give a little plug--I am the chief of public affairs. So, as we are waiting, please ask us any questions. Again, we may not be able to answer all of them but we will do our best to do so. We have team members in Memphis, we have team members in Vicksburg, we have team members here in the New Orleans both, present as well as virtually. That can be a little bit of why there's a delay between getting the question and the answer, as the subject matter expert may not be here in the room with us. However, we do have the best team we can that can answer most of the questions, so please do not hesitate to submit a question to us.

Jeff Varisco: Hey uh this is Jeff Varisco again, I just want to go ahead, we've gotten some comments that folks have been calling the the line to leave comments but have not been leaving a voicemail. So they've been calling but not leaving a voicemail, so again, I'm gonna leave the number, you can actually text to this number as well if you don't want to leave a voicemail and the number is area code 601-392-2237. Again that's area code 601-392-2237 thank you. Oh yeah I'm sorry i should give you a little...please do leave your name, your location, and you know, any other pertinent details that we might need and the project that you're specifically concerned about, if it is just one or if it's a comprehensive question, feel free to leave that as well, thank you.

Ricky Boyett: So just to clarify a little bit with it, what we're using is we're using a Google number so when you call and you leave a voicemail, it actually transcribes that to us, so that it comes in to us in an email format, and so that's why it's important to leave your voicemail. It's basically we're taking your voice transcribing it into the written, and that that's how we will get your question. You can also text it and then it will come through as your text as well, so that's why it's so important to use the voicemail option or text in. Again, please do submit your questions, your comments. Jeff is eagerly awaiting the chance to answer another one. He does have an excellent singing voice, so we'll hold that towards the end of it. So if you hang on a little longer, Jeff will break out in Ave Maria.

I do want to note, we are going up in viewers, but we're not going up in questions. So please do submit your questions to us so that we can, we can help get the best information to you, so not only that you can submit comments to us, return the favor but also, so that you are aware, the

Mississippi River levee system, the MR&T as a whole, is one of the most important and most successful infrastructure projects we've ever had. It is a life safety project that we look at, you know, more than four million people are served by these levees, in their homes, and their businesses, and so as you move forward and you're looking through this, this SEIS and this this study, you know, one of the greatest threats of living with the Mississippi River is the threat of flooding, and so this will help us in risk reduction factors.

But, we also know that no one knows their portion of the levee system better than you do. You are out there, you're on the levee system, you bike, you walk, you just go, in some cases, I think you're walking your dogs along that side, so you see things, you know things, that will help us make sure that A, we have the best information available, but B, we're making the right decisions as we move forward. So please do submit your questions, submit your comments so that we can ensure that as we reach that final supplemental impact state environmental impact statement, we can be confident that we're getting there using the best information available. So we are dropping in numbers. I've just been informed that if we can hit 75 people, Jeff will in fact really will sing Ave Maria for us.

Jeff Varisco: I do not consent.

Ricky Boyett: Call your friends, call your vote.

Jeff Varisco: I do not consent.

Ricky Boyett: Everyone we haven't had a question coming in so in all seriousness we haven't had our question coming in so we'll stick around just a little longer, but what we will do is we may close down the live function of it, but we'll continue to monitor monitor this site for any questions that are coming in for a little while after.

Jeff Varisco: I believe we are going to offer just a little bit of clarification on the mitigation question and that that is coming in right now before we close, Ricky.

Ricky Boyett: Excellent, thanks sir. So we did get a question, "What kind of virus safety standards will be observed by your employees when they report to work?" I cannot speak on behalf of the Memphis or the Vicksburg District, but I can speak on behalf of the New Orleans District. We have multiple options that we are looking at, and multiple means. One is we will maintain the six feet distance, or we have a masking policy, while you're in the building, you also to come into the New Orleans District site, you must go through a temperature check as well. As we move forward and through it, our driver and our guidelines will be the federal and the state as well as the local, for the location of your headquarters, so that for us is the federal guidelines, the state of Louisiana, the governor's guidelines, as well as the City of New Orleans, and so that's what we will be looking at.

So what that means in a daily life is we will have reduced capacity within the building, we're going to stay within the government's, or the governor's requirements for capacity within a room. Such as if you were looking at the gym or the cafeteria there will be a reduced capacity to do so as well. We're also maintaining a very healthy telework policy as we move forward for that element as well, so what we do not want to do is have people who are high risk or they have extenuating circumstances, such as having to take care of their children or, or be at home while their children are virtually going to school, so we'll maintain that our policy is as flexible as possible for as long as possible. However, with regards to the public side of our our efforts, we will be maintaining a more virtual environment. I know that New Orleans District, as a general rule, we are one of the more frequent public meeting sites, or locations but for the foreseeable future, we are going to be running more and more virtual meetings, as we move through. So I hope that does answer your question as what we will be doing. We do have sanitation policies in place as well, so we are really leading to adhering to all of our state local and federal guidelines to ensure that when you do return into the building, you're returning to a safe and clean environment.

Jeff Varisco: Hi, just another reminder for those that weren't on before, we are getting calls or text to our Google voice box but folks are not leaving either a text message or voice message. So it is not a manned phone number, you have to leave a message. So again, that number is 601 392-2237. Again 601-392-2237. Please leave your name, your location and your concern. It could be any project in the supplemental impact statement or it could just be a comment or a question about anything that we've discussed here today, and we will obviously respond to that by the final impact statement. It will be an appendix. Thank you. So just one more thing on where I just said, if you have specific questions it has been pointed out to me, and I knew this, just didn't know exactly where it is, so thank you to the team that's that's listening. If you're interested in specific work items you can refer to appendix one in the supplemental impact statement which has a project description of every one of the items and an accompanying map of the location.

Ricky Boyett: Again, we'll hang out a little longer as we're waiting for questions but please do submit your question via the chat function on Facebook or leave a voicemail or text through the 601 number that we have on your screen. You can also please submit your comments for the record to the email, the physical address, or also to the Google number. So, there are multiple ways to submit comments if you want them into the record. They are all received, they are all evaluated, they are all considered, as we move to the final portion of the evaluation itself. If you have a question that you want us to address, or you need something clarified with the SEIS, or the process itself, please submit those through the chat function or texting the Google 601 phone number.

All right, so we're just going to hold here for a few more minutes just in case there's any remaining questions or comments. We may not be able to answer them fully here, but certainly if you log it here we can definitely respond to it in full in the wake of the draft EIS, we'll do it by the final EIS. So thank you again, we'll give about five more minutes, if there's no more questions, we will bring this to a conclusion. Thank you very much for your time.

Jeff Varisco: Okay so we have an addendum to a previously asked question. I'm going to read the question again and it's from Mr. Mike Erwin, "Have the there been any considerations such as increased mitigation ratios for long-standing MRL compensatory mitigation deficits?" So the addendum to the previously provided response is that construction and operation and maintenance of work items and the associated acquisition of mitigation lands continue for activities described in the 1998 SEIS. As congress, as congressional funding is received, the construction of the remaining work will be accomplished based on risk and form prioritization. To date, USACE has undertaken reforestation efforts on 5,672 acres, or approximately 86 percent of the total required mitigation acreage that are under under various stages of restoration. So again thank you for your question.

Yeah we do have a Google voice question that is being transcribed right now and we'll be answering that in just a minute or so. Okay so we've got another question from Peter Nimrod. Mr. Nimrod asked, "I noticed that you have specifically located potential borrow areas for levee enlargement items. Some borrow areas are identified as currently being open farmland. What happens if that farmland is converted to trees through the WRP program? Will this SEIS number two be flexible enough for you to go to another borrowed site located outside of the SEIS identified area?" Again, excellent question and we'll be happy to answer that one.

So I think we'll talk a little bit holistically about how these these work items were were laid out, and then it specifically addressed your question, Peter. These work items obviously were were designed without site-specific data such as geological data and surveys that were required before you can do detailed designs, at and that's just due to the scale of of the number of work items, and the the permissions that would be required in the expenditures that would be required to do that specifically for each of these items. So once we are funded to construct one of these work items, our first move is to go in and get this site-specific data. Some of these borrow areas that we located could end up being in areas that have the land use has changed, or perhaps they're in areas that don't have suitable soils to use for levee construction. So much like we do with the 1998 SEIS number one work items, there is some flexibility there. We go in and review what we said we would do, and compare it to what we're in we're planning to do now, and at that time a determination is made whether a tiered NEPA document needs to be created. Those come out typically as an environmental assessment that tiers from the SEIS, and those are circulated for public review and and for public awareness as well, so that that process will still be followed as we do at this point. Thank you.

Ricky Boyett: All right everyone, we're gonna give it a couple more minutes and then we'll go ahead and close it again. There's still opportunities to to comment at this point, and then of course you can always join us for the exciting conclusion of our virtual meetings tomorrow at 6 p.m. So by all means, anybody who attended today is is urged to join us again tomorrow, and if we receive any questions after the meeting then we will address them tomorrow to open the to open the Q&A tomorrow's meeting but again we're going to hang on just for a couple more minutes. If we don't get any more questions, I do want to say thank you very much for joining us. You know, the public's role in determining the future of these projects and where we go is is is integral to, I think I said that wrong, but into to us getting to the projects that we need to move forward, these are critical these are very successful but they're very important life safety infrastructure that we need to make sure we are moving in the right direction with them. So again, thank you very much for coming.

Unless we get another question at the end, I do want to thank everybody regardless of where you are, whether you're in the upper river, lower river, or not in in the valley at all, thank you so much for joining us this morning. I do hope that you are will join us tomorrow at 6 p.m. We'll be around for an hour or so but at this time, I'm going to look to my my team for any last minute add-ins, but I thank you and we'll close. Again, you can still submit your comments to the different ways that we have available and we will bring them forward to the 6 p.m. but barring anything, I'm going to turn it to Jeff for one final word, and then we'll close out. Thank you again, thank you everyone.

Jeff Varisco: Thanks Ricky, and I just want to echo what Ricky said. We do really appreciate all the input that we got here today. We will be here tomorrow night six to eight o'clock central standard time. We look forward to any additional questions or thoughts you might come up with in the interim, and just to reinforce that we do have formally until October 13th for any questions, so it's not that you have to submit them during any specific time period so again, we appreciate your participation. I'd like to thank my co-leads here Mark and Daniel, and we will see you tomorrow. Thank you very much.

END

Draft MRL-SEIS-II Virtual Public Meeting
Facebook Live - https://www.facebook.com/usacenola/
Question and Answer Session Transcript – 1 Oct. 2020

Ricky Boyett: we do have a question coming in, we are working that, quickly, and will get those response to you.

Jeff Varisco: alright, so we're going to go ahead and respond to the first question, which is, "What federal agencies are asked, required to provide comment on this effort?" So for this one, I'm actually going to turn it over to Mark Lahare, our NEPA lead.

Mark Lahare: Thank you, Jeff. Per the question, I'd like to also refer anyone listening or watching on live-stream to the actual SEIS, the section 6.0 Public Involvement, specifically section 6.2, starting off with cooperating agencies and participating agencies. For this SEIS, cooperating agencies included the U.S. Fish and Wildlife Service, the Environmental Protection Agency, and the Osage Nation. And if you look at section 6.3, we have a list of agencies, organizations and persons to whom the copies of statements are sent. These consist of multiple federally- and state-recognized tribes, numerous federal agencies, for example such as the U.S. Department of Energy, U.S. Department of Interior, Department of Commerce, state agencies include, the various states that are included in this project, all the way from Missouri, Tennessee, Memphis, I'm sorry, Tennessee, Arkansas, Mississippi and Louisiana. So you have, for example the Missouri Department of Conservation, you have the Arkansas Natural Resources Commission, Louisiana Department of Environmental Quality. We also have all the local levee districts and local governments, non-governmental organizations. And so for a greater or in-depth look at that, again, I'd like to just refer you to section 6.3, page 161 of the SEIS. Thank you, that's a great question.

Ricky Boyett: Excellent, thank you much, Mark, and thank you for the question. And so again, we'll hold a few minutes just to see if we have any other questions coming in. Anything that you want to pick our brain about, regarding the SEIS, I don't know if you want to really get into the dark recesses of Matt Roe.

I am equipped with some non-scripted conversations. If we need to go down that road. I don't think anybody wants that, but I do. So much.

We're going to leave the slide up a little bit, just so that you can see the different manners in which to submit comments. We also do want to highlight that we have the SEIS II, and other additional information about the project on the project website at the bottom of the slide, so, as we moved forward, you will always be able to check this out to get the latest public information regarding the SEIS part II effort. And again, we're taking comments on that, of course we'll be answering questions tonight, but we'll be taking comments up until the 13th of October.

I believe as well, we have placed the links, the relevant links to the site in the chat function of the Facebook site, so the comment section, so you can also click and see where to go from there.

This is a large effort, you know, it's not that common that we undertake a project that incorporates multiple districts, multiple states, and so, you know, when we're looking at this SEIS, you're looking at 143 work items that they're looking at, they're evaluating 35 of those would be within the Memphis District, 16 would be within the Vicksburg District, and 92 in the New Orleans District. All of these sections are broken down, you can read about them individually within the SEIS online on the project webpage.

While we're looking at the 143 work items, about 101 of them, if I'm remembering my number offhand, are what we would consider a levee enlargement. A levee enlargement is a frequent topic of conversation, especially down here in Louisiana, but throughout the area. Quite often, what we get is the question of "why not build what would be considered a super levee instead of in levee lifts."

Matt Roe: that would just be a terrible name for a super hero, though, Super Levee.

Ricky Boyett: Right you are, Matt. So, one of the reasons why you actually build a levee in lifts is because, as we've built, and many people who live along the levee system, they will see that levee lifts are a requirement to maintain an elevation along that side. Now if you were to build a larger levee than up to the elevation itself, it does take more property, it takes more land, it takes more borrow, and there are a lot of requirements and its overall more expensive. We have to understand that all levees will have subsidence, compaction, they will have settlement. And then, in south Louisiana especially when we're in our levee systems whether it's MRL or the HSDRRS, we're looking at sea level rise factors to it. So, that is why we would be looking at levee enlargements as a component of the SEIS. The levees are supposed to be built to a project elevation. As time goes by, they do drop through and we will restore them to the project elevations.

Ricky Boyett: I think we're gonna give it a couple more minutes, and again, I do want to just kind of stress the different ways in which you can chat tonight if you are watching. Our first is, you can submit it through the chat function within Facebook, and the second would be through the 601 phone number. Again, the 601 number is not being manned by a person to talk with. You leave a voicemail, it will convert it into a written message which we can then read here live. You can also text that phone number. And again, that phone number is 601-392-2237.

Again, we are receiving questions through Facebook chat on the comments side as well as through the 601 phone number that we have. And then, once again, I do want to take this opportunity to stress that we are in our public comment period. The manner in which you can submit public comments for the record is we have the official MRL SEIS II email address, you can also send it through the physical address through the regular mail and that is in Vicksburg, Mississippi, and you can also submit it through the call or text, voicemail or text function at the 601 number. That's information is on the screen now, and we'll hold it for a little while just to ensure everybody has an opportunity.

You also can visit the website and get the latest information regarding the SEIS II, and also, within that website, you can find this information on how to submit. October the 13th is the day on which we're looking to have these received by, and then every comment we received is considered and we will be looking at this information as we develop the path forward or we undertake the path forward for completing the SEIS II document.

Jeff Varisco: Alright, we did get a question in, from Ms. Crutcher. She asks why, I'll make sure I read it correctly, "Could you explain again why levee setbacks were not considered?" They were considered actually, it is alternative 6, levee setback alternative, however it was not carried forward into the final analysis. There's a few reasons, they are outlined on page 18 of the SEIS, but in short, it's an extremely expensive option and there are a lot of direct impacts associated with moving a levee backwards from its present location. Thank you for the question again.

Ricky Boyett: Thanks Jeff, I do appreciate the response, and I will ask if we have anybody out there that has a question or would like to submit a comment, by all means, please do. We are here for a little while longer, and we are happy to address anything that you have, provided we can.

So again, we are here today discussing the findings of our second draft Supplemental Environmental Impact Statement on the Mississippi River Levees of the Mississippi River and Tributaries project. The original EIS was constructed, completed in 1976 and the first supplemental EIS was in 1998. These levees and floodwalls have been under construction since the authorization in 1928 following the great flood of '27, and they're designed to reduce the flood risk in the Mississippi River Valley extending from Cape Girardeau, Missouri to the Head of Passes in Louisiana. The purpose and need of this project is to address specific areas of the levees and floodwalls that are deficient to ensure that the MRL system can provide protection up to the congressionally authorized level of project design flood. And the project design flood is essentially the factor of flood that we can reasonably expect to experience during the lifespan of this levee project.

Again, as we were talking about a little bit yesterday, the MR&T and Mississippi River Levees have been one of the most successful infrastructure projects ever undertaken by the Corps but also the nation itself, and each year that you have these large, major river events, these high water events, that's where you start to see the benefits of investing in a Mississippi River levee system. You know, the project design flood is the design factor of how we are going to manage that water, but some areas have reached this project design flood before, some areas we haven't reached that point yet, so this is a very real number, these are very real levees and they do serve a large portion. Again, we're looking at from Missouri down to below New Orleans, so it's an important, one of our area's most important life safety features.

I will say sometimes in New Orleans area we have these large levees, and one of my big concerns as an outreach or a public affairs person is complacency in them as well. So this is an opportunity for me to just kind of point out how important they are and how often they are subjected to stress, and ensuring that we have the projects that meet the authorized design levels is very important to these areas, when you're looking at the city of New Orleans and you're looking at south Louisiana itself, I always say that water itself is the economic and the cultural impetus for New Orleans, you know, it is the lifeline to our economy, it's the basis in which much of our culture is built on. It's who we are, is the water, but also, water can be the greatest threat that faces this area, and one of the factors that we have is the Mississippi River Levee System, and that works in conjunction with other levee systems we have in the area. I say this because 92 of the 143 work item areas are within our district, and you know, it's a part of the entire system, but it's a part that has to pass the drainage for 41% of the country.

So, I will say again, please do, if you have any questions, you are listening, by all means, we are eager to hear, we want to make sure that we are moving in the right direction, but also, again, through the 13th of October, please do not hesitate to submit your questions or your comments so that can evaluate those. I would ask that no one assume that the comment has already been received. I'd rather read the same comment twice from two different people than not get that comment at all. Again, through October 13, we'll be accepting comments through the email address, through the physical address, through the 601 phone number in the form of a voicemail or text, and then tonight, we are answering questions and comments, more questions coming in through Facebook or if they come in through the 601 number via voicemail or text.

We're gonna give it a few more minutes and see if anybody else has any questions or comments and then we'll start to close. But again, I believe that you know the Mississippi River is one of the most important waterways to the United States, and then those of us who are lived and served by it, it's one of the most important infrastructures to us and so, making sure that our path forward is right, it meets the requirements, it meets the regulations and the stipulations set for us is important, and I do ask just consider, if you've read it, if you reviewed it, please do submit your comments by the 13th of October.

Alright everybody, we're gonna give it about 5 more minutes, that will put us right at 7:15 if we don't receive any more questions or comments through the Facebook or the 601 number, we're gonna go ahead and close this meeting, so again, please, if you do have a question, don't hesitate to ask it, we do have people on standby to answer and we're eager to do so.

Alright, so we are going to, we didn't receive any in the last 5 minutes or so, so we're gonna go ahead and close it. I do want to thank those of you who did show up and tune in and ask questions not only tonight, but as well as yesterday morning, I also want to thank those of you who have provided comment over the days, and in closing, we are still in the public comment period. Tonight is our last virtual meeting, but we are in the public comment period and you are able to submit your comments via the email address, the MRL SEIS II email address, you can mail it in to the District Engineer at his physical address in Vicksburg, or you can call or text the 601-392-2237. If you do call, please ensure that you leave a voicemail as that is how the messaging system on that phone works, and then we'll consider it. So again, through October 13th we will be taking the comments. Do not hesitate to drop by and visit the project website that we have here on the screen for any additional information, as well as to see the documents, project schedules, you name it, it's all located in one centralized location.

I do want to thank the team, here, this is again, it is unusual for us all to be able to undertake one massive project with three districts working simultaneously together. I want to thank the Vicksburg District for taking the lead on this. It has been a learning experience for me as well as, I think a challenge within the Covid to do what we are doing, and I do appreciate the patience of you who have been on the Facebook as well as following us as we move forward.

In closing, I'll say thanks to the team here, the PDT that has helped us not only answer the questions but also as you can see behind you on the camera, you can see we had people working in the computers, monitoring, maintaining that communication with not only the public but those other virtual members. And then I'll say thank you to my team, the PA team, without them, the lights would have been off, the screen would have been black and the audio would have been muted. So, with that, I thank everyone, if you have any questions, by all means, definitely go to the final site, the email, or phone numbers and present them to the team as they move closer to the close of the comment period on the 13th of October. Thank you all.

END

A21-7 DRAFT SEIS II PUBLIC COMMENTS AND RESPONSES

A21-7.1 Responses to Comments on Draft MRL-SEIS-II

Comments and responses are included chronologically in the order they were received. Copies of comments received are included in A21-7.2.

1. E-mail, Illinois Department of Natural Resources, Office of Water Resources, August 31, 2020.
    a. Comment. The construction in the floodway, or floodplain if a floodway is not delineated, of streams with a drainage area of one square mile or more in an urban area, or ten square miles or more in a rural area will require an IDNR/OWR permit unless it is exempt. All construction in IDNR/OWR jurisdiction will have to demonstrate the standards found in the Part 3700 Floodway Construction rules (view at https://www2.illinois.gov/dnr/adrules/documents/17-3700.pdf) are met, with the exception of items meeting the exemptions found in Section 3700.30(b). Any activity that could result in a restriction of access to, or use or enjoyment of a public body of water in Illinois or construction in a public body of water in Illinois will require a permit in accordance with the Part 3704 Public Waters rules (view at https://www2.illinois.gov/dnr/WaterResources/Documents/3704.pdf).

       Response. The United States will apply for applicable permits as governed by federal law.

2. E-mail, Thomas Jackson, September 2, 2020.
    a. Comment. The sheet pile cutoff wall shown as a potential alternative looks similar to I-wall that failed during Katrina. Please respond to my concerns.

       Response. This sheet pile cutoff wall figure illustrates one of the Seepage Remediation alternatives the team considered. The sheet piling would be driven to a certain tip elevation to cut-off seepage paths through the levee section. The sheet piling would then be buried within the levee section. There would be no exposed portions of the sheet pile wall that could be loaded similar to an I-wall type floodwall.

3. E-mail, Office of U.S. Senator Tom Cotton, September 7, 2020.
    a. Comment. Does any of this impact the Ouachita in Arkansas?

       Response. No impacts to the Ouachita River are expected as a result of the implementation of the proposed action. Thank you for your interest in our project and please let us know if there is any additional information we can provide.

4. E-mail, Seminole Tribe of Florida, September 8, 2020.

a. Comment. Some of the Work Items are within the Seminole Tribe of Florida Area of Interest, specifically Jackson Barracks and Fort Jackson. Need a more detailed map.

Response. Response e-mailed September 22, 2020: The subject EIS addresses the same series of undertakings that the attached Final Draft PA addresses. Funding for each item's construction is not yet in place, so USACE moved to the programmatic approach outlined in the agreement. The Seminole Tribe of Florida are currently listed as a "consulting party" to the document. The last scheduled meeting for this agreement is Monday, 28 Sept 2020.

All the projects are listed in Appendix A in the attached PA. To my knowledge there are 2 project items within STF's areas of interest. They are: "Holy Cross, LA, Levee, Item 92-L" and "Arabi Levee and Floodwall, LA, Floodwall, Item 91.2-L." No projects are in the vicinity of Ft. Jackson. I have attached figures of the Jackson Barracks and Ft. Jackson vicinities from the MRL SEIS Levee website.

Let me know if you have any further questions.

5. E-mail, Hernandez Consulting & Construction, September 8, 2020.
   a. Comment. We request that the new $2Billion in levee spending be divided into packages and set aside for HUB-zone, SDVOSB and 8a contractors like ourselves.

      Response. Set-aside determinations for future work will be made based on the requirement and the market conditions in accordance with federal regulations. In general, USACE is committed to provide maximum practicable opportunities in its acquisitions to small business, veteran-owned small business, service-disabled veteran-owned small business, Hubzone small business, small disadvantaged business, and women-owned small business concerns.

6. E-mail, Plaquemines Parish Government, September 11, 2020.
   a. Comment. Please send me any further information you have on the attached Notice of Availability.

      Response. Response e-mailed September 11, 2020: USACE prepared a draft supplemental environmental impact statement (SEIS) for 143 proposed Work Items along various reaches of the Mississippi River Levees (MRL) feature of the Mississippi Rivers and Tributaries (MR&T) Project located across portions of seven states: Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi, and Louisiana. These 143 Work Items include remedial measures necessary to control seepage and/or raise and stabilize deficient sections of the existing levees and floodwalls to protect the structural integrity and stability of the MRL system. The SEIS and supporting appendices are available on the project website http://wwww.mvk.usace.army.mil/MRLSEIS/. Please note that if there is interest in specific Work Items, Appendix 1 contains a description of each Work Item and accompanying maps oriented from upstream to downstream. The public comment period extends through 13 October.

7. USACE New Orleans District Facebook Page, Kentucky Energy and Environment Cabinet, September 23, 2020.
   a. Comment. I do communication for KY's Energy and Environment Cabinet. I'm trying to find specific areas in KY that will be affected by the levee, floodwall projects in 7 states and also share a link for the public comment period. Is there such a list in the project pdf? A specific page. I'm about 80 pages in so far and haven't found it. I'm referring to this if that helps https://apnews.com/a867510fa91115e1155bdf37e2c0a24. Am I correct that the affected areas and projects for Kentucky are here htps://www.mvk.usace.army.mil/MRLSEIS>FileId/293148/

      Response. Response posted September 23, 2020: Descriptions and maps of these Work Items can be found in Appendix 1 - Work Item Descriptions and Maps. Descriptions of these specific Work Items in Kentucky are shown on Page 2 and maps are shown on Map#7 of 64.

8. Letter, Arkansas Technical Review Committee (multiple State agencies), September 29, 2020.
   a. Comment. No comments; however, construction stormwater permits, short term activity authorizations (STAA), and Section 401 water quality certifications need to be coordinated with Arkansas Department of Environmental Quality before work commences.

      Response. The United States will apply for applicable permits as governed by federal law. Federal contractors are required under contract to comply with stormwater and STAA requirements for the work they perform.

9. Letter, Board of Mississippi Levee Commissioners, October 9, 2020.
   a. Comment. Alt. 3 avoids and minimizes damage to the environment and is an environmentally sustainable project.

      Response. Comment acknowledged.

10. E-mail, Mary Ann Sternberg, October 12, 2020.
    a. Comment. I appreciate the critical need for flood protection in the Lower Mississippi River Alluvial Valley.

I have been made aware that the SEIS includes extensive capacity for Mitigation Plans for the areas where sediment sourcing for raising and upgrading levees is done. So I write to encourage the Corps of Engineers to actively explore the opportunities for protecting sites within this corridor, to preserve their value as part of the Mitigation Planning process.

Response. Comment acknowledged.

11. Letter, Baton Rouge Group of the Sierra Club, October 12, 2020.

a. Comment. An issue of primary concern for our Group is the ongoing going development of floodplain and wetland areas in East Baton Rouge Parish, a process which has accelerated since the 2016 Flood (the flood of record for the parish.) This trend is causing increased flood risk from the loss of natural retention capacity of natural areas such as forests, swamps, and floodplains.

The Corps is involved with this process through its jurisdiction under the Clean Water Act (Section 404) and the Rivers and Harbors Act (Section 10), and routinely approves development permits in these flood zones and contiguous areas. While this is a separate statutory authority from the Mississippi Rivers and Tributaries Project, in the area south of Baton Rouge along River Road these authorities and the Corps' role in this process have come together.

Response. During high water events on the Mississippi River, both USACE and the NFS (Lake Pontchartrain Levee District) personnel actively engage in flood fight operations including, but not limited to active patrolling of the referenced levee reaches. Where any sand boils and/or seepage sites are located, they are documented, investigated, and actively monitored. Information from the general public regarding the location(s) of these sights is always welcome and encouraged.

In regard to the 404 permitting process, the USACE regulatory branch is responsible for issuance of all Section 404/10 permits under the Corps' Regulatory Program per the following authorities and responsibilities as codified in the following laws: Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403); Section 404 of the Clean Water Act (33 U.S.C. 1344); Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1413). The Clean Water Act uses the term "navigable waters" which is defined (Section 502(7)) as "waters of the United States, including the territorial seas." Thus, Section 404 jurisdiction is defined as encompassing Section 10 waters plus their tributaries and adjacent wetlands and isolated waters where the use, degradation or destruction of such waters could affect interstate or foreign commerce. Any person, firm, or agency (including Federal, state, and local government agencies) planning to work in navigable waters of the United States, or discharge (dump, place, deposit) dredged or fill material in waters of the United States, including wetlands, must first obtain a permit from the Corps of Engineers. Permits, licenses, variances, or similar authorization may also be required by other Federal, state and local statutes.

Issuance of a Section 404/10 Permit requires USACE to both review and balance the need and expected benefits against the probable impacts of the work, and take into consideration all comments received and other relevant factors. This process is called the public interest review. If a project involves the discharge of dredged or fill material, it will be necessary for the USACE to evaluate the proposed activity under the Section 404(b)(1) guidelines prepared by the Environmental Protection Agency. The guidelines restrict discharges into aquatic areas where less environmentally damaging, practicable alternatives exist.

b. Comment. The SEIS II states that unavoidable impacts to significant resources from levee construction and borrow extraction require the development of compensatory mitigation plans. The landscape of pasture land, woodlands, and wetlands along River Road south of Baton Rouge and continuing into Iberville and Ascension Parishes constitutes a significant resource. Their loss to development will impact the hydrology and drainage functions of these parishes, since land elevations and flow fall away from the river and the natural levee.

We believe that many of these areas qualify for and merit protection under the Mitigation Rule.

Areas subject to sand boils and seepage during high water periods on the river would seem to fall under Mitigation Zone 3 (p. 143): "Moderately flooded landside areas." These areas should also be given priority for the development of Mitigation Banks that would lie in close proximity to the MRL and project impacts.

Response. As noted in the Draft MRL SEIS II, Section 5 Compensatory Mitigation and Monitoring, sub-section 5.6.2 Site Selection Criteria, site-specific mitigation tracts have not yet been identified or acquired. Should a ROD be signed implementing the preferred alternative, landowners in the proposed mitigation zones would be surveyed to identify willing sellers. Preliminary information would then be gathered on each prospective tract including hydrological conditions, elevation, soil characteristics, habitat connectivity, compatibility with adjacent land uses, geomorphic setting, adjacent drainage patterns, and proximity and relation to other desirable tracts, and then each tract would be assessed for suitability and sustainability, and prioritized accordingly for acquisition. These tract-specific parameters would influence the specific types of vegetation that would be planted. It is reasonable to presume that this process would take several years before all needed lands are identified and purchased and all compensatory mitigation is satisfactorily accomplished. Because the undertaking would be long and complex and would be coordinated with the inter-agency team, USACE would build flexibility and adaptability into the process to, among other things, adjust to changes in the willingness of prospective sellers to convey property to the Government. Therefore, landowners would be periodically surveyed on their amenability to sell land.

The USACE neither owns nor operates Mitigation Banks. Mitigation Banks are privately owned and operated. The USACE Regulatory Program provides guidance and methodology for mitigation bank sponsors to be able to evaluate a potential mitigation bank site to predict potential mitigation credits available depending upon different restoration/enhancement techniques.

12. Letter, Secretary of State, State of Mississippi, October 13, 2020
    a. Comment. I was pleased to find the U.S. Army Corps of Engineers recommend Alternative 3 in the August Draft SEIS II. At the Mississippi Secretary of State's Office, we understand the importance of flood control in the western portion of our state. The farmland and ports are vital to Mississippi's prosperity. But, beyond mere economic measurements, the region's people deserve to live their lives uninhibited by flooding and the accompanying damage. Choosing Alternative 3 is wise since it provides the protection our people need from the Project Design Flood, while also taking environmental sustainability into account. With such a well thought plan, I believe your action along the Mississippi River Levees will pay dividends for years to come. I'm happy to lend my full support to Alternative 3.

       Response. Comment acknowledged.

13. Letter, State of Louisiana Department of Natural Resources, Office of Coastal Management, October 13, 2020.
    a. Comment. Review of this determination has proceeded per NOAA regulations on federal consistency at 15 CFR §930.36(d) for "phased consistency determinations."

       After careful review, this office finds that **this phase** of the project, as proposed in the application, is consistent with the LCRP. Pursuant to federal regulations, consistency determinations must be submitted for each major decision in subsequent phases of the project that are subject to Federal discretion. The federal agency shall ensure that the activity under development continues to be consistent to the maximum extent practicable with the management program until such plans are finalized.

As planning for the proposed work proceeds and detailed information is developed, please provide additional consistency determinations as appropriate to ensure compliance with the LCRP. Please understand that this concurrence letter specifically does not authorize any construction or other activities which may have reasonably foreseeable effects on coastal land use, water use, or natural resources.

Response. Comment acknowledged. This is consistent with the framework outlined in the SEIS II.

14. Letter, Louisiana Environmental Action Network, October 12, 2020.

a. Comment. The core provision of NEPA is for public participation in the environmental decision-making process. LEAN is especially committed to low-income and minority communities achieving full participation in this process.

Response. USACE held 2 virtual public meetings during the comment period to solicit input from the public. Associated notifications were sent through various media and advertisements. This information is included in Appendix 21 - Public Involvement and Coordination.

b. Comment. Given the history of this area, in particular the sections of the corridor from Baton Rouge south, we urge the Corps to ensure that a thorough (HTRW) evaluation is done. ... Two of the SEIS II Work Item areas in the MVN are listed as connecting to Ironton - #138, Alliance to Ironton, LA, Levee Item 61.5-R, and Item #139, Ironton to Deer Range, LA, Levee, Item 58-R. Both describe raising the levee an average of 2 feet. Site Assessments for HTRW were carried out for both Work Items - Alliance to Ironton, LA, and Ironton to Deer Range, LA. Both found no REC's within the right-of-way (ROW) for both sections, though the assessment for the first states that "several historical REC's exist in the vicinity of the project feature." In both cases, the SEIS II states that "when the final SEIS II is completed, ROD [Record of Decision] is signed, and funding allocated, then a final full Phase I ESA [Environmental Site Assessment] would be executed on the project feature prior to construction."

Response. USACE has thoroughly reviewed the HTRW comments from LEAN, specifically comments related to work items Alliance to Ironton, LA, Levee, Item 61.5-R and Ironton to Deer Range, LA, Levee, Item 58-R. In the SEIS II Appendix 19, the following is stated in the Update Memorandum for each of these work items: Based on the results of Task 1 and Task 2 described above, the probability of encountering HTRW during the course of this proposed levee lift project is low. As described in the SEIS II, after funding is allocated for individual Work Items, then a final full Phase I ESA would be executed on the project feature prior to construction. Given a Phase I ESA is only valid for one year, there are currently no detailed designs for each Work Items, and the exact location of borrow areas is dependent on geotechnical information such as soil borings, the most appropriate timing for a full Phase I ESA would be after funding has been allocated and detailed design has been completed. The results and approach for these two work items also generally applies to the other work items addressed in the SEIS II. The USACE follows its internal HTRW guidance "Engineering Regulation No. 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance For Civil Works Projects" and the commercial, private sector guidance "American Society for Testing and Materials (ASTM) E 1527-13, Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process" closely and intends - as stated within the SEIS II - to perform a full Phase I ESA on all work items prior to construction. This will be done to ensure the alignment right-of-ways are free of HTRW constituents. This is standard USACE procedure executed prior to construction projects or real estate purchases to promote early HTRW detection so avoidance can be initiated or the appropriate responses can be initiated by responsible parties. The USACE greatly appreciates LEAN's interest in this matter and appreciates the detailed response.

c. Comment. Trace metals were discharged for decades by facilities into the Mississippi River. A LEAN Report from 2009 described data showing that the ExxonMobil Chemical Plant in Baton Rouge was listed as discharging Ethylbenzene, Phenols, Toluene, Lead, Mercury, and Nickel into Monte Sano Bayou, the southernmost tributary of the Mississippi River, while the Lion Copolymer was listed as discharging Mercury. ExxonMobil manages a dormant facility that still releases residual amounts of these substances into Monte Sano Bayou (LDEQ AI 1395). Regulatory requirements for monitoring of these substances are now included in LDPES permits.

Response. Comment acknowledged.

d. Comment. We urge the Corps to continue to incorporate the most up to date projections for these trends, especially in light of the impacts of 2019's record Mississippi River high water event. More frequent and prolonged flood events, in conjunction with periodic severe drought periods, which climate models forecast for the Mississippi River Basin, will obviously impact the sustainability of the MR&T project and other parts of the system's infrastructure.

Response. As described in the SEIS II, the 2018 Flowline assessment found that "the meteorological and hydrological underpinnings of the MR&T PDF are found to be adequate". While the 2019 flooding was a significant event, it does not affect this conclusion. The assessment of published literature, observed trends, and projected future river flows outlined in USACE (2018a) did not find strong consensus for changes in flow frequency basin-wide as to the hypothetical MR&T PDF event. Hypo-Flood 58A-EN imagines three historic rain events occurring in rapid succession, and does not have an overall associated probability of occurrence (the likelihood of the project design flood flows varies by location along the river system). As a result, there is no objective analysis or sufficient actionable science presently available to credibly adjust this hypothetical event to account for future climate change. USACE 2018 concluded that no clear trends could be observed or projected, and the likelihood of the PDF and the potential impacts of climate change on that likelihood remain unknown.

15. Letter, Undersigned by 56 conservation, civic, and faith organizations and businesses, October 13, 2020.
    a. Comment. The Corps should consider: obtaining all levee and berm construction material from non-wetland locations. Wetlands are a vital national resource that provide multiple benefits to people and wildlife, including reducing flood damages. Wetlands should not be destroyed for use as construction material, and obtaining construction material from non-wetland sources should be mandatory for this project.

       Response. Complete avoidance of all wetlands was not practicable. An alternative in which borrow areas would be selected in locations that resulted in no impacts to wetlands was considered in SEIS I as Alternative 2, Landside Borrow. A borrow area that results in no wetland impacts would be required to be located on the protected side of the levee for most Work Items. To avoid impacts to landside terrestrial wetland areas, these borrow areas would be located on agricultural property. The findings from the alternative analysis conducted on Alternative 2 in the 1998 SEIS I remain valid, thus an alternative where borrow area placement would result in no wetland impacts was eliminated from further consideration. Justification for this decision includes cost effectiveness of implementation, low water quality and habitat values provided by landside borrow areas, and the likelihood of condemnation being required to attain required project lands. Reference to this analysis was added to the Section 2.2 of the Final SEIS.
       The SEIS describes how USACE plans to avoid and minimize adverse environmental impacts.

    b. Comment. The Corps should consider: realigning segments of the levee system farther away from the river and using other natural infrastructure approaches wherever possible. Levee setbacks give a river more room to spread out during flood events. Such setbacks have been used along the Mississippi River to reconnect at least 50,000 acres of land to the River.1 The Corps should assess these and other natural infrastructure approaches, including restoring floodplain and coastal wetlands to protect vulnerable communities, and expanding and restoring wetland buffers on the riverside of the levees to improve the integrity and effectiveness of the levee system.

       Response. The scope of this effort is not a reformulation of the entire MR&T Project. The MR&T continues to successfully pass floods and provide flood-risk reduction to the 7 states bordering the Mississippi River. The purpose and need of this effort is to ensure reliability and resiliency of the system, as described in the notice of intent, included in Appendix 21 of the SEIS. The scope of this effort is not a reformulation of the entire MR&T project. As described in the SEIS II, Alternative 6 considered relocating levees that are unstable or prone to seepage if other means were not sufficient to address these concerns. While it is acknowledged that levee setbacks have been implemented in some areas in the past, particularly where scour has threatened the levee's integrity, engineering analyses identified other solutions at each Work Item location. It is anticipated that all deficiencies can be addressed at a much lower cost than levee relocations would demand. Moving levees would create extensive ground disturbances and environmental impacts at both the site of the new levee and the existing levee which would be degraded. In addition, this approach requires extensive borrow areas. The new, setback levee section would have to be constructed to authorized grade prior to degrading the existing levee section so as to not have a significant lapse in flood protection during construction. Additionally, residences, infrastructure, and large tracts of privately owned property would almost certainly be required to accommodate drastic shifts in the mainline levee alignment, and would almost certainly require condemnation of private property. Thus, Alternative 6 did not undergo additional detailed analyses.

c. Comment. The Corps should consider: modifying management of the Mississippi River & Tributaries floodways to reduce flood risks. The MR&T floodways are designed to be used during large flood events to reduce flood risks and flood damages. The SEIS II should examine whether the MR&T floodways can be operated more regularly to reduce flood risks and create fish and wildlife habitat, and should examine whether an alternative approach to the current 70/30 split of flow between the Mississippi and Atchafalaya Rivers could assist in reducing flood risks associated with increased sedimentation below the Old River Control Structure.

   Response. The scope of this effort is not a reformulation of the entire MR&T Project. The MR&T continues to successfully pass floods and provide flood-risk reduction to the 7 states bordering the Mississippi River. The purpose and need of this effort is to ensure reliability and resiliency of the system, as described in the notice of intent, included in Appendix 21 of the SEIS.

d. Comment. The Corps should consider: utilizing sediment diversions to reduce flood risks and advance coastal wetland restoration. Sediment and freshwater diversions can reduce flood risks and are an important tool for restoring coastal wetlands. The SEIS II should examine whether new sediment and freshwater diversions could be implemented in the future, and whether existing and planned structures could be better utilized to reduce flood risks and advance coastal wetland restoration. The SEIS II should also examine options for transporting sediment from the stretch below the Old River Control Structure to use in rebuilding coastal wetlands.

Response. The scope of this effort is not a reformulation of the entire MR&T Project. The MR&T continues to successfully pass floods and provide flood-risk reduction to the 7 states bordering the Mississippi River. The purpose and need of this effort is to ensure reliability and resiliency of the system, as described in the notice of intent, included in Appendix 21 of the SEIS. Addressing the Work Items described in the SEIS II would not affect future large-scale restoration projects proposed by the state and Federal Governments to combat coastal wetland losses.

e. Comment. The Corps should consider: modifying and/or removing targeted river training structures to reduce flood risks. River training structures (wing dikes, bendway weirs, and chevrons constructed to reduce navigation dredging costs) have significantly increased flood heights in broad stretches of the Mississippi River while also destroying important fish and wildlife habitat. The SEIS II should evaluate options for removing and modifying some of these structures to reduce flood risks, which the Corps has acknowledged could be done at some locations without impacting navigation.

Response. The Scope of this SEIS is limited to the Levee Feature of the MR&T. River training structures fall into the Channel Improvement Aspect of the MR&T Project. However, USACE considers public safety to be of paramount importance when designing and evaluating projects. The agency believes strongly that the best available science shows that river training structures do not increase flood heights, and consequently do not pose a significant risk to public safety. USACE, other federal agencies and academic institutions have performed extensive research dating back to at least the 1930s on the physical effects of river training structures, including their impact on flood heights, and have concluded that river training structures do not raise flood heights. These evaluations have fully considered all available literature and science.

Modification of river training structures, such as dike notching, to encourage connectivity of side channels within the LMR for the benefit of fish and wildlife is already a best management practice of the Channel Improvement Program of the MR&T project, as described in the Endangered Species Act Section 7(a)(1) Conservation Plan (citation below).

Killgore, K. J., P. Hartfield, T. Slack, R. Fischer, D. Biedenharn, B. Kleiss, J. Hoover, and A. Harrison. 2014. 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)). MRG&P Report No. 4. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

f. Comment. Our organizations have been unable to locate any reference to an independent external peer review being carried out for the SEIS II, despite the fact that such a review is mandatory for this project. 33 U.S.C. § 2343.

Response. IEPR is being conducted on this SEIS II by the Analysis Planning and Management Institute (APMI) for use by the decision maker. Once completed, the final report will be placed at: https://www.usace.army.mil/Missions/Civil-Works/Project-Planning/Completed-Peer-Review-Reports/.

g. Comment. The draft SEIS II does not comply with the National Environmental Policy Act, the Clean Water Act, the mitigation requirements for civil works projects, the Independent External Peer Review Requirements, or longstanding National Water Resources Planning Policy which requires that all water resources projects protect and restore the environment, including by protecting and restoring the functions of natural systems. 42 USC 1962–3.

Response. USACE disagrees with this characterization. See responses to Comment #15f and #15i.

h. Comment. The draft SEIS II fails to meaningfully evaluate alternatives. Instead of evaluating long-term flood damage reduction solutions that can both protect communities and restore vital wildlife habitat, the SEIS II rubber stamps use of the same approach that was adopted in 1998 for at least the next 50 years.2 This approach—identified in the SEIS II as the "avoid and minimize" alternative—establishes criteria for ranking potential locations that will be dug up so the soil can be used for construction material, based on land use and locations that could avoid and minimize the adverse environmental effects resulting from excavating the soil. Critically, however, this approach does not require that construction material be obtained from non-wetland areas. While our organizations appreciate the establishment of criteria to attempt to avoid and minimize adverse impacts to wetlands, efforts to avoid and minimize adverse impacts to wetlands and other aquatic resources are required as a matter of law under Clean Water Act § 404. As a result, such avoid and minimize efforts must be carried out regardless of the alternative selected.

Response. USACE has followed applicable laws and regulations as to compensatory mitigation. See Section 5 of the SEIS II and Appendix 20.
A full range of alternatives has been evaluated consistent with the requirements of the Clean Water Act, NEPA and USACE regulations, policies and guidance. USACE has sufficiently documented that proposed compensatory mitigation is commensurate with unavoidable impacts and that adequate safeguards are in place to ensure mitigation success and that implementation of compensatory mitigation occurs concurrently with project impacts.

i. Comment. The draft SEIS II fails to meaningfully evaluate impacts. Despite identifying the precise locations of 146 proposed work items, the SEIS II provides only the most general assessment of possible impacts to wetlands and wildlife. For example, despite the Mississippi River's role as a critical migration corridor for "more than 40 percent of the waterfowl that breed in North America," the SEIS II bases its entire assessment of waterfowl impacts on just one species of waterfowl—the mallard. SEIS II at 36, 80, and Appendix 2. The SEIS II must assess all "reasonably foreseeable" direct, indirect and cumulative environmental impacts, and may not delay that obligation until the development of site-specific environmental assessments.4

Response. USACE disagrees that the SEIS II provides only the "most general assessment" of impacts. USACE assessed impacts to the significant resources as detailed in Sections 3 and 4 and accompanying Appendices. This analysis included use of ecological models that were certified or approved by the USACE Ecosystem Restoration National Planning Center of Expertise and used within their applicable ranges, in accordance with Engineer Circular EC 1105-2-412. Application of the models were also reviewed by the interagency team throughout the development of the SEIS. While some models, such as the HEP, are derived from species-specific habitat requirements, the analyses represent the overall wildlife community as detailed in the SEIS II and accompanying appendices.

Specific to waterfowl, the use of the Mallard as a representative species for habitats impacted by project construction is described in the Waterfowl Appendix 5. While the Waterfowl analysis for the MRL SEIS II incorporated energetic values focused on the Mallard, it is directed at multiple species of waterfowl that rely on areas that will be directly impacted (i.e. bottom-land hardwood forest and agricultural croplands). Many species of dabbling ducks rely on the same food resources within BLH forest and agricultural grain fields (e.g. soybean or corn). Therefore, the Mallard serves as a representative species in which to evaluate loss of foraging habitat as well as using the same criteria to determine suitable mitigation. Smaller ducks such as Blue-winged and Green-winged Teal are more likely to feed in shallower water (i.e. <12 inches depth); therefore, selection of the Mallard which often feeds at depths < 18 inches was selected to encompasses other dabbling duck species. The primary food type categories described in the DUD manual (Heitmeyer 2010) apply not only to Mallards but to many other ducks using BLH or agricultural habitats. An exception to this are waterfowl such as Gadwall or American Wigeon that also frequently feed on aquatic plants and seeds; however, habitats that include these food resources are not likely to be impacted by the MRL project. Ultimately, the objective is to assess the value of the habitat being lost as suitable foraging habitat to waterfowl, rather than being directed at various species of waterfowl. USACE believes that the current analysis sufficiently addresses waterfowl foraging habitat loss and required mitigation.

j. Comment. Our organizations appreciate the care that has gone into developing a mitigation framework for the project, however this framework does not satisfy the mitigation requirements applicable to civil works projects. 33 U.S.C. § 2283(d). The SEIS II must include a specific mitigation plan (that must include specific activities, ecological success criteria, a monitoring plan and a contingency plan if the mitigation is not successful). The SEIS II also must identify specific mitigation lands and provide the basis for the Corps' determination that those lands will be available. 33 U.S.C. § 2283(d). None of these details are included in the draft SEIS II.

   Response. The mitigation plan was prepared in accordance with Engineer Regulation 1105-2-100, Appendix C, which applies to civil works projects. Sufficient details are included in Section 5 of the SEIS and accompanying Appendix 20. As described in Section 5 of the SEIS, once a specific tract of land is identified for acquisition, a tract-specific, detailed mitigation plan comprising the mitigation measures described in the SEIS II would be developed in coordination with the interagency team.

k. Comment. The Corps' timeline for completing the SEIS II precludes a legitimate consideration of comments on the draft submitted by Federal and State agencies, Tribes, or members of the public. At the October 1, 2020 virtual public hearing on the draft SEIS II, the Corps announced that the final SEIS II would be released on or about October 30—just 13 working days after the close of the public comment period on October 13. It is not possible to consider public comments and make necessary changes to the draft SEIS II under this timeline.

   Response. USACE has fully considered all comments received to the draft SEIS II.

16. Letter, Lower Mississippi Riverkeeper, October 12, 2020.

   a. Comment. The SEIS II states that the Refined 1973 MR&T Project Flood Flowline is the basis for design of the levee system under construction...A flowline assessment in response to the 2011 Greater Mississippi River Basin Flood was completed in 2018, but concluded that "the meteorological conditions associated with the 1955 hypo flood still characterized the storm event that generates and defines the PDF.
   The Public Scoping Period for the project was carried out in 2018. Hence that process and the benchmarks cited above all occurred prior to the 2019 high water event. The unprecedented onset and duration of that event would worthy of being integrated into the MR&T FEIS process, especially since the record duration for opening the Bonnet Carre Spillway, following an unprecedented number of openings, led to major water quality impacts on the Mississippi Gulf Coast and on Louisiana's oyster fishery.

A combination of alternatives, especially utilization of nature-based measures, seems called for in the wake of the 2019 high water event, especially since another significant high water event is quite possible before completion of construction measures for levee raising and upgrades. Water storage and flood risk reduction are included among the functions and values of wetlands in the Mississippi River Valley (p. 41)

Response. See response to Comment #14d.

b. Comment. The SEIS II states that once mitigation tracts are identified, a tract-specific mitigation plan would be developed in coordination with an interagency team of USFWS, EPA, respective State wildlife agency, and respective State water agency. We support the interagency approach, but recommend inclusion of State agricultural agencies as well to assist in potential farmland mitigation/protection sites.

   Response. Comment acknowledged. USACE appreciates the comment and will investigate those opportunities.

c. Comment. Many of the areas proposed for Work Items may lack nearby approved mitigation banks, and it is critical that mitigation of land and water resources is carried out close to where the impacts occur. We suggest the USACE explore creation of a mitigation bank(s) specifically designed to address the impacts of MRL work, where mitigation would be done in close proximity to levee and borrow work.

   Response. USACE does not have Congressional authority to establish Mitigation Banks. Mitigation Banks are privately owned and operated. The USACE Regulatory Program provides guidance and methodology for mitigation bank sponsors to be able to evaluate a potential mitigation bank site to predict potential mitigation credits available depending upon different restoration/enhancement techniques. USACE would target large tracts of land near the levee to use for mitigation of several Work Items as opposed to small tracts of mitigation land to just address small acreages of impacts, as described in Section 5 of the SEIS and recommended in the Draft Fish and Wildlife Coordination Act Report (Appendix 2).

d. Comment. The riverside/batture areas vary substantially along the Lower Mississippi River in terms of their size and offer important conservation opportunities. The USDA Mississippi River Batture Initiative carried out several years ago engaged in restoration and protection of such areas in the lower river region, while the Lower Mississippi River Conservation Committee (LMRCC) has focused on restoration efforts between the levees. Some of the National Wildlife Refuges managed by USFWS lie within the batture area or in floodplains along the mainstem river and tributaries. We encourage the USACE to work with these agencies to develop extensive mitigation plans for the MRL system.

Response. USACE coordinates with these agencies regarding these on-going conservation activities and will continue to coordinate mitigation planning and pursue available opportunities.

e. Comment. Clearly there are potential intersections and coordination between the Mitigation Planning Process and development/improvement of recreational opportunities in the MRL work corridor, and we urge the USACE to fully investigate these.

   Response. Concur. See response to Comment #16d. Most USACE mitigation lands will have recreation opportunities.

f. Comment. Utilizing the opportunities provided by nature-based strategies, mitigation planning, and recreational areas can also provide a collateral benefit in improvement of water quality where those efforts result in reconnection of the river with natural floodplains and restoration of hydrologically connected wetlands. This benefit can also help address the key water quality issue for the mainstem river and its discharge area in the Gulf of Mexico - nutrient loading upstream causing the spread of hypoxia offshore. ... These same measures as noted above can help take pressure off the levee system during high water events, and would indicate a potential for collateral benefits from integrating multiple strategies in the MRL repair and upgrade effort under the MR&T.

   Response. The scope of this effort is not a reformulation of the entire MR&T Project. The MR&T continues to successfully pass floods and provide flood-risk reduction to the 7 states bordering the Mississippi River. The purpose and need of this effort is to ensure reliability and resiliency of the system, as described in the notice of intent, included in Appendix 21 of the SEIS.

17. Letter, The National Wildlife Federation, October 13, 2020.

   a. Comment. The Corps Should Go Back To The Drawing Board And Develop And Adopt A Fundamentally New Approach To Sustainably Reducing Flood Risks Along The Mississippi River. As highlighted above, providing meaningful, long-term flood damage reduction requires use of modern solutions that address the underlying causes of flood risks. To develop these solutions—and comply with the National Environmental Policy Act—the SEIS II should carefully analyze the underlying causes of increased flood risks, including the role of the full suite of Corps activities that have fundamentally changed the form and function of the Mississippi River, its floodplain, and its coastal wetlands; the extensive body of science and data developed since completion of the 1998 SEIS I; and the significant implications of our rapidly changing climate.

Response. The MR&T continues to successfully pass floods and provide flood-risk reduction to the 7 states bordering the Mississippi River. The purpose and need of this effort is to ensure reliability and resiliency of the system, as described in the notice of intent, included in Appendix 21 of the SEIS.

b. Comment. The Corps should then carefully consider...Obtaining all levee and berm construction material from non-wetland locations. Wetlands are a vital national resource that provide multiple benefits to people and wildlife, including reducing flood damages. Wetlands should not be destroyed for use as construction material, and obtaining construction material from non-wetland sources should be mandatory for this project.

   Response. See response to Comment #15a.

c. Comment. The Corps should then carefully consider...Realigning segments of the levee system farther away from the river and using other natural infrastructure approaches wherever possible. Levee setbacks give a river more room to spread out during flood events. Such setbacks have been used along the Mississippi River to reconnect at least 50,000 acres of land to the River.1 The Corps should assess these and other natural infrastructure approaches, including restoring floodplain and coastal wetlands to protect vulnerable communities, and expanding and restoring wetland buffers on the riverside of the levees to improve the integrity and effectiveness of the levee system.

   Response. See response to Comment #15b.

d. Comment. The Corps should then carefully consider...Modifying management of the Mississippi River & Tributaries floodways to reduce flood risks. The MR&T floodways are designed to be used during large flood events to reduce flood risks and flood damages. The SEIS II should examine whether the MR&T floodways can be operated more regularly to reduce flood risks and restore fish and wildlife habitat, and should examine whether an alternative approach to the current 70/30 split of flow between the Mississippi and Atchafalaya Rivers could assist in reducing flood risks associated with increased sedimentation below the Old River Control Structure.

   Response. See response to Comment #15c.

e. Comment. The Corps should then carefully consider...Utilizing sediment diversions to reduce flood risks and advance coastal wetland restoration. Sediment and freshwater diversions can reduce flood risks and are an important tool for restoring coastal wetlands. The SEIS II should examine whether new sediment and freshwater diversions could be implemented in the future, and whether existing and planned structures could be better utilized to reduce flood risks and advance coastal wetland restoration. The SEIS II should also examine options for transporting sediment from the stretch below the Old River Control Structure to use in rebuilding coastal wetlands.

Response. See response to Comment #15d.

f. Comment. The Corps should then carefully consider...Modifying and/or removing targeted river training structures to reduce flood risks. River training structures (wing dikes, bendway weirs, and chevrons constructed to reduce navigation dredging costs) have significantly increased flood heights in broad stretches of the Mississippi River while also destroying important fish and wildlife habitat. The SEIS II should evaluate options for removing and modifying some of these structures to reduce flood risks, which the Corps has acknowledged could be done at some locations without impacting navigation.

   Response. See response to Comment #15e.

g. Comment. Given the significance of the SEIS II to public safety and the environment, the Corps should engage the National Academy of Sciences to carry out the independent external peer review required by 33 U.S.C. § 2343. This peer review should include an evaluation of the long-term effectiveness of the alternative recommended by the Corps; whether the selected alternative will protect and restore the functions of the Mississippi River and its floodplain and coastal wetlands; and whether the proffered skeleton mitigation plan will be ecologically successful.

   Response. IEPR is being conducted. See response to Comment #15f.

h. Comment. The recommended alternative in the Draft SEIS II is prohibited under Section 404 of the Clean Water Act because the Corps: (1) has not clearly demonstrated that there is no "practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem"...The Clean Water Act 404(b)(1) Guidelines prohibit the Corps from discharging dredged or fill material into any regulated "waters of the United States," including wetlands, unless the Corps has clearly demonstrated that there is no "practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem."

   Response. USACE has followed all applicable laws and regulations. USACE sufficiently documented that proposed compensatory mitigation is commensurate with unavoidable impacts and that adequate safeguards are in place to ensure mitigation success and that implementation of compensatory mitigation activities occurs concurrently with project construction.

i. Comment. The Draft SEIS II clearly lacks "sufficient information"13 to make a reasonable judgment that the recommended alternative is in fact the LEDPA

because the Draft SEIS II fails to evaluate a full range of reasonable alternatives and fails to identify the full extent of adverse impacts. Moreover, neither the Draft SEIS II nor the preliminary 404(b)(1) evaluation demonstrate that:
a. Less damaging alternative locations for obtaining construction material are not available or are impracticable;
b. Less damaging alternative locations for obtaining construction material are prohibitively expensive;
c. Less damaging practicable borrow pit configurations are not available;
d. Less damaging levee configurations are not available;
e. Less damaging alternatives, including some or all of the components highlighted in Section A of these comments are not available; or
f. Additional practicable steps cannot be taken to further minimize adverse impacts.

<u>Response.</u> Comment noted. However, USACE has followed all applicable laws and regulations. USACE has sufficiently documented that proposed compensatory mitigation is commensurate with unavoidable impacts and that adequate safeguards are in place to ensure mitigation success and that implementation of compensatory mitigation activities occurs concurrently with project construction. Additionally, EPA stated that identification of Alternative 3 (Avoid and Minimize) as the least environmentally damaging practicable alternative appears to be consistent with the guidelines, as shown in Comment #18.

j. <u>Comment.</u> The Draft SEIS II provides little to no information on the steps taken to avoid adverse impacts in the first instance, as clearly required by the Clean Water Act. Indeed, the Corps appears to have done little more than propose a set of non-mandatory criteria for ranking possible locations for obtaining construction material—criteria that in fact prioritize destruction of ecologically significant wetlands in direct violation of the Clean Water Act404(b)(1) Guidelines.
The Draft SEIS II borrow pit criteria prioritize locating borrow pits in ecologically valuable riverside wetlands over less ecologically valuable, non-wetland locations: 4 of the top 5 priority borrow pit location criteria target riverside wetlands (as discussed below, prior-converted croplands can retain vital wetland functions); and 5 of the total 8 priority locations target riverside wetlands. These non-mandatory ranking criteria are also less protective of wetlands than the ranking criteria adopted by the Corps in the 1998 SEIS I....Indeed, the Draft SEIS II criteria establish the "most preferable" location for borrow pits in ecologically valuable riverside lands described as "Riverside prior-converted cropland" despite the clear acknowledgement in the Draft SEIS II that riverside lands are riverside lands are far more likely to be of high ecological value due to their connection to the river....Prior converted cropland can retain vitally important wetland characteristics, as acknowledged in the Corps' Regulatory Guidance Letter 90-07...Making riverside prior-converted cropland the top priority for the location of

borrow pits is also a significant rollback to the borrow pit ranking priority adopted by the Corps in the 1998 SEIS I, which recommended riverside prior-converted cropland only if "landside cropland from willing sellers" and "landside cropland when riverside locations were unavailable" could not be utilized.

Response. The SEIS describes how USACE plans to avoid and minimize adverse environmental impacts. The functional wetland value of all agricultural lands affected by the project are described in thorough detail in the Wetland Appendix 10. While there may be some functional ecological value of prior-converted cropland riverside of the levee (NOTE: functional value was assigned to them as detailed in the wetland analyses in Appendix 10), borrow areas also provide functional ecological value as described in thorough detail in the Aquatics Appendix 11. USACE has followed applicable laws and regulations.

k. Comment. The Draft SEIS II fails to provide information on the acreage extent of wetland impacts, making it extremely difficult for the public to understand the true scope of the impacts to these critical aquatic resources. The acreage information that is provided is buried in the Draft SEIS II, with for example, the first reference to the total number of forested wetland acres impacted by the project not mentioned until page 150 of the Main Report.
Response. A summary of impacted acreages was added to Table S-1 in the Final SEIS II. Also, see A21-7.3-*Addendum*: *Determination of Acreages for Resource Assessments*, which was prepared to consolidate assumptions, acreage calculations, and methodologies of the various functional assessments. See response to Comment #17w for details regarding wetlands

l. Comment. The lack of wetland acreage information makes it impossible to verify whether or not the functional assessments in the Draft SEIS II account for all wetland impacts from the project. This is highly problematic, including because the Draft SEIS II functional assessments require acreage inputs in the calculation process. For example, many of the acres deemed unsuitable for inclusion in the DUD analysis likely provide significant habitat and other values but it is not possible to determine whether those impacts were in fact accounted for in the functional assessments. According to the Draft SEIS II, more than 90% of the proposed Work Item footprints (6,762 of 7,283 acres of Alternative 3 construction footprints) were deemed to be unsuitable habitat for foraging waterfowl because "they lacked flooded conditions or were flooded for more than 18 inches in depth." Draft SEIS at 28.
Response. See response to Comment #17w for details regarding wetlands. All functional assessments describe in thorough detail the acreage inputs and associated assumptions associated with those resources. Acreages were used

according to the associated ecological models. Not all of the Work Item footprints are suitable for foraging waterfowl. Section 3.2.1.1 describes how waterfowl habitat was determined and Table 3-2 breaks down the acreages and associated Duck-Use-Days by habitat type. See A21-7.3-*Addendum*: *Determination of Acreages for Resource Assessments*, which was prepared to consolidate assumptions, acreage calculations, and methodologies of the various functional assessments. Additionally, a summary of impacted acreages was added to Table S-1 in the Final SEIS.

m. Comment. The limited acreage information that is provided is presented in a confusing manner and the partial acreage impact numbers provided in one section of the Draft SEIS II often cannot be reconciled with numbers provided in a different section. For example, the Draft SEIS II states that the "preferred alternative would impact 655 acres of riverside forested wetlands and 351 acres of landside forested wetlands, primarily through borrow source acquisition and levee improvement features," for a total of 1,006 acres of forested wetland impacts (no information is provided in this section regarding non-forested wetland acre impacts, so total wetland acre impacts could be higher). Draft SEIS II at 150. However, the preliminary 404(b)(1) evaluation, which according to the Corps does not include borrow pit impacts, identifies 871.9 acres of wetland impacts (and 4.1 acres of open waters). Draft SEIS II, Appendix 3 at 3. A comparison of these numbers would suggest that borrow pits would impact 134 acres of wetlands. However, this number cannot be reconciled with the fact that the project will include at least 292 acres of borrow pits in riverside wetlands that provide "suitable" duck habitat; and that the entire project is projected to require 1,402 acres of borrow pits, the vast majority of which will be located on the riverside of the levee where wetlands are prevalent.19 Draft SEIS at 102 and 83 at Table 4-5.

Response. The 404b1 evaluation was updated to better describe acreages as related to the wetland assessment and associated assumptions. The Wetland Assessment treated all assumed wetland areas, with the exception of marshes, active agricultural lands, and pastures, as forested wetlands. As a result, the forested land cover class included areas mapped as forested, tree plantations, shrub/scrub wetlands, sandbars, and non-forested wetlands. This selection was made to reflect the potential that these unmanaged areas may mature into forested wetlands via forest succession within the 50 year period of analysis. Because forested wetlands receive the highest scores within the assessment approach, this represents the most conservative possible tactic for evaluating impacts to wetland resources. As a result, and impacts to assumed non-forested wetland areas are captured in the analysis. Additionally, only one project work item, 67-L, is anticipated to impact marshes. Resulting in an estimated 5 ac decrease in marsh extent. Application of the assessment model identifies a -12.0 AAHU decrease in wetland functions for that work item, requiring establishment of 19.2 acres of wetland mitigation.

n. Comment. The recommended alternative includes 110 more acres of riverside borrow pits than the traditional construction alternative, even though riverside lands are far more likely to be of high ecological value due to their connection to the river.20 Draft SEIS II at 102. The higher ecological value of riverside lands is clearly acknowledged in the Draft SEIS II: "Areas subject to Mississippi River flooding or those that receive a seasonal flood pulse are inherently more valuable than those that are not (Junk et al. 1989)" while "the ecological resources landside of the MRL are in sub-optimal condition due to the general loss of BLH habitat and connection with the Mississippi River, with the exception of a few isolated, relatively small patches of BLH." Draft SEIS II at 142. The Draft SEIS II also recognizes the higher ecological value of riverside lands by prioritizing those lands for mitigation.21 Draft SEIS II at 143.

Response. USACE does not agree that existing agricultural lands riverside of the levee inherently have more ecological value than existing forested lands landside of the levee, or that their ecological value is inherently more significant than some other riverside habitats (e.g., floodplain waterbodies). Functional assessments were utilized to determine adverse impacts for this SEIS including the use of ecological models that were certified or approved by the USACE Ecosystem Restoration National Planning Center of Expertise and used within their applicable ranges, in accordance with Engineer Circular EC 1105-2-412. Application of the models were also reviewed by the interagency team throughout the development of the SEIS.

Borrow areas located riverside of the levee have been shown to provide significant aquatic benefits as described in Sections 3.2.7, 4.2.7, and Appendix 11. Aquatic communities within borrow areas are similar to other floodplain water bodies along the LMR, with 95 macroinvertebrate species and 75 fish species having been documented (Miranda et al. 2013 and Cobb et al. 1984).

Prioritizing riverside agricultural lands for both borrow and mitigation is consistent with this understanding.

o. Comment. The recommended alternative fails to demonstrate that there are no alternatives to the extensive use of ecologically significant wetlands for borrow pits in the portion of the state of Louisiana located in the Vicksburg District. This area, Concordia Parish Louisiana, is the location of the overwhelming majority of duck habitat lost to borrow pits for the entire project, despite the fact that just 12 of the 143 Work Items are located in Concordia Parish. Draft SEIS II, Appendix 4 at 36. The borrow pits in Concordia Parish Louisiana account for 94.7% of the acres of suitable duck habitat and 81.8% of the total DUD values that will be lost to borrow pits for the entire project.22 Draft SEIS II at 84. The Draft SEIS II fails to explain why it is not practicable to impact fewer acres of wetland habitat critical to waterfowl for these 12 work items.

Response. In selecting borrow sites, USACE avoided impacts to wetlands and other ecologically significant habitat to the extent practicable. This area in Concordia Parish has a dense number of work items requiring significant borrow amounts and due to existing conditions presents added challenges for USACE efforts to avoid wetlands and other ecologically significant habitat. Much of the area landside of the levee is located within the Red River Wildlife Management Area. Borrow sites cannot be located closer than 1500 feet from the levee toe due to seepage and stability risks. Existing infrastructure such as Louisiana State Highway 15 also needed to be avoided.

p. Comment. The Draft SEIS II appears to have ignored potential locations for borrow pits that were more than ½ mile distance from either side of the existing levee. Non-wetland and/or non-forested areas may well be available for use as borrow pits in landside areas outside the ½ mile buffer zone evaluated in the Draft SEIS II, but no effort was made to locate any such sites.

Response. The 1/2 mile distance is not the maximum distance that USACE will look for borrow. Some borrow areas are shown farther than ½ mile of Work Items (e.g., MVN); however, USACE experience and practice has shown that most borrow, particularly in rural areas, can be obtained within the 1/2 mile zone and was selected as a reasonable distance for the planning level of detail for this SEIS.

This SEIS II does not prevent later examination of areas beyond this, but a supplemental NEPA document, most likely an environmental assessment (EA), would be required to assess and utilize proposed borrow areas not covered by this SEIS II.

q. Comment. The Draft SEIS II provides virtually no information on actions that will be taken to minimize impacts that cannot be avoided (other than a general discussion of basic best management practices for construction and acknowledging that the Corps could work with landowners to attempt to improve the ecological value of individual borrow pits).

Response. USACE will continue to investigate measures to minimize impacts during detailed design. Environmental features (e.g., irregular shorelines, islands, variable depths, reforestation, etc.) that could be incorporated into borrow area designs to increase habitat value would be explored with willing landowners and non-Federal sponsors during project design. A brochure detailing these recommendations and outlining this framework was added to Appendix 21 and will be used to solicit willing landowners. It should be noted that these environmental benefits were not assumed to offset any impacts in calculations of compensatory mitigation, but they would provide noteworthy ecological benefits when implemented.

r. Comment. The Draft SEIS II also does not—and cannot—properly assess the extent to which adverse impacts can be avoided through mitigation because it does not meaningfully evaluate the full range and extent of direct, indirect, and cumulative adverse environmental impacts that will result from the project. Moreover, while the National Wildlife Federation appreciates the work that has gone into developing a mitigation framework for the project, this framework does not satisfy the mitigation requirements established by the Clean Water Act or the mitigation requirements applicable to civil works projects, as discussed in detail in these comments.

   Response. See response to Comment #15j. USACE has followed applicable laws and regulations. Compensatory mitigation is commensurate with unavoidable impacts with adequate safeguards in place to ensure mitigation success. Implementation of compensatory mitigation should occur concurrently with project impacts. See Section 5 of the SEIS II and Appendix 20.

s. Comment. Importantly, the preliminary 404(b)(1) evaluation also clearly fails to comply with the Clean Water Act. Among other problems, that evaluation completely fails to consider the impacts resulting from the digging up of vital wetlands so that the wetland soil can be used for construction material. As noted above, the project will destroy extensive areas of wetlands in this manner. Obtaining construction material from wetlands unquestionably triggers the requirements of Clean Water Act Section 404, as it requires extensive actions, including the use of heavy equipment, that will result in the discharge of dredged material within the wetlands being dug up. The Corps' limitation of the 404(b)(1) evaluation to the discharge of dredged material "at levee enlargement, slope flattening, and berm construction sites" demonstrates a fundamental misunderstanding of the Clean Water Act and the 404(b)(1) Guidelines. Draft SEIS II, Appendix 3 at 3.

   Response. The preliminary 404(b)(1) Evaluation was updated to better describe wetland impacts and maintain consistency with the Wetland Assessment (see Appendix 3).

t. Comment. The Draft SEIS II also appears to suggest that the 14-page 404(b)(1) evaluation can somehow satisfy the Clean Water Act Section 404 review requirements for each of the 143 work items that will be carried out across portions of seven states over at least the next 50 years. Such an approach, however, would violate the Clean Water Act because absent a Section 404 (and a Section 401) review for each work item, the Corps cannot demonstrate that the site-specific action is the LEDPA alternative, that the site-specific action has properly employed required avoid-and-minimize techniques, or that the site-specific action meets the other requirements established by the 404(b)(1) Guidelines.

Response. See Comment #18a. USACE has followed applicable laws and regulations.

u. Comment. The National Wildlife Federation notes that all references to the Council on Environmental Quality (CEQ) NEPA regulations in these comments refer to the CEQ NEPA regulations issued in 1978—as these are the regulations that properly apply to this NEPA process. While the Council on Environmental Quality recently issued new NEPA regulations, those new regulations are facially invalid and under legal challenge (including by the National Wildlife Federation) in multiple courts.
We also note that the SEIS II NEPA process should follow the 1978 CEQ NEPA regulations because the scoping process was initiated years before either the issuance or the effective date of the new CEQ NEPA Regulations; the Draft SEIS II was well underway before the issuance or effective date of the new CEQ NEPA Regulations; and the Draft SEIS II was released for public comment before the effective date of the new CEQ NEPA Regulations.27 Under these circumstances, it would be both unfair to the public and inappropriate to claim reliance on the new CEQ regulations even if those regulations were not facially invalid (as noted above, these new CEQ regulations are not facially valid).

Response. The Draft SEIS II was published prior to the effective date of September 14, 2020 and prepared under the 1978 CEQ NEPA Regulations.

v. Comment. The Draft SEIS II violates NEPA because it fails to evaluate highly reasonable alternatives and fails to evaluate an appropriate range of alternatives….the SEIS II provides a critical opportunity for developing meaningful, comprehensive long-term flood damage reduction solutions that can both protect Mississippi River communities and restore vital wildlife habitat.

Response. USACE has followed applicable laws and regulations. USACE has sufficiently documented that proposed compensatory mitigation is commensurate with unavoidable impacts and that adequate safeguards are in place to ensure mitigation success and that implementation of compensatory mitigation occurs concurrently with project impacts.

w. Comment. Impacts to wetlands, including complete destruction of many hundreds of acres and changes to the extent and duration of inundation on many more acres, are a major impact from the project. Such losses and impacts will also result in significant adverse impacts to fish and wildlife species—and indeed, such losses are the primary drivers of the functional losses identified in the Draft SEIS II functional assessments.

Despite the importance of properly assessing impacts to wetlands—including site-specific impacts—the Draft SEIS II provides only the most general information on wetland impacts and the information that is provided is both confusing and contradictory, as discussed in Section B of these comments. The Draft SEIS II also fails to take into consideration the many changes that have impacted the hydrology, ecology, flow patterns, and uses of the Mississippi River and its floodplain and coastal wetlands since the 1998 SEIS I. Each of these changes can result in significant direct, indirect, and cumulative impacts to wetlands and other special aquatic sites and as a result, should be analyzed in the Draft SEIS II.

The failure to fully evaluate impacts to wetlands and other aquatic resources fundamentally taints all other impact analyses in the Draft SEIS II.

Response. Impacts associated with each Work Item are detailed in Attachment 1 of the Wetlands Appendix 10 and summarized in tabular form. These materials provide site specific information on the location of wetland resources, the wetland land cover type, anticipated activity (e.g., levee enlargement, installation of relief wells), and associated acreages. Further, the materials in Attachment 1 of Appendix 10 provide detailed information on the current wetland functional capacity or habitat suitability associated with each landcover type under pre- and post-project scenarios including the anticipated changes in wetland functions over the 50 year period of analysis. This provides a fully transparent determination of wetland impacts resulting from project implementation and the required compensatory mitigation acreages needed to offset project impacts. The selected approach also reflects the current conditions across the study area, which accounts for changes in landscape conditions and wetland functions that may have occurred since the development of the 1998 SEIS I. The resultant assessment provides the most comprehensive analysis possible, and as noted throughout the wetland appendix, assumptions were made throughout the process to ensure that 1) the maximum wetland acreage possible was included, 2) wetlands were classified to yield the highest possible functional capacity/habitat suitability scores based on the available data, and 3) compensatory mitigation determinations incorporated the best available state-of-the-science.

x. Comment. The Mississippi River is a vital migration corridor for "40 percent of the Mississippi Flyway's waterfowl and 60 percent of all U.S. bird species." Draft SEIS II at 26. Despite the significance of the Mississippi River migration corridor and the vital importance of wetlands and forested habitats to the multitude of waterfowl species that rely on this corridor, the Draft SEIS II bases its entire assessment of waterfowl impacts on just one species of waterfowl—the mallard. SEIS II at 36, 80, and Appendix 2. The analysis of Impacts to bird species is also severely limited—considering the impacts to only 8 species.54 Draft SEIS II at

92. Just 4 avian species were considered in the assessment of impacts to terrestrial habitats. Draft SEIS II at 30.

Failure to look at a truly representative sampling of waterfowl and bird species prevents assessment of impacts to species that have different life-cycles, habitat needs, and food source needs. The food source, breeding, resting, migratory, and other patterns of many waterfowl and bird species are entirely different, which can cause species to react to impacts in fundamentally different ways. For example, species that eat fish will respond differently to a loss of wetlands that provide critical fish habitat than species that do not eat fish. Hawks and raptors have fundamentally different food source, breeding, and other life cycle needs than waterfowl and songbirds. And the list of differences goes on and on.
The aggressively limited number of species considered in the waterfowl and bird analyses render the Draft SEIS II inadequate. These problems are greatly amplified by the many problems with the wetland analysis discussed throughout these comments.

Response. The use of the Mallard as a representative species for habitats impacted by project construction is described in the Waterfowl Appendix 5. While the Waterfowl analysis for the MRL SEIS II incorporated energetic values focused on the Mallard, it is directed at multiple species of waterfowl that rely on areas that will be directly impacted (i.e. bottom-land hardwood forest and agricultural croplands). Many species of dabbling ducks rely on the same food resources within BLH forest and agricultural grain fields (e.g. soybean or corn). Therefore, the Mallard serves as a representative species in which to evaluate loss of foraging habitat as well as using the same criteria to determine suitable mitigation. Smaller ducks such as Blue-winged and Green-winged Teal are more likely to feed in shallower water (i.e. <12 inches depth); therefore, selection of the Mallard which often feeds at depths < 18 inches was selected to encompasses other dabbling duck species. The primary food type categories described in the DUD manual (Heitmeyer 2010) apply not only to Mallards but to many other ducks using BLH or agricultural habitats. An exception to this are waterfowl such as Gadwall or American Wigeon that also frequently feed on aquatic plants and seeds; however, habitats that include these food resources are not likely to be impacted by the MRL project. Ultimately, the objective is to assess the value of the habitat being lost as suitable foraging habitat to waterfowl, rather than being directed at various species of waterfowl. USACE believes that the current analysis sufficiently addresses waterfowl foraging habitat loss and required mitigation. USACE did not receive any objections from the review panel from the IEPR on the analysis including the use of the Mallard serving as a representative species of the habitat within the MAV. As described in the SEIS and shown in Table 5-3, compensatory mitigation would also provide significant waterfowl habitat and is expected to mitigate approximately 350 percent of waterfowl losses.

As detailed in the SEIS and Appendix 8, USACE looked at 35 species of migratory birds using the U.S. Fish and Wildlife Service's IPaC database, of which eight species were most likely to be impacted. These eight species are those that extensively use bottomland and floodplain forests during the breeding or wintering seasons, and whose ranges largely overlap the Work Item areas. The original 35 species included a wide range of taxa, in varying foraging and nesting guilds.

Additionally, while some models, such as the HEP, are derived from species-specific habitat requirements, the analyses represent the overall wildlife community as detailed in the SEIS II and accompanying appendices. For example, the four avian avian HSI models can represent multiple cavity-nesting passerines (Carolina Chickadee and Pileated Woodpecker HSI model), raptors (Barred Owl HSI model), and waterfowl (Wood Duck HSI model).

Construction sites for borrow pits and other work item features are not likely to impact permanent water sources that support populations of fish. Overbank flooding within the batture will enable fish presence for a portion of time within BLH forest, but many diving ducks do not frequent BLH to the same extent as dabbling ducks. Therefore, the importance of fish and aquatic plant species are less important for this analysis. It is important to note that while minimal credit is assigned for the creation of borrow pits associated with shallow fringe habitat (i.e. SHM-passively unmanaged and open water/aquatic habitat), values assigned for fish were not assessed for these areas. It is likely that borrow pits will provide benefit to multiple species of wildlife including certain species of waterfowl. A fact-sheet designed to promote creation of fish and wildlife habitat during construction of borrow areas has been produced by USACE.

y. Comment. Like the assessments of impacts to waterfowl and birds, the assessment of impacts to mammals is far too limited to meaningfully account for impacts to mammal species. While the Draft SEIS II does examine impacts to numerous species of bats, just two mammal species were considered in connection with the evaluation of impacts to terrestrial habitat (mink and fox squirrels). Draft SEIS II at 30. It is not clear whether mammal species were considered in connection with the assessment of impacts to wetlands.

   Response. See response to comment #15i.

z. Comment. Despite the importance of wetlands to amphibian and reptile populations, the Draft SEIS II does not assess the project's impacts to those species. Indeed, the Draft SEIS II does not mention amphibian species and references only one reptile species (the Alligator Snapping Turtle). It is critical that the SEIS II analyze impacts to amphibians and reptiles given the dire conditions of many of these species...The failure of the Draft SEIS II to evaluate impacts to amphibians and reptiles renders the Draft SEIS II inadequate.

Response. See response to comment #15i.

aa. Comment. The Draft SEIS II should fully analyze and account for this information and changed conditions that have significant implications for the long-term effectiveness of flood damage reduction measures and the long term health and viability of coastal and riverine wetlands and the fish and wildlife that rely on those resources.

Response. Cumulative impacts are described in Section 4.3 of the SEIS II.

bb. Comment. Many other significant cumulative impacts must be evaluated in the Draft SEIS II, including the cumulative impact of the vast numbers of Corps-built river training structures on increasing flood heights in portions of the Mississippi River.

Response. Cumulative impacts are described in Section 4.3 of the SEIS II.

cc. Comment. The Corps has established a timeline for finalizing the SEIS II that precludes a legitimate consideration of comments on the draft submitted by Federal and State agencies, Tribes, and members of the public. At the October 1, 2020 virtual public hearing on the draft SEIS II, the Corps announced that the final SEIS II would be released on or about October 30—just 13 working days after the close of the public comment period on October 13. It is not possible to consider public comments and make necessary changes to the draft SEIS II under this timeline.

NEPA requires a meaningful consideration of public comments that cannot be carried out under the Corps' accelerated timeline.

Response. See response to #15k.

dd. Comment. While the National Wildlife Federation appreciates the work that went into developing the conceptual mitigation plan provided in the Draft SEIS II, that conceptual plan does not—and cannot—comply with the mandatory mitigation requirements applicable to civil works projects. To satisfy these requirements, the SEIS II must include a "specific plan to mitigate fish and wildlife losses" that complies with the civil works mitigation requirements established through numerous Water Resources Development Acts and "the mitigation standards and policies established pursuant to the regulatory programs" administered by the Corps....The SEIS II must include a specific and detailed mitigation plan that satisfies the requirements outlined in this section.

Response. USACE has followed applicable laws and regulations. USACE has sufficiently documented that proposed compensatory mitigation is commensurate with unavoidable impacts and that adequate safeguards are in place to ensure mitigation success and that implementation of compensatory mitigation activities occurs concurrently with project construction.

ee. Comment. Despite the fact that the Draft SEIS II clearly triggers "mandatory" IEPR because it vastly exceeds the $200 million cost trigger for mandatory IEPR review, the National Wildlife Federation has been unable to locate any reference to an independent external peer review being carried out for the SEIS II. Such information should be readily available since as noted above, the Corps must notify the public about the parameters of the IEPR within 7 days of determining that an IEPR is needed and because the IEPR must be finalized within 60 days of the close of the public comment period on the Draft SEIS II.

Response. See response to Comment #15f.

18. Letter, Environmental Protection Agency, October 13, 2020.

a. Comment. Of the three alternatives presented, the USACE's preliminary analysis of identifying Alterative 3 (Avoid and Minimize) as the least environmentally damaging practicable alternative appears to be consistent with the guidelines. The Draft SEIS II analysis provides rationale for avoidance and minimization associated with the construction of project components.

Response. Comment acknowledged.

b. Comment. Section 5.5.1 states "[t]he preferred alternative would impact 655 acres of riverside forested wetlands and 351 acres of landside forested wetlands, primarily through borrow source acquisition and levee improvement features, resulting in a loss of wetlands function…. , respectively." Forested wetlands will be heavily impacted. Further, EPA believes the use of the Hydrogeomorphic (HGM) assessment was appropriate for the wetlands and is a reasonable estimate of the number of functional capacity units that would be lost as a result of Alternative 3. The USACE stated, and EPA is mindful that, wetland conditions in the project area reflect the historic alterations within the Mississippi River floodplain, including removal of dominant hardwood tree species, conversion of forested wetlands to agriculture, and disruption of natural flood regimes by established flood control projects. EPA recognizes that Alternative 3 decreases the impacts to wetland resources by shifting the location of some borrow areas and other features from forested areas adjacent to the levee to agricultural lands and other cover types, as compared to Alternative 2. EPA recommends the USACE continue to seek non-wetland borrow areas to further avoid impacts to wetlands at the project sites.

Response. Concur. USACE will continue to seek ways to avoid wetlands during detailed design of the Work Items to the extent practicable.

c. Comment. In order to improve the effectiveness and enforceability of the compensatory mitigation proposed, EPA provides the following recommendations:

Pages 142 & 143 of the main document mention potential compensatory mitigation siting adjacent to drainage ditches would be considered due to their residential populations of fish and fresh-water mussels.
EPA recommends that mitigation siting adjacent to ditches have direct or frequent connectivity to the Mississippi River and account for potential drainage of the restored wetland.

Response. USACE concurs with the benefits that direct or frequently connected ditches would have on mitigation tracts. Language added to the SEIS to acknowledge this. Any potential mitigation lands identified with these features would be prioritized in coordination with the interagency team. Connectivity details, including local hydrology and adaptive management opportunities, will be detailed in the tract specific plans conducted in coordination with the interagency team, as described in the SEIS II.

d. Comment. It is understood prior to construction on the proposed work items in the Draft SEIS II that agency coordination will be conducted on each individual work item and associated compensatory mitigation planning. This coordination is an important aspect of this project which EPA fully supports and plans to participate in as the project proceeds. EPA recommends that the Interagency Review Team model be used as the basis for the field team coordination.

   Response. USACE will coordinate with the interagency team throughout the life of the project. Coordination of tract-specific details with EPA, the state water quality agency, state wildlife agency, and USFWS is standard operating procedure in implementing mitigation for these Civil Works activities.

e. Comment. Section 5.5.2 states “since proposed mitigation benefits multiple resources, mitigation required to compensate for impacts pursuant to the Clean Water Act (CWA) also compensated for impacts associated with fish and wildlife resources.” In order to clarify where compensatory mitigation may be proposed for compliance with CWA 404(b)1 analysis and where compensatory mitigation may be proposed for compliance with other statutes (i.e., WRDA section 906 as amended for Fish and Wildlife habitat), EPA recommends the USACE articulate which aspects of wetland compensatory mitigation are proposed to meet which requirements.

   Response. The 404b1 was updated to describe wetland impacts and associated assumptions consistent with the wetland assessment. It should be pointed out that the HGM model has a function directly linked to "Provide fish and wildlife habitat". Additionally, Table 5-3, Summary of compensatory mitigation techniques, in the SEIS II shows the benefits of the proposed compensatory mitigation for each of the resources according to the ecological models (i.e., wetlands, terrestrial wildlife, waterfowl, and aquatic resources) by each state and district. The "Net Effects" from Table 5-3 was updated to show the impacted AAHU/FCUs to help the reader track how these impacts are offset (and where compensation exceeds the impacts).

Additional language was also added to the description of the preferred alternative (see Section 2.4) to clarify that wetland mitigation is the limiting resource that drives the compensatory mitigation numbers, as follows: "The proposed compensatory mitigation plan includes active reforestation of agricultural lands within three hydrologic zones: Mitigation Zone 1) in the batture area (i.e., lands between the river and the levee); Mitigation Zone 2) frequently flooded areas, or those with a hydrologic connection to the Mississippi River landside of the MRL; and Mitigation Zone 3) low lying flooded areas landside of the MRL whose hydrologic conditions are dictated by precipitation and landscape position. Restoring wetland vegetation within these three zones would mitigate 100 percent of the wetland losses and greater than 100 percent of the waterfowl and terrestrial habitat/wildlife losses. The project results in benefits to aquatic resources; thus, compensatory mitigation was not required."

This is further detailed in the Mitigation Appendix 20, Section A20-1.2.5, stating that "restoring wetland vegetation, as proposed, would mitigate 100 percent of the wetland losses but approximately 350 percent of the waterfowl losses and approximately 150 percent of the terrestrial habitat/wildlife losses."

f. Comment. Objectives. Section 5.5.2 states "since proposed mitigation benefits multiple resources, mitigation required to compensate for impacts pursuant to the Clean Water Act (CWA) also compensated for impacts associated with fish and wildlife resources." In order to clarify where compensatory mitigation may be proposed for compliance with CWA 404(b)1 analysis and where compensatory mitigation may be proposed for compliance with other statutes (i.e., WRDA section 906 as amended for Fish and Wildlife habitat), EPA recommends the USACE articulate which aspects of wetland compensatory mitigation are proposed to meet which requirements.

Response. See response to Comment #18e.

g. Comment. Site Selection. The USACE states that the information presented in Section 5.0 of the Draft SEIS II represents a compensatory mitigation plan according to the requirements of the Rule. However, the Rule assumes that a mitigation project site has been chosen to which the requirements of the Rule apply. This is not the case in this Draft SEIS II as specified on page 138 of the Main Report, which states "specific mitigation tracts have not been identified. Once tracts are selected and acquired, decisions on the implementation of mitigation measures would be made based upon tract-specific parameters such as soil conditions, anticipated hydrology, elevation, etc." In order to ensure the mitigation considered is effective and enforceable, EPA recommends that the Final SEIS II identify when the specific mitigation tracts (especially the alternative borrow areas) would be identified in relation to the proposed start of construction, how the compensatory mitigation analysis would be updated to ensure the mitigation adequately compensates for the unavoidable impacts to waters of the U.S., and what coordination would occur with EPA and other resource agencies on any updates to the mitigation plan.

EPA further recommends that key considerations that need to be updated post record of decision be included in the Final SEIS II, including, but not limited to the following mitigation site characteristics:
• Hydrologic conditions;
• Soil conditions;
• Existing vegetation conditions;
• Reference sites by wetland type;
• Verification of assumptions regarding mitigation site connectivity indicating mitigation sites will be large in size and well connected to other habitats (e.g., HGM variables Vtract, Vcore, Vconnect)

Response. These Work Items will be constructed incrementally as annual Congressional appropriations allow. Potential borrow areas were identified as part of this SEIS, and after funding is received from Congress then detailed designs commence to include detailed geotechnical investigations and other pertinent siting information to determine suitability. Detailed design usually takes approximately 18 months during which results of the detailed design are compared to what was proposed in the SEIS. Updated environmental compliance, associated agency coordination, and any potential tiered NEPA documents (if needed) occurs, as described in the SEIS. In regards to mitigation, priority would be given to large tracts accounting for multiple Work Items (as well as prioritizing tracts adjacent to forested areas) as these areas are more ecologically beneficial than small or isolated tracts and more efficient to administer and manage, as described in the SEIS and consistent with recommendations in the Fish and Wildlife Coordination Act Report (Appendix 2).

The information below describes how USACE considered these key considerations for this SEIS. As stated in Section 5.6.2, prior to acquisition of any tract for mitigation "hydrological conditions, elevation, soil characteristics, habitat connectivity, compatibility with adjacent land uses, geomorphic setting, adjacent drainage patterns, and proximity and relation to other desirable tracts" are all preliminary information to be gathered and used to determine the tract's suitability and would influence the specific species of vegetation to be planted. Coordination with the interagency team would occur post record of decision with all tract-specific plans, as described in the SEIS.

• hydrologic conditions - The proposed mitigation plan highlights the need to select mitigation areas with appropriate hydropatterns in order to offset impacts to wetland resources. Additionally, mitigation lands will be evaluated using the HGM assessment to ensure that they are within the appropriate wetland functional subclass which are defined by their hydrodynamics as well as other characteristics. This approach will ensure that mitigation sites will compensate for the specific wetland functional impacts identified during the wetland assessment. The proposed monitoring and adaptive management plan will also provide data, which will be made available to EPA in the form of technical reports, demonstrating that the target hydrologic conditions have been achieved. If the monitoring data reports that the required hydrologic conditions have not been achieved adaptive management will be initiated to correct wetland functional shortfalls. Failure to achieve the anticipated results may require the acquisition of additional mitigation areas.

• Soil conditions - All mitigation lands will be developed on hydric soils as specified in the wetland appendix. Hydric soils are abundant in the study area and many marginal agricultural lands are located on hydric soils that display the capacity to maintain high water tables and support hydrophytic vegetation following the cessation of agricultural activities and implementation of the mitigation plan.

• Existing vegetation conditions - Mitigation activities will occur on agricultural lands, where appropriate hydrophytic tree species will be established following a detailed planting plan. Species selection will be determined base on landscape position, soil type, and other factors and will follow established recommendations for wetland reforestation, including guidance derived from the HGM functional assessments applicable to the region.

• Reference sites by wetland type - The HGM methodology is based upon the assessment of conditions at reference standard locations, representing the highest possible level of wetland function within the assessment domain. As a result, the concept of reference locations is explicitly accounted for in the assessment of both potential impact areas and mitigation locations. Since the mitigation areas will be selected, developed, monitored and managed to maximize the wetland functional capacity, they will adhere to the reference standard concept.

• Verification of assumptions regarding mitigation site connectivity indicating mitigation sites will be large in size and well connected to other habitats (e.g., HGM variables Vtract, Vcore, Vconnect) - The HGM variables noted here will be considered during the siting of compensatory mitigation tracts. Functional shortfalls resulting from deficiencies in these variable subindex scores or mitigation areas that fail to perform as intended based on monitoring data will need to be improved through adaptive management. If the functional shortfall cannot be remedied, the development of additional mitigation lands would be required to obtain the required functional capacity units/habitat suitability units.

h. Comment. Mitigation Site Plans. With respect to mitigation site plans, EPA recommends that key considerations that need to be updated post record of decision be included in the Final SEIS II, including, but not limited to:
• Landscape position of the site;
• Surrounding land use;
• Design mitigation site plans to specific site hydro-pattern;
• Baseline hydrologic monitoring;
• Site soil mapping/verification on each site;
• Delineation of geographic boundaries of the project;
• Construction methods, timing, and sequence;
• Source(s) of water, including connections to existing waters and uplands;
• Methods for establishing the desired plant community;
• Plans to control invasive plant species;
• Proposed grading plan, including elevations and slopes of the substrate as well as microtopographic relief;
• Soil management and amendments as needed; and
• Erosion control measures

Response. Section 5.6.6 of the SEIS II was updated to include all these key considerations.

i. Comment. Performance Standards. In addition to parameters discussed in the Main Report and ecological model variables, EPA recommends that key considerations that need to be updated post record of decision be included in the Final SEIS II, but are not limited to:
• Identification of suitable reference sites against which to compare compensatory mitigation sites
• Vegetation (e.g., species composition, density, growth, cover)
• Soils (e.g. type, bulk density, organic matter content)
• Site specific hydrology (e.g., frequency, duration, timing or each water source)
• Invasive species control (coverage does not exceed 10% of site)
• Monitoring of the mitigation sites should be compared to suitable reference sites

Response. The information below describes how USACE considered these key considerations for this SEIS. Coordination with the interagency team would occur post record of decision with all tract-specific plans, as described in the SEIS.
• Identification of suitable reference sites against which to compare compensatory mitigation sites - The HGM methodology is based upon the assessment of conditions at reference standard locations, representing the highest possible level of wetland function within the assessment domain. As a result, the concept of reference locations is explicitly accounted for in the assessment of both potential impact areas and mitigation locations. Since the mitigation areas will be selected, developed, monitored and managed to maximize the wetland functional capacity, they will adhere to the reference standard concept.

• Vegetation (e.g., species composition, density, growth, cover) - Specific performance standards related to each of these parameters are addressed in the HGM methodology and therefore will be documented during implementation of the monitoring and adaptive management plan. For example, mitigation sites will be planted with appropriate hydrophytic species at predetermined densities based on the guidance in the HGM guidebook and the growth and cover provided by those species will be tracked over time to determine if the mitigation sites are performing as intended. If functional shortfalls are encountered they will be addressed using adaptive management or through the development of additional mitigation areas.

• Soils (e.g. type, bulk density, organic matter content) - Mitigation lands will be selected based upon the presence of hydric soils, ensuring that the substrates are appropriate and have the capacity to support the wetland hydrology and hydrophytic vegetation. The assessment approach accounts for soil factors using the variable Vsoil, and previous studies have identified increases in soil carbon along with decreases in bulk density as mitigation sites mature. Since the HGM method accounts for these factors, no independent performance standard for these soil variables have been included in the monitoring and adaptive management plan.

• Site specific hydrology (e.g., frequency, duration, timing or each water source) - The mitigation areas will be selected based upon their HGM wetland subclass to ensure that they receive the appropriate hydropattern. All mitigation areas will need to comply with the technical standard for wetland hydrology and will be monitored to ensure that they display appropriate site characteristics (microdepressional ponding) and indicators of wetland hydrology. These represent the performance standards for wetland hydrology.

• Invasive species control (coverage does not exceed 10% of site) - The presence of invasive species is incorporated into the HGM monitoring protocol, as a result the presence of invasive species will be documented and quantified. The presence of invasive species decreases wetland functional capacity scores and therefore the assessment approach includes performance standards in the evaluation of species composition. If the presence of invasive species results in a functional shortfall, adaptive management will be implemented to improve species composition.

j. Comment. EPA defers to the USFWS for a determination of compliance with Section 230.10(b) impacts to Threatened or Endangered Species. However, we offer the following comments for consideration.

• Regarding the federally endangered gray bat, the main document and Appendix 9 mention "[t]here are no caves within any of the proposed Work Item footprints." As cave surveys have not been conducted within the entirety of the proposed work items, EPA suggests this language be modified to state, "There are no known caves within any of the proposed Work Item footprints." Cape Girardeau is known to have karst limestone, and Missouri has the second highest number of caves in the U.S. We suggest that a habitat management plan that addresses gray bats be provided in the Final SEIS II or prior to construction. We suggest further gray bat coordination with USFWS for Cape Girardeau area work items.

Response. During field investigations for the draft SEIS II, no caves (or karst topography) were observed at any Work Item location. The Work Item located in Cape Girardeau County is immediately adjacent to the Headwater Diversion Channel with alluvial soils. Any potential borrow areas would undergo soil borings and geotechnical investigations during detailed designs. Subsequent ESA coordination with the USFWS will be conducted during detailed design, as outlined in the SEIS II.

k. Comment. Though bald cypress has been historically logged out of the Mississippi River Alluvial Valley, forested wetland restoration planning should include a cypress-tupelo component. We recommend that the Final SEIS II distinguish between cypress-tupelo and oak dominated bottomland hardwood (BLH) impacts or restoration.

Response. Cypress-Tupelo dominant communities were not observed at any Work Item location for the SEIS II. Some cypress were identified in three wetland assessment areas near potential work item locations (approximate river miles 223, 293, 762) but it was not a dominant tree at those locations based upon application of the 50/20 rule. It was also identified near Davis Island and Eagle Lake MS as part of early data collection efforts, but no levee work items are located in those areas. No tupelo was identified during the field assessments. USACE acknowledges the significance of the historical removal of Cypress-Tupelo within the MAV, and inclusion of these species for compensatory mitigation is consistent with the SEIS II, particularly at heavily inundated locations. As stated in Section 5.2.1 of the SEIS "...these sites would exhibit hydric soils and would be planted with a mixture of hydrophytic saplings associated with high wetland habitat values described in Smith and Klimas (2002)."

l. Comment. EPA recommends updating Appendix 01: Levee item B0208 riverside borrow area appears to include BLH impacts. Please revise the wetland impact table and corresponding compensatory mitigation or shift the area to avoid BLH.

Response. Impacts to BLH are included in the impact assessment (reference Figure 10.1.1 in Appendix 10 (pages 49-50). The description in Appendix 01 was re-worded to more accurately describe the area as "mostly" cultivated.

m. Comment. EPA recommends updating Appendix 01: Map 4 of 64 partially cuts off 22-R work items near RM5. Please update the map to include a complete view of work items near RM5.

Response. Appendix 1 - Map 4 of 64 was re-centered to show complete view.

n. Comment. EPA recommends updating Appendix 03: Table 2 shows 65.02 acres of forested wetland will be impacted in Missouri, but Table 5-2 in the Main Report indicates 74.4 acres of forested wetland impacts in Missouri. This discrepancy in forested wetland acreage impacted needs to be addressed either through explanation or by ensuring the tables are consistent.

Response. See response to Comment #18e. The 404b1 evaluation was updated to better describe acreages and associated assumptions related to the wetland assessment.

o. Comment. EPA recommends updating Table 5.3, "Summary of Compensatory Techniques" may need to be modified to include a simple chart listing impacts by acreage and type and mitigation by acreage and type, including mitigation ratios by habitat type. This change would help decision makers and the public to better understand the totality of the potential impacts, if the project is built.

Response. As stated in Section 5.6.1, although mitigation ratios are commonly used for USACE-permitted activities, a more rigorous function- and habitat-based assessment was used to determine what and how much mitigation would be appropriate in this case. Each ecological model used in this case underwent independent review; all were determined to be suitable.

Table 5-2 (see caption #1) and Table 5-3 (see caption #2) were revised/added to better clarify how impact acreages differ across the resource assessments. The associated appendices detail the acreages and associated assumptions relevant to each model. An addendum to this Comment/Response Section was added to consolidate acreage assumptions and associated functional outputs, including the various assumptions used, for clarity. Table S-1 of the Final SEIS was also updated to include impacted acreages.

Descriptions of the acreages of potential impacts and associated assumptions, mitigation requirements, and mitigation ratios specific to wetlands are described in Appendix 10.

p. Comment. The proposed project has the potential to impact communities, including those that are low-income along and within proximity to the river. If acquisition of land is required, EPA recommends that USACE provide equitable compensation and mitigation.

Response. Comment acknowledged. Equitable compensation, mitigation, and associated coordination will be included, where applicable, during detailed design, in accordance with law and policy.

q. Comment. EPA also recommends that USACE develop and incorporate a contingency plan within the Final SEIS II in case of events, such as levee failure, occur during levee construction.

Response. Construction season is typically performed outside of high water stages. Maintaining the level of protection throughout construction is standard operating procedure, and USACE requires inspectors at all construction sites to ensure compliance.

19. E-mail, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, October 14, 2020.

a. Comment. The NMFS Habitat Conservation Division (HCD) has reviewed the Mississippi River Mainline Levee (MRL) Supplemental Environmental Impact Statement (SEIS II), and does not object to the implementation of the project as proposed.

Response. Comment acknowledged.

20. Letter, U.S. Fish and Wildlife Service, October 16, 2020.

a. Comment. Page 19, Avoid and Minimize. To help minimize impacts to migratory birds and bats, forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds and breeding bats, when practicable. State specific time frames should be obtained from the local Service office and state conservation agency.

Response. Comment acknowledged. The potential for fall and winter tree clearing at all locations is not always practicable because of wet weather conditions, high river stages, and shortened construction seasons; however, as described in the SEIS coordination with the USFWS will be conducted during detailed design to determine practicability. These details are particularly relevant to those future Section 7 consultations with listed bat species, as described in the SEIS.

b. Comment. Page 85, last paragraph. Correct application of the mink model results in a decrease in bottomland hardwood mitigation because of the increase in value of borrow sites due to the creation of surface water. However, the mink model has previously been modified by USACE to reflect the differing value of surface water areas for channelized water bodies. Future use of the mink HEP model for

any impact/mitigation analysis should be predicated on the having the model incorporate aquatic productivity of the adjacent water bodies (e.g., borrow areas) into the model thus reflecting the true value of such areas to the species.
In addition, since the proposed borrow areas value are reducing mitigation of bottomland hardwoods and there is no long-term protection or management requirements of these borrow areas a landowner could fill in the borrow areas or modify them and reduce their value according to the mink model. Therefore, the Service recommends that additional monitoring be included to determine if these borrow areas are still present and functioning as described over the life of the project. If there is a loss of borrow areas then additional mitigation could be incorporated into the project to ensure there is no net loss of functions and values.

Response. Future use of the mink model will use the modified values of the refined mink model based off of the amount of disturbance (Devendorf and Yeager 2013).

As described in the SEIS II and detailed in Table 5-3, wetlands are the limiting resource driving mitigation numbers. The overall compensatory mitigation acreages are not reduced based off of the value of borrow area to mink. Additional information was added to Tables 5-2 (note caption #2) and 5-3 (note caption #1) to show the impacts and benefits under 2 scenarios: 1) proposed borrow areas providing habitat value to mink and 2) proposed borrow areas providing no value to mink. Appendix 6, Table A6-10a also details the impacts and benefits to mink under these 2 scenarios. As detailed in Table 5-3 (see caption #1), due to the hydrology needed for wetland impacts within Mitigation Zones 1 and 2, full compensation is expected even if the borrow areas do not provide any (or some -as would be the case with the refined mink model) value.

The refined mink model referenced in Appendix 2- Draft FWCA report (Devendorf and Yeager 2013) would allow for a disturbance factor (i.e., heavy, moderate, or none) to be assigned to the proposed borrow areas (or other applicable water bodies) to show varying levels of benefits to mink that could result from the creation of borrow areas or water bodies present on the landscape. While mink is not likely to drive mitigation acreages this refined model can be used during monitoring and adaptive management reporting to track these values in coordination with your agency to ensure our assumptions are met and additional mitigation is not needed. To date, USACE has not observed evidence of landowners filling in borrow areas prior to them naturalizing and becoming jurisdictional under Section 404 of the Clean Water Act. As detailed in the aquatic analyses in Appendix 11, long term changes in borrow areas have shown that the mean shoreline length and Shoreline Development Index increased 38 percent and 39 percent, respectively. Number of days flooded annually increased during this same time period. Multivariate comparison of the morphological, bathymetric, and water quality variables over the 38-year period indicate that the shorelines of most borrow areas become more sinuous over time, which would not indicate a loss of habitat value to mink.

c. Comment. Page 141, fourth bullet, tree planting. While seeding and natural regeneration are potential reforestation techniques, based on the Service's experience the most reliable means of re-establishing bottomland hardwoods and achieving planting success criteria is by planting of bare root seedlings that meet local National Resource Conservation Services specifications. The Service recommends against the use of seeding as a reforestation technique for mitigation areas. In addition to using seedlings, the Service also finds acceptable the planting of RPM trees when needed to establish hard mast tree species. Some natural regeneration may be acceptable but should be very limited because that technique is unlikely to recruit sufficient mast producing species to achieve mitigation success. Use of natural recruitment should be coordinated with the Service and the local state natural resource agency prior to planning the use of this method.

   Response. Concur. Section was revised to state planting of bare root seedlings is standard practice and clarify limited use of natural regeneration.

d. Comment. Page 141 - Herbaceous wetland plantings should include species that are beneficial to native pollinators including the monarch butterfly.

   Response. Additional verbiage was added to indicate the potential for species beneficial to native pollinators. Any potential herbaceous wetland plantings would be coordinated with the interagency team during tract-specific planting.

e. Comment. Page 143, bullets 1 through 4. In locating lands within each of the mitigation zones the Service recommends implementation of the following sub-hierarchy to further achieve conservation:
   a. areas that provide benefits to species listed as threatened or endangered under the ESA or areas that protect or are within their designated critical habitat,
   b. areas that provide benefits to at-risk species or Birds of Conservation Concern (https://www.lmvjv.org/conservation-tools-summary), and
   c. lands adjoining or in close proximity to lands held for conservation, especially public lands. In addition, when feasible, mitigation located in zones 2 through 4 should also be located in areas that would preserve or restore off channel flood storage areas thus providing additional flood risk reduction benefits in line with Engineering with Nature concepts as well as providing habitat for fish and wildlife.

   Response. As described in the SEIS, mitigation lands will target willing sellers in coordination with the interagency team to ensure any tract is acceptable. USACE concurs with the conservation value of these areas and welcomes any assistance in the identification of willing sellers with suitable mitigation lands.

Acknowledgement of the conservation value of these lands was added to Section 5.3.

f. Comment. Page 145, Mitigation Bank Credits. Purchase of credits from mitigation banks should follow the same hierarchy presented in the DEIS as well as the Service's above sub-hierarchy. If credits are purchased from a mitigation bank an assessment of the banks credits would need to be undertaken using the same technique used to determine impacts. A review of that assessment should be undertaken by the local Service office and the State natural resource agencies prior to its finalization.

   Response. Concur. Coordination with the interagency team would be conducted prior to use of mitigation banks.

g. Comment. Page 151, Mitigation Zone 3. If mitigation is done in Zone 3 there will be a net loss of Duck Use Days (DUDs). It this situation occurs USACE should coordinate with the Service and state natural resource agencies to determine if additional mitigation for these resource losses are justified.

   Response. Waterfowl benefits are assumed in Zones 1 and 2 to offset impacts, as shown in Table 5-3. USACE is not proposing all mitigation to be conducted in Zone 3. Coordination with the USFWS would continue during identification of tract-specific details and monitoring of mitigation lands as described in the SEIS.

h. Comment. Page 153, Site Protection Instrument. If mitigation lands are purchased for inclusion within a publicly managed area those lands may need to meet certain requirements; the proposed land managing agency should be contacted prior to purchase of such lands to ensure those requirements are met. Funding for management and oversight should be provided on an annual basis to the agency managing mitigation lands.

   Response. Verbiage was added to Section 5.6.3, Site Protection Instrument, to include considerations for lands that could be turned over to another public land managing agency. Funding for management of mitigation lands is dependent on annual appropriations.

i. Comment. Page 153, second to last paragraph. This paragraph indicates that USACE mitigation lands are intended to be placed in a perpetual conservation status. Service mitigation policy specifies that mitigation should remain as long as the impacts occur on the landscape. Therefore, the Service recommends that word intends be replaced with planned.

   Response. Concur. Replaced intended with planned.

j. Comment. Page 154, Credit Determination Methodology. This section should indicate that the Service and the state natural resource agencies will be involved in the determination of credits.

   Response. Concur. Coordination with the interagency team was added to this section.

k. Comment. Page 154, Mitigation Work Plan. Under Sec 7(a)1 of the ESA the Service recommends that mitigation areas should also include, to the extent feasible, management to provide habitat for listed bats. Management actions should be continually updated in coordination with the Service and other natural resource agencies as habitat needs become better understood.

   Response. While the goal is for mitigation to be self-sustaining, tract specific mitigation plans developed with the interagency team, such as tree species with exfoliating bark, and adaptive management activities such as tree girdling in overly dense areas can be included and is consistent with Section 7(a)1, as described.

l. Comment. Page 155, third to last paragraph, second sentence. This sentence should reflect that the 5 year monitoring intervals during the 0 – 20 year period would only start after attainment of initial and intermediate success criteria.

   Response. The SEIS II was revised to clarify that these intervals are based off of the initial planting/site establishment.

   The monitoring intervals referenced here coincide with the initial plantings/site establishment in order to support adaptive management. Trees are typically establishing root growth for the first few years, and the models are not typically sensitive enough to document changes at more frequent intervals. As described in the next paragraph, these intervals have proven effective for identifying shifts in wetland functional capacity and habitat over multiple time intervals including short- (e.g., 0-5 year), mid- (e.g., 5-10 year) and long (e.g., >20 year) and implementation of a multi-year WVA/HGM assessment protocol will document functional capacity changes over the period of analysis (Berkowitz 2019). If mitigation lands are not attaining the required functional responses at the end of the period of analysis, monitoring and adaptive management would be extended accordingly.

   As referenced later, monitoring would occur a minimum of 3 times within the first 10 years. Monitoring details specific to each tract will be coordinated with the interagency team to ensure those tract-specific mechanisms are in place to support initial and intermediate success. USACE acknowledges that early monitoring may occur during the 0-5 year timeframe, but the models may not be sensitive to changes at these earlier monitoring events. Remedial activities may or may not be warranted based off of these early monitoring events, as described in response to Comment #20(o).

m. Comment. Page 155, Ecological Performance Standards. The Service recommends that details of Ecological Performance Standards be developed in coordination with the Service and state natural resource agencies.

   Response. Concur. Language added to Section 5.6.8, Ecological Performance Standards, stating this is done in coordination with the interagency team.

n. Comment. Page 156, Vegetation. Because hardmast seeds are typically not easily dispersed the Service recommends that percent survivor of planted seedlings by soft and hardmast be determined during monitoring events during the first 10 years to ensure adequate hardmast is recruited into mitigation areas and that a variety of soft mast species are also recruited. This is especially important in areas where those species are part of the impact assessment and mitigation analysis.

   Response. Concur. Percent composition and success of planted vegetation is included with each monitoring event and will be coordinated with the interagency team. This information is critical in determining ecological outputs at each tract and support adaptive management decisions.

o. Comment. Page 157, Phase 1, Adaptive Management Report. Based on previous experience, the Service recommends that the monitoring reports for each event determine if implementation of mitigation is progressing successfully or if changes are required to ensure success. Waiting 5 years post planting to determine the need for remedial action may result in greater efforts and potentially greater costs to achieve success, in addition to a longer time period to achieve mitigation. Failure to achieve initial success early in the mitigation phase may result in the need to modify mitigation plans (e.g., expansion of mitigation areas, purchase of credits, etc.) to ensure no net loss is achieved.

   Response. See response to Comment #107. Each monitoring event will be coordinated with the interagency team to determine success of those tracts. Some remedial activities could very well be warranted within the first 5 years (e.g., invasive species issues, obvious failures, etc.), while the interagency team may decide other situations (e.g., some herbivory, unusual flood events, etc.) may not warrant decisions on remedial activities until after 5 years and trees have established root growth, etc. Adaptive Management monitoring will determine whether observed responses match expected ecological success outcomes and validate uncertainties such as temporal gains and losses.

p. Comment. Page 157, Scenario B, Partial Success. The Service acknowledges that some resources or functions may be over compensated in comparison to others; nonetheless, if a resource or function has not attained success, the overall success may not be achieved because of the influence of that variable on the overall success. Therefore, remedial action to achieve success for that resource or function should be implemented or an equivalent amount of mitigation credits should be purchased or implemented to offset the non-attainment.

   Similarly, use of mitigation tracts that have achieved anticipated or greater levels of functions and values to offset tracts that are not in attainment could result in a net loss in functions and values if the functions and values at either or both areas do not continue to obtain their anticipated levels of functions and values. Therefore, the Service recommends that USACE prior to deciding to exchange resources or functions as a means of attaining overall success first consult with the Service and state natural resource agencies to ensure no net loss of resources or functions occurs.

   Response. Concur. All phases of monitoring and adaptive management will be coordinated with the interagency team. As stated in the last sentence: "Results would be furnished to the interagency team prior to making any adaptive management decision."

q. Comment. Appendix 2 and 6: Given the Mink model should be refined it may be appropriate to re-evaluate the benefit or value of borrow pits during post project monitoring and evaluation to determine if additional mitigation may be recommended for impacts to bottomland hardwood habitats.

   Response. Concur. See response to Comment #20b.

r. Comment. Appendix 9: Page 7 - The chronology of typical reproductive activities of bald eagles varies in parts of the United States (US). The information provided is for the southeast region; the upper portions of the MRL probably fall more in line with the dates for the northern US. The bald eagle management guidelines should be referenced for better chronology

   Response. Concur. Revised Appendix 9 to state northern reaches likely extend later and referenced Bald Eagle Management Guidelines.

21. Facebook Live, David Stokes, Virtual Public Meeting, September 30, 2020.

   a. Comment. Please briefly describe some of the projects proposed for the Bootheel of Missouri. Thank you. If you would prefer to e-mail me that information, please send to dstokes@grha.org.

      Response. E-mailed October 15, 2020. These projects are described in paragraph form in Appendix 1 (they are numbered 14 through 22), and their titles are also listed below. There are associated maps accompanying these descriptions in

Appendix 1 oriented from upstream to downstream that are referenced with the Work Item #s (e.g., Item 49-R, etc.).

Nash, MO Slope Flattening (11/12+00 to 12/0+00), Item 49-R AC.
Commerce to Birds Point (15/0+00 to 17/49+00), Item 29-R AC.
Commerce to Birds Point (17/49+00 to 32/0+00), Item 22-R AC.
Birds Point – New Madrid Setback (0/0+00 to 12/32+00), Item 947-R.
Birds Point – New Madrid Frontline Levee (43/21+00 to 87/0+00), Item 920-R.
Birds Point – New Madrid Setback (12/32+00 to 36/0+00), Item 915-R.
Farrenburg Levee, MO Slope Flattening (1/50+00 to 2/21+00), Item 889-R.
New Madrid, MO to MO-AR Levee (5/0+00N to 0/0+00), Item 882-R.
New Madrid, MO to MO-AR Levee (2/0+00S to 2/30+00S), Item 877-R.

22. Facebook Live, Christine Adler, Virtual Public Meeting - September 30, 2020.

a. Comment. What portion of the 1976 EIS has not become outdated (the portion being used to support decisions for this project). Why wasn't a completely new EIS prepared?

Response. The 1976 EIS addressed environmental effects associated the with the Mississippi River Levees and Channel Improvement features of the MR&T Project. Channel Improvement features were not addressed in the 1998 SEIS or in the SEIS II because no significant changes were/are proposed for those features. The SEIS II evaluates proposed work items that would ensure the MRL continues to provide flood risk reduction to meet the Project Design Flood as discussed in Sections 1.3, 1.4, and 2.1. These proposed work items were not studied in the 1976 EIS or the 1998 SEIS. While the SEIS II builds on the earlier NEPA documents in terms of its discussion of the MR&T and MRL projects, it does not rely on those earlier documents for its impacts analyses for the new proposed work items. NEPA regulations encourage reference to and incorporation of discussion and analyses in existing NEPA documents.

23. Facebook Live, Janet McConnaughey, Virtual Public Meeting - September 30, 2020.

a. Comment. Will answers after the presentation be available to everyone?

Response. Response from Public Meeting September 30, 2020: The Virtual Public Meeting Recording will stay on USACE Facebook Page and will also be on YouTube.

24. Facebook Live, Ward Campbell, Virtual Public Meeting - September 30, 2020.

a. Comment. What coronavirus safety standards will be observed by your employees when they report to work?

Response. Response from Virtual Public Meeting September 30, 2020 hosted from USACE – New Orleans District: I cannot speak on behalf of the Memphis or the Vicksburg District, but I can speak on behalf of the New Orleans District. We have multiple options that we are looking at, and multiple means. One is we will maintain the six feet distance, or we have a masking policy, while you're in the building, you also to come into the New Orleans District site, you must go through a temperature check as well. As we move forward and through it, our driver and our guidelines will be the federal and the state as well as the local, for the location of your headquarters, so that for us is the federal guidelines, the state of Louisiana, the governor's guidelines, as well as the City of New Orleans, and so that's what we will be looking at.

So what that means in a daily life is we will have reduced capacity within the building, we're going to stay within the government's, or the governor's requirements for capacity within a room. Such as if you were looking at the gym or the cafeteria there will be a reduced capacity to do so as well. We're also maintaining a very healthy telework policy as we move forward for that element as well, so what we do not want to do is have people who are high risk or they have extenuating circumstances, such as having to take care of their children or, or be at home while their children are virtually going to school, so we'll maintain that our policy is as flexible as possible for as long as possible. However, with regards to the public side of our efforts, we will be maintaining a more virtual environment. I know that New Orleans District, as a general rule, we are one of the more frequent public meeting sites, or locations but for the foreseeable future, we are going to be running more and more virtual meetings, as we move through. So I hope that does answer your question as what we will be doing. We do have sanitation policies in place as well, so we are really leading to adhering to all of our state local and federal guidelines to ensure that when you do return into the building, you're returning to a safe and clean environment.

25. Facebook Live, Mike Irwin, Virtual Public Meeting - September 30, 2020.

   a. Comment. Have there been any considerations, such as increased mitigation ratios, for temporal resource loss due to long-standing MRL compensatory mitigation deficits?

   Response. Response from Public Meeting September 30, 2020: Construction and operation and maintenance of work items and the associated acquisition of mitigation lands continue for activities described in the 1998 SEIS. As congressional funding is received, the construction of the remaining work will be accomplished based on risk and form prioritization. To date, USACE has undertaken reforestation efforts on 5,672 acres, or approximately 86 percent of the total required mitigation acreage that are under various stages of restoration.

26. Facebook Live, Alisha Renfro, Virtual Public Meeting - September 30, 2020.

   a. Comment. Was sea level rise as outlined in the Army Corps Engineering pamphlet EP 1100-2-1 considered?

      Response. Please see Section 1.4 of the SEIS II and response to Comment #14d for more information. A flowline assessment was conducted following the 2011 flood which evaluated the sensitivity of sea level rise through simulation as provided in ER 1100-2-8162. The assessment demonstrated that the maximum expected influence of sea level rise would range from approximately 0.1 feet in Baton Rouge to 1.1 feet in Venice.

27. Facebook Live, Christie Adler, Virtual Public Meeting - September 30, 2020.

   a. Comment. Please add mitigation measures to keep bike lanes open or rerouted safely during construction - the Mississippi River Trail is a national bike corridor. Thanks for all the great work keeping us dry!

      Response. USACE will minimize closures where practicable. Appropriate signage and associated safety measures will be incorporated during construction.

28. Facebook Live, Alisha Renfro, Virtual Public Meeting - September 30, 2020.

   a. Comment. Why is the focus only on levee construction and improvement? This MRL SEIS II provides an opportunity to develop meaningful, long-term flood damage reduction solutions for the Mississippi River communities that actually address the underlying causes of increased flood risk and also help restore the river's hydrologic processes, including connection to floodplain and delta wetlands to minimize future flood risks.

      Response. The scope of this effort is not a reformulation of the entire MR&T Project. The MR&T continues to successfully pass floods and provide flood-risk reduction to the 7 states bordering the Mississippi River. The purpose and need of this effort is to ensure reliability and resiliency of the system, as described in the notice of intent, included in Appendix 21 of the SEIS.

29. E-mail, Peter Nimrod, Virtual Public Meeting - September 30, 2020.

   a. Comment. I notice that you have specifically located potential borrow areas for Levee enlargement items. Some borrow areas are identified as currently being open farm land. What happens if that farm land is converted to trees through the WRP program - will this SEIS II be flexible enough for you to go to another Borrow site located outside the SEIS identified area?

      Response. During detailed design, USACE will have flexibility to avoid impacts to WRP if practicable.

30. Google Voice, Kevin White – Levee District #3, Virtual Public Meeting - September 30, 2020.

    a. Comment. Yes, this is Kevin White with Levee District Number three in Wyatt, Missouri, and I was watching this virtual video meeting and a gentleman had made a comment about if you would send a copy of some of the proposed projects for the Boot hill, Missouri, and I saw that and I was kind of interested myself if you could send me maybe the same info. The email address is Sandra@leveedist3.com. I appreciate it. Thank you. Bye.

       Response. E-mailed response: These projects are described in paragraph form in Appendix 1 (they are numbered 14 through 22), and their titles are also listed below. There are associated maps accompanying these descriptions in Appendix 1 oriented from upstream to downstream that are referenced with the Work Item #s (e.g., Item 49-R, etc.).

       Nash, MO Slope Flattening (11/12+00 to 12/0+00), Item 49-R AC.
       Commerce to Birds Point (15/0+00 to 17/49+00), Item 29-R AC.
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       Birds Point – New Madrid Frontline Levee (43/21+00 to 87/0+00), Item 920-R.
       Birds Point – New Madrid Setback (12/32+00 to 36/0+00), Item 915-R.
       Farrenburg Levee, MO Slope Flattening (1/50+00 to 2/21+00), Item 889-R.
       New Madrid, MO to MO-AR Levee (5/0+00N to 0/0+00), Item 882-R.
       New Madrid, MO to MO-AR Levee (2/0+00S to 2/30+00S), Item 877-R.

31. Facebook Live, Morgan Nicole Crutcher, Virtual Public Meeting – October 1, 2020.

    a. Comment. What federal agencies are asked/required to provide comment on this effort?

       Response. See Sections 6.2 and 6.3 of the SEIS II.

32. Facebook Live, Morgan Nicole Crutcher, Virtual Public Meeting – October 1, 2020.

    a. Comment. Could you explain again why levee setbacks were not considered?

       Response. See response to Comment #15b.

33. E-mail, Melissa Samet, National Wildlife Federation, Virtual Public Meeting – October 1, 2020.

    a. Comment. Alternative 2 would not comply with the requirements of the CWA, so it really looks like you only are looking at one alternative. Why aren't you looking more comprehensively at other ways to reduce flooding?

Response. The scope of this effort is not a reformulation of the entire MR&T Project. The MR&T continues to successfully pass floods and provide flood-risk reduction to the 7 states bordering the Mississippi River. The purpose and need of this effort is to ensure reliability and resiliency of the system, as described in the notice of intent, included in Appendix 21 of the SEIS.

34. E-mail, Melissa Samet, National Wildlife Federation, Virtual Public Meeting – October 1, 2020.

    a. Comment. Are you following the old CEQ NEPA regs or the new ones?

       Response. See response to Comment #17u.

35. E-mail, Melissa Samet, National Wildlife Federation, Virtual Public Meeting – October 1, 2020.

    a. Comment. How will you be able to respond to public comments on the DSEIS in 15 days?

       Response. See response to Comment #15k.

A21-7.2 Public Comments on Draft SEIS II

From: Tinch, Jesse
To: MRL-SEIS-2
Cc: Milner, Bill; IDNR-OWR; Wobig, Loren
Subject: [Non-DoD Source] Mississippi River Mainline Levees Draft Supplemental Environmental Impact Statement II
Date: Monday, August 31, 2020 9:14:57 AM

To Whom It May Concern,

The Illinois Department of Natural Resources, Office of Water Resources (IDNR/OWR) received the subject notice regarding MRL SEIS II. The notice describes construction in Illinois that will require an IDNR/OWR permit. The construction in the floodway, or floodplain if a floodway is not delineated, of streams with a drainage area of one square mile or more in an urban area, or ten square miles or more in a rural area will require an IDNR/OWR permit unless it is exempt. All construction in IDNR/OWR jurisdiction will have to demonstrate the standards found in the Part 3700 Floodway Construction rules (view at Blockedhttps://www2.illinois.gov/dnr/adrules/documents/17-3700.pdf) are met, with the exception of items meeting the exemptions found in Section 3700.30(b). Any activity that could result in a restriction of access to, or use or enjoyment of a public body of water in Illinois or construction in a public body of water in Illinois will require a permit in accordance with the Part 3704 Public Waters rules (view at Blockedhttps://www2.illinois.gov/dnr/WaterResources/Documents/3704.pdf).

Please note that in some reaches of the Ohio River, the floodway is only mapped on the neighboring state's side of the river and not mapped on the Illinois side of the river. In this case the entire Ohio River floodplain in Illinois would be regulated in accordance with the Part 3700 Floodway Construction rules.

Illinois Department of Natural Resources, Office of Water Resources regulates to the landside toe of levees if they are shown as the boundary of the floodway (or floodplain, if a floodway is not delineated).

In order to initiate IDNR/OWR's permit review process please submit an application (view at Blockedhttps://www2.illinois.gov/dnr/WaterResources/Pages/PermitApplicationandInstructions.aspx <Blockedhttps://www2.illinois.gov/dnr/WaterResources/Pages/PermitApplicationandInstructions.aspx>), along with documentation to demonstrate the applicable rules are met. The application can be mailed to my attention at IDNR/Office of Water Resources, One Natural Resources Way, Springfield, Illinois 62702-1271.

Please let me know if you have any questions.

Jesse Tinch, P.E., CFM

Regulatory Engineer

IDNR, Office of Water Resources

One Natural Resources Way

Springfield, IL 62702-1271

Tel: 217/782-4545

Jesse.Tinch@illinois.gov <mailto:Jesse.Tinch@illinois.gov>

From:	Thomas Jackson
To:	MRL-SEIS-2
Subject:	[Non-DoD Source] Comment on proposed improvements to MR levees.
Date:	Wednesday, September 2, 2020 4:07:13 PM

In my review of the draft report on MRLSEIS I am curious about the sheet pile cutoff wall shown as one of the alternatives in the seepage investigation. It appears that a sheet pile "cutoff wall driven along the center of the existing levee. This looks very similar to the I-wall that failed during Katrina. The failure mechanism of the I-wall was caused by the deflection of the sheet piles resisted by only one-half of the levee section.
Will you please respond to my concerns.

Thomas L. Jackson, P.E. Retired, Past President SLFPAE, Past National President ASCE
150 Broadway St, Apt 902
New Orleans, LA 70118
Phone 504 303-8318
Cell 504 330-7918
Email tomleejack@gmail.com

From:	McPherson, Brian L CIV USARMY CEMVN (USA)
To:	Sumerall, Daniel C CIV USARMY CEMVK (USA); Thron, John M (Mike) CIV USARMY CEMVN (US)
Subject:	FW: Notice of Availability_Draft Supplement II (Draft SEIS II) to the 1976 Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees
Date:	Wednesday, September 9, 2020 9:50:47 AM

-----Original Message-----
From: Herring, Patricia (Cotton) [mailto:Patricia_Herring@cotton.senate.gov]
Sent: Monday, September 07, 2020 8:15 PM
To: McPherson, Brian L CIV USARMY CEMVN (USA) <Brian.L.Mcpherson@usace.army.mil>
Subject: [Non-DoD Source] Re: Notice of Availability_Draft Supplement II (Draft SEIS II) to the 1976 Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees

Brian,
Does any of this impact the Ouachita in Arkansas?

Thanks,

Patricia Herring
Deputy State Director
Casework Manager
US Senator Tom Cotton
(870) 864-8582

On 8/28/20, 10:00 AM, "McPherson, Brian L CIV USARMY CEMVN (USA)" <Brian.L.Mcpherson@usace.army.mil> wrote:

Good morning,

The U.S. Army Corps of Engineers (USACE) has prepared a Draft Supplement II (Draft SEIS II) to the 1976 Final Environmental Impact Statement (FEIS), Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees (MRL).

Through evaluation of information and data obtained from levee inspections, seepage analyses, research, studies, and engineering assessments, the USACE Memphis, Vicksburg, and New Orleans districts have collectively identified a total of 143 additional Work Items along various reaches of the MRL feature of the MR&T project. These Work Items are required to control seepage and/or raise and stabilize deficient sections of the existing levees and floodwalls to maintain the structural integrity and stability of the MRL system. The 143 Work Items constitute the proposed action for this Draft SEIS II and are located across portions of seven states: Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi and Louisiana. This document is intended to supplement and, as necessary, augment the 1976 FEIS and 1998 Supplemental EIS (SEIS I) to achieve USACE's primary goals for the MR&T: (1) providing flood risk reduction from the Project Design Flood; and (2) being an environmentally sustainable project.

A Notice of Availability (NOA) of the Draft SEIS II was published in the Federal Register on Friday, August 28, 2020, opening the comment period lasting through October 13, 2020.
The general public, interested parties and stakeholders are invited to comment on the Draft SEIS II. The draft report contains a description of the project, an evaluation of the alternatives under consideration and an analysis of potential environmental impacts. All public comments received will be addressed and considered as part of the USACE's decision-making process. The Draft SEIS II is available online at the project website at:
Blockedhttp://www.mvk.usace.army.mil/MRLSEIS/.

Due to COVID-19, USACE will host virtual public meetings to provide information on the project and to receive verbal public comments; times and meeting details will follow in subsequent media releases, advertisements, and updates to the project website. USACE will accept written comments through October 13, 2020.

Comments on the Draft SEIS II should be sent by e-mail to MRL-SEIS-2@usace.army.mil or by mail to the District Engineer, USACE, Vicksburg District, 4155 Clay Street, Vicksburg, Mississippi 39138-3435.

The above information is also summarized in the attachment, for reference. In an attempt to reach a wide audience, we are sending this through a multitude of distribution lists across the large project area; thus, we apologize for any duplicate notifications. For further information, please contact Mr. Mike Thron via e-mail at John.M.Thron@usace.army.mil or telephone at (901) 544-0708 or Brian McPherson via email at Brian.L.Mcpherson@usace.army.mil or telephone at (601) 631-5678.

Thank you and have a great day,

Brian McPherson
Biologist
Regional Planning and Environment Division South
U.S. Army Corps of Engineers
4155 East Clay Street
Vicksburg, MS 39183
Brian.L.Mcpherson@usace.army.mil

From: Bradley Mueller
To: Thron, John M (Mike) CIV USARMY CEMVN (US)
Subject: [Non-DoD Source] Draft SEIS II, MR&T MRL
Date: Tuesday, September 8, 2020 8:52:04 AM

September 8, 2020

Mr. Mike Thron

U.S. Army Corps of Engineers

Regional Planning and Environmental Division South

167 North Main Street, Room B-202

Memphis, Tennessee 38103-1894

Phone: 901-544-0708

Email: john.m.thron@usace.army.mil

Subject: Draft SEIS II, MR&T MRL

THPO Compliance Tracking Number: 0032646

In order to expedite the THPO review process:

1. Please correspond via email and provide documents as attachments (a THPO FTP site is available for large files),

2. Please send all emails to THPOCompliance@semtribe.com,

3. Please reference the THPO Compliance Tracking Number if one has been assigned.

Dear Mr. Thron,

Thank you for contacting the Seminole Tribe of Florida – Tribal Historic Preservation Office (STOF-THPO) Compliance Section regarding the availability of the Draft SEIS II, MR&T MRL

Although most of the project is not within the STOF Area of Interest (AOI), some of the proposed Work Items in Louisiana may be within our AOI. Specifically, there are two locations of importance to the STOF, one in Orleans Parish (Jackson Barracks) and one in Plaquemines Parish (Fort Jackson). In order for the Tribe to be able to assess possible impacts to these two sites would you be able to provide a more detailed map of the location of Work Items begin proposed for Orleans and Plaquemines Parishes? Once we have this information we will be able to continue our assessment.

Thank you for your assistance in this matter. Please feel free to contact us with any questions or concerns.

Respectfully,

Bradley M. Mueller, MA, Compliance Specialist

STOF-THPO, Compliance Review Section

30290 Josie Billie Hwy, PMB 1004

Clewiston, FL 33440

Office: 863-983-6549 ext 12245

Fax: 863-902-1117

Email: bradleymueller@semtribe.com <mailto:bradleymueller@semtribe.com>

From: John-Michael Johnson
To: MRL-SEIS-2
Subject: [Non-DoD Source] Levee projects for small business
Date: Tuesday, September 8, 2020 8:40:51 AM
Attachments: image001.png

Good morning,

We are a small business that completed a corps of engineers levee project in Jefferson parish with over 9 miles of levee lift. We request that the new $2Billion in levee spending be divided into packages and set aside for HUB-zone, SDVOSB and 8a contractors like ourselves.

Thank you for your consideration. If you have work that needs to be contracted before the end of the fiscal year, we are available for 8a sole source with a team of estimators ready to price out the project.

Cheers,

John-Michael Johnson

Vice President, Business Development

Hernandez Consulting & Construction

Main Office: 504.305.8571

Cell: 318.613.4307

Fax: 504.617.6590

Email: jmichael@hernandezconsulting.com <mailto:jmichael@hernandezconsulting.com>

Blockedwww.hernandezconsulting.com <Blockedhttps://urldefense.proofpoint.com/v2/url?u=http-3A__www.hernandezconsulting.com_&d=DwMFAg&c=euGZstcaTDllvimEN8b7jXrwqOf-v5A_CdpgnVfiiMM&r=4p9NxARCDWekb7AgUwd-9uNrcJbo2O1S_ky6HMLB_Ec&m=ksOFURRdxn9R-nrFOLCXFhyZf1QG0XbqxOFqH7REcnM&s=e3G0XfpEis5jCmnhDJtc5LS7XJDbCOxKMQYZh1cI0BQ&e=>

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From:	John L Barthelemy Jr.
To:	Thron, John M (Mike) CIV USARMY CEMVN (US)
Subject:	[Non-DoD Source] FW: Letter from Corps
Date:	Friday, September 11, 2020 11:18:58 AM
Attachments:	image001.png Corps of Engineers Ltr 8-28-20.pdf

Mr. Thron,

Please send me any further information you have on the attached Notice of Availability.

John L. Barthelemy, Jr.

Council Assistant District 1

18055 Hwy 15

Pointe-a-la-Hache, L.a 70040

504.934-9507 (Office)

504.295-9505 (Cell)

jbarthelemy@ppgov.net <mailto:jbarthelemy@ppgov.net>

From: Barbara Marcotte <bmarcotte@ppgov.net>
Sent: Thursday, September 3, 2020 2:59 PM
To: John L Barthelemy Jr. <jbarthelemy@ppgov.net>; William "Beau" Black <wblack@ppgov.net>; Corey Arbourgh <carbourgh@ppgov.net>; Dr. Stuart J. Guey, Jr <sguey@ppgov.net>; Benedict "Benny" Rousselle <brousselle@ppgov.net>; Trudy Newberry <tnewberry@ppgov.net>; Carlton M. LaFrance, Sr <clafrance@ppgov.net>; Richie Blink <rblink@ppgov.net>; Mark "Hobbo" Cognevich <mcognevich@ppgov.net>
Subject: Letter from Corps

FYI

Barbara Marcotte

Assistant Council Secretary

Plaquemines Parish Government

333 F. Edward Hebert Blvd., Bldg. 203

Belle Chasse, LA 70037

Phone: (504) 934-6306

Fax: (504) 934-6309

Email: bmarcotte@ppgov.net <mailto:bmarcotte@ppgov.net>

Asa Hutchinson
Governor

ARKANSAS DEPARTMENT OF AGRICULTURE

1 Natural Resources Drive, Little Rock, AR 72205
agriculture.arkansas.gov
(501) 225-1598

Wes Ward
Secretary of Agriculture

MEMORANDUM

TO: Christopher Rice
State Clearinghouse

FROM: Bruce Holland, Chairman
Technical Review Committee

B Holland
29 September 2020

SUBJECT: # 3153 ENVIRONMENTAL ASSESSMENT
USACE - Memphis
Mississippi River Mainline Levees Draft Supplemental Environmental Statement II

DATE: September 25, 2020

Members of the Technical Review Committee have reviewed the supplemental draft Mississippi River Mainline Levee Environmental Impact Statement (EIS) II. The updated draft Environmental Impact Statement II references ongoing Mississippi River mainline levee repair and maintenance activities of the Memphis, Vicksburg, and New Orleans District Corps of Engineers in accordance with the Mississippi River & Tributaries project authorization. Through evaluation of information and data obtained from levee inspections, seepage analyses, research studies, and engineering assessments, the Corps of Engineers Districts have collectively identified a total of 143 additional work items along various reaches of Mississippi River mainline levees. The supplemental draft EIS covers these work items (individual projects and activities).

The Committee supports these proposed activities with the following condition:

1) All proposed Corps of Engineers activity and work conducted within Arkansas is coordinated with the Arkansas Department of Environmental Quality to obtain Section 401 Water Quality Certification, Construction Stormwater General Permits, and Short-Term Activity Authorizations before work commences.

Agency comments are included for your review.

The opportunity to comment is appreciated.

BH/lab

STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

1515 West Seventh Street, Suite 412
Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

TO: Technical Review Committee Members

FROM: Chris Rice - State Clearinghouse

DATE: August 28. 2020

SUBJECT: #3153 - USACE - Mississippi River Mainline Levees Draft Supplemental Environmental Impact Statement II

Please review the above stated document under the provisions of the National Historic Preservation Act (1966), National Environmental Policy Act (1969), Clean Water Act (1972), Environmental Assessments / Environmental Impact Statements and the Arkansas Project Notification and Review System.

Your comments should be emailed by **September 25th** to Laura Brown, from the office of Arkansas Natural Resources Commission (ANRC). The Director of ANRC and the Technical Review Committee Chairman is Bruce Holland. Ms. Brown will ensure that he is informed of any needed information.

It is imperative that your response be sent by the date requested. If you have "No Comments," this should be indicated below and submitted. Should your Agency anticipate having a response which will be delayed beyond the stated deadline for comments, please contact Laura Brown at (501) 682-3985 or the State Clearinghouse Office at (501) 682-8070.

________ Support	________ Do Not Support (Comments Attached)
________ Comments Attached	________ Support with Following Conditions
___X___ No Comments	________ Non-Degradation Certification Issues (Applies to ADEQ Only)

Name (Print) Darren Spinks Date September 1, 2020

Agency Arkansas Dept. of Agriculture, Forestry Division Phone Number (501) 944-2577

STATE OF ARKANSAS

OFFICE OF INTERGOVERNMENTAL SERVICES

Department of Finance and Administration

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Little Rock, Arkansas 72203-8031
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Fax: (501) 682-5206
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TO: Technical Review Committee Members

FROM: Chris Rice - State Clearinghouse

DATE: August 28. 2020

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__X______Support ________Do Not Support (Comments Attached)

________Comments Attached ________Support with Following Conditions

__X_____No Comments ________Non-Degradation Certification Issues (Applies to ADEQ Only)

Name (Print)_William Lee Prior____________ Date___8-28-2020___________________

Agency)_Geological Survey-Energy & Environment___ Phone Number_501-683-0117____

STATE OF ARKANSAS

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Little Rock, Arkansas 72203-8031
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Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

TO: Technical Review Committee Members

FROM: Chris Rice - State Clearinghouse

DATE: August 28. 2020

SUBJECT: #3153 - USACE - Mississippi River Mainline Levees Draft Supplemental Environmental Impact Statement II

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________Support	________Do Not Support (Comments Attached)
________Comments Attached	________Support with Following Conditions
__X__No Comments	________Non-Degradation Certification Issues (Applies to ADEQ Only)

Name (Print)____Bill Bailey________ Date____8/31/2020________

Agency____ArDOT________ Phone Number___501-569-2617______

ARKANSAS
ENERGY & ENVIRONMENT

September 9, 2020

Technical Review Committee Members
Office of Intergovernmental Services
Department of Finance and Administration

RE: National Environmental Policy Act (NEPA) Comments Regarding Public Notice #3153
USACE Mississippi River Mainline Levees Draft SEIS II.

The Division of Environmental Quality (DEQ) is pleased to comment on the U.S. Army Corps of Engineers Mississippi River Mainline Levees Draft Supplemental Environmental Impact Statement II.

Based on the information submitted, there are areas of concern from an environmental compliance standpoint. All construction projects are subject to Construction Stormwater regulations if they disturb one acre of land or more. The permit must be active before any work can begin. Information on stormwater construction regulations can be found on DEQ's website, https://www.adeq.state.ar.us/water/permits/npdes/stormwater/, or by contacting DEQ's Office of Water Quality, Construction Stormwater Section, at 501.682.0620.

The Stormwater Construction General permit does not authorize any activity to be conducted in Waters of the State or Waters of the United States. Work in the Waters of the State require a short-term activity authorization (STAA) from DEQ prior to working in the wetted area of a stream or water body, and may require a U.S. Corps of Engineers permit. A STAA is necessary for any in-stream activity that may cause an exceedance of applicable water quality standards, including, but not limited to: gravel removal, bridge or crossing repair/maintenance, bank stabilization, debris removal, culvert replacement, flood control projects, and stream relocation. For more information and forms see DEQ's website, https://www.adeq.state.ar.us/water/planning/instream/, or call 501.682.0040.

This letter is issued in reliance upon the statements and representations made in the submittal. DEQ has no responsibility for adequacy or proper functioning of the proposed project. Please contact the Office of Water Quality with any questions.

Sincerely,

Julia Nicol

Julie Nicol
Director of Enterprise Services, Division of Environmental Quality
5301 Northshore Drive, North Little Rock, AR 72118

STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

1515 West Seventh Street, Suite 412
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Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

TO: Technical Review Committee Members

FROM: Chris Rice - State Clearinghouse

DATE: August 28. 2020

SUBJECT: #3153 - USACE - Mississippi River Mainline Levees Draft Supplemental Environmental Impact Statement II

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________Support	________Do Not Support (Comments Attached)
________Comments Attached	________Support with Following Conditions
________No Comments	________Non-Degradation Certification Issues (Applies to ADEQ Only)

____

____

____

____

Name (Print) Julie Nicol Date September 9, 2020

Agency Division of Environmental Quality Phone Number 501.682.0849

STATE OF ARKANSAS

OFFICE OF INTERGOVERNMENTAL SERVICES

Department of Finance and Administration

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Fax: (501) 682-5206
http://www.state.ar.us/dfa

MEMORANDUM

TO: Technical Review Committee Members

FROM: Chris Rice - State Clearinghouse

DATE: August 28. 2020

SUBJECT: #3153 - USACE - Mississippi River Mainline Levees Draft Supplemental Environmental Impact Statement II

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✓ Support

________ Do Not Support (Comments Attached)

________ Comments Attached

________ Support with Following Conditions

________ No Comments

________ Non-Degradation Certification Issues (Applies to ADEQ Only)

THE EIS STATES BORROW ~~AREAS~~ & SPOIL ~~BANKS~~ AREAS WILL ~~BE~~ MINIMIZE FOOTPRINT & IMPACTS UNDER THE SELECTED ALTERNATIVE

Name (Print) RON BRAZIL Date 9/20/20

Agency ADA - NATURAL RESOURCES DIVISION Phone Number ________

BOARD OF
MISSISSIPPI LEVEE COMMISSIONERS
KENNETH RODGERS, PRESIDENT
P. O. BOX 637
GREENVILLE, MISSISSIPPI 38702-0637
(662) 334-4813
(662) 332-6732
FAX# 378-9592
WEB PAGE www.msleveeboard.com

October 9, 2020

District Engineer
U.S. Army Corps of Engineers
Vicksburg District
4155 East Clay Street
Vicksburg, MS 39138-3435

Via e-mail: MRL-SEIS-2@usace.army.mil
Robert.A.Hilliard@usace.army.mil
John.M.Thron@usace.army.mil
Daniel.C.Sumerall@usace.army.mil

Re: Mississippi River & Tributaries Project, Mississippi River Mainline Levees
Draft Supplemental Environmental Impact Statement II

Dear Col. Hilliard:

I am Peter Nimrod, Chief Engineer for the Board of Mississippi Levee Commissioners, and I have the privilege of presenting these comments as part of the U.S. Army Corps of Engineers public comment period for the Draft Supplement II to the Final Environmental Impact Statement (SEIS II) for the Mississippi River Mainline Levees of the MR&T Project dated August 2020. The Board of Mississippi Levee Commissioners was established in 1865 and is comprised of 7 elected commissioners representing the counties of Washington, Bolivar, Sharkey, Issaquena, and parts of Humphreys and Warren counties. The Mississippi Levee Board is responsible for 212 miles of levees and 350 miles of interior streams.

From 1865 until the 1927 Flood the Mississippi Levee Board was responsible for the design, construction and maintenance of the levee to protect the Lower Mississippi Delta. Following the devastating 1927 Flood, Congress passed the 1928 Flood Control Act which established the Mississippi River & Tributaries (MR&T) Project and set up the U.S. Army Corps of Engineers to design and construct levee enlargement projects. The Mississippi Levee Board is the local sponsor and we provide right-of-way for Corps projects and we maintain the completed levee projects.

Following the 1973 Flood, the Corps of Engineers evaluated the performance of the Mainline Mississippi River Levee system and they discovered that there were areas along the levee system that were deficient in grade and section. It was determined that there were 69.2 miles of deficient levee within the Mississippi Levee District.

The Corps of Engineers prepared a Supplemental Environmental Impact Statement (SEIS) for the Mainline Mississippi River Levee Enlargement and Berms Project in 1998. This 1998 SEIS supplemented the original 1976 Environmental Impact Statement. The riverside batture land includes very important habitat for waterfowl, fisheries and wildlife. As part of this original 1998 SEIS the Corps adopted "avoid & minimize" criteria within their design parameters in an effort to eliminate and lessen impacts to the environment.

Since 1998 the Corps and the Mississippi Levee Board have completed enlarging 44.0 miles of the 69.2 miles of deficient levee and currently have another 12.1 miles of levee under contract. The Corps is currently advertising another 7.1 miles of levee. The Corps has completed the design for an item containing another 2.4 miles of deficient levee and the Mississippi Levee Board is currently obtaining right-of-way to construct this item in 2021. Once all these items are constructed this leaves less than 4 miles of deficient levee left to raise on our Mainline Mississippi River Levee within the Mississippi Levee District.

During the past 22 years the Corps of Engineers has done a wonderful job of avoiding and minimizing damage to the environment when they design and construct these levee enlargement and berm projects. When you raise a levee you must first widen out the base and since the riverside slope is steeper than the landside slope of the levee the Corps has utilized a riverside enlargement for the majority of our levee enlargement projects. The practice of using riverside enlargements lessens the footprint and greatly reduces the amount of borrow material needed to raise the levee.

When the Corps starts the design of a levee enlargement project it first looks at batture land in which the Levee Board holds a perpetual easement. If not enough borrow material exists within our easement, the Corps starts looking just outside our right-of-way at adjacent riverside property. Every attempt to minimize damage to the environment is made and post-project borrow area use for the landowner is considered.

These 44 miles of completed levee construction have included utilizing existing landside seepage berm material to raise the levee; utilizing a hydraulic dredge to build back berms using sand from the Mississippi River; using an unused set-back levee as borrow material; building numerous aquatic riverside borrow areas that are irregular shaped, varying depths and islands left in the middle which is perfect for fish habitat; building numerous riverside duck holes that are precision graded and installing water control structures so that water levels can be held, regulated and drained so that millet can be planted for ducks; building numerous riverside reforested borrow areas in which the pit is graded to drain and reforested with trees which provides terrestrial habitat; and finally the Corps is installing Relief Wells in certain areas instead of construction of an earthen landside seepage berm which greatly reduces the need for more borrow material from the borrow areas.

The Levee Enlargement & Berms Project needs to move towards completion because at this point our Mainline Mississippi River Levee will overtop during a Project Design Flood (PDF). If our levee overtops and fails, over a million acres are subject to flooding, hundreds of thousands of people will be displaced, homes, roads and farms will be damaged causing billions of dollars of damage in the Mississippi Delta alone.

The Backwater Levees within the MR&T Project are designed to be 2' below the Project Design Flood (PDF). Therefore in the future when we experience a PDF these Backwater Levees are designed to overtop and take pressure off the Mainline Mississippi River Levees. However, the Yazoo Backwater Levee located within the Mississippi Levee District is currently 7.8' below the PDF and it needs to be raised 5.8'. We request that the Corps of Engineers immediately begin designing the enlargement of the Yazoo Backwater Levee.

The Mississippi Levee Board has been pleased to partner with the U.S. Army Corps of Engineers over the past 22 years on the Mainline Mississippi River Levee Enlargement Project and we are proud of the Corps of Engineers designing and building projects that not only provide critical flood protection for the Mississippi Delta, but also provide environmental gains in all environmental categories.

The Mississippi Levee Board requests that the U.S. Army Corps of Engineers continue to expeditiously design and enlarge the remaining deficient Mainline Mississippi River Levee and the entire deficient Yazoo Backwater Levee using the same design criteria and the same avoid and minimize environmental considerations that they have utilized over the past 22 years. It is also important that the landowners giving up lands for the construction of these projects continue to have input into the design process and the location of borrow areas.

The Mississippi Levee Board fully supports the U.S. Army Corps of Engineers' recommended plan (Alternative 3) as outlined in the August 2020 Draft Supplement II to the Final Environmental Impact Statement for the Mainline Mississippi River Levees within the Mississippi River & Tributaries Project. The recommended plan will provide much needed flood protection from the Project Design Flood. The recommended plan avoids and minimizes damage to the environment and is an environmentally sustainable project. Please proceed forward with this recommended plan so that the citizens of Mississippi can be further protected from Mississippi River flooding by the completion of this important project.

BOARD OF MISSISSIPPI
LEVEE COMMISSIONERS

Peter Nimrod, P.E., P.L.S.
Chief Engineer

From: mary sternberg
To: MRL-SEIS-2
Subject: [Non-DoD Source] Re: Environmental impact statement for the Mississippi River Levees
Date: Monday, October 12, 2020 10:24:44 AM

To: District Engineer
U.S. Army Corps of Engineers Vicksburg District
4155 Clay Street
Vicksburg, Miss. 39183-3435

I submit this email regarding the Draft Supplement Final Environmental Impact Statement for the Mississippi River Mainline Levees Project. I'm a resident of Baton Rouge with a longtime interest in the river and the corridor along it.
As a matter of fact, I know my area of the river very well as the author of several books about the River Road between New Orleans and Baton Rouge as well as the only book about Bayou Manchac. So I appreciate the cultural and historic value of this area and have shared it with readers and many audiences who have come to here my talks on the subject over the past twenty years.

That said, of course I appreciate the critical need for flood protection in the Lower Mississippi River Alluvial Valley.

I have been made aware that the SEIS includes extensive capacity for Mitigation Plans for the areas where sediment sourcing for raising and upgrading levees is done. So I write to encourage the Corps of Engineers to actively explore the opportunities for protecting sites within this corridor, to preserve their value as part of the Mitigation Planning process.

Thank you for your thoughtful pursuit of your work.

Sincerely,
Mary Ann Sternberg
Freelance writer and nonfiction author
Blockedwww.maryannsternberg.com <Blockedhttp://www.maryannsternberg.com>
Blockedhttps://lsupress.org/authors/detail/mary-ann-sternberg/

SIERRA CLUB
FOUNDED 1892

October 12, 2020

District Engineer
Vicksburg District
U.S. Army Corps of Engineers
4155 Clay Street
Vicksburg, MS 39183-3435

To Whom It May Concern,

The Baton Rouge Group of the Sierra Club offers the following comments on the Draft Supplement II of the Final Environmental Impact Statement for the Mainline Levees of the Mississippi River and Tributaries Project.

Our Group's main area of focus is East Baton Rouge and surrounding parishes. The Mississippi River and the Mainline Levee are pivotal features of the city and parish. The oldest (downtown) section of Baton Rouge sits on the southernmost bluff on the east side of the Mississippi River. Land elevations fall south from downtown Baton Rouge to Louisiana State University (LSU) and areas along the River Road and the mainline levee.

High water events in recent years have put increasing stress on these levees. The 2011 flood necessitated emergency steps to raise a portion of the levee in downtown Baton Rouge, and the Corps of Engineers has done substantial work to strengthen a section of levee at Duncan Point near the intersection of Brightside Drive and River Road south of LSU, which was at risk in the 2011 flood.

An issue of primary concern for our Group is the ongoing going development of floodplain and wetland areas in East Baton Rouge Parish, a process which has accelerated since the 2016 Flood (the flood of record for the parish.) This trend is causing increased flood risk from the loss of natural retention capacity of natural areas such as forests, swamps, and floodplains.

One area where we are concerned about these trends is the low-lying areas south of LSU along River Road, going south through East Baton Rouge, Iberville, and Ascension Parishes. Sand boils and seepage have been recurring problems for subdivisions in the Brightside/River Road area, and these have worsened with more frequent and elevated high water events seen in recent years.

It is clear that East Baton Rouge Parish will allow expansion of subdivision development along River Road despite these problems, a trend that will also result in loss of agricultural land with rich alluvial soils, wetland and forest areas, and a scenic amenity for the parish and region. We also question the wisdom of allowing population growth in low-lying areas along the river where potential levee problems in future years may make their vulnerability more pronounced due to more frequent high water events caused by climate change.

The Corps is involved with this process through its jurisdiction under the Clean Water Act (Section 404) and the Rivers and Harbors Act (Section 10), and routinely approves development permits in these flood zones and contiguous areas. While this is a separate statutory authority from the Mississippi Rivers and Tributaries Project, in the area south of Baton Rouge along River Road these authorities and the Corps' role in this process have come together.

The SEIS II states that unavoidable impacts to significant resources from levee construction and borrow extraction require the development of compensatory mitigation plans (Section 5.1, p. 139). The landscape of pasture land, woodlands, and wetlands along River Road south of Baton Rouge and continuing into Iberville and Ascension Parishes constitutes a significant resource. Their loss to development will impact the hydrology and drainage functions of these parishes, since land elevations and flow fall away from the river and the natural levee.

We believe that many of these areas qualify for and merit protection under the Mitigation Rule described in Section 5 (p. 140):

The resources to be preserved provide important physical, chemical, or biological functions for the watershed;

The resources to be preserved… contribute significantly to the ecological sustainability of the watershed;

The resources are under threat of destruction or adverse modifications;

The preserved site would be permanently protected through an appropriate real estate or other legal instrument.

Areas subject to sand boils and seepage during high water periods on the river would seem to fall under Mitigation Zone 3 (p. 143): "Moderately flooded landside areas." These areas should also be given priority for the development of Mitigation Banks that would lie in close proximity to the MRL and project impacts.

Sincerely,

Angelle Bradford
Executive Committee

Baton Rouge Group of the Sierra Club
11533 Robin Hood Drive
Baton Rouge, LA 70815-6161

Michael Watson
SECRETARY OF STATE

October 13, 2020

District Engineer
U.S Army Corps of Engineers
Vicksburg District
4155 Clay Street
Vicksburg, MS 39183-3435

Greetings,

I was pleased to find the U.S. Army Corps of Engineers recommend Alternative 3 in the August Draft SEIS II. At the Mississippi Secretary of State's Office, we understand the importance of flood control in the western portion of our state. The farmland and ports are vital to Mississippi's prosperity. But, beyond mere economic measurements, the region's people deserve to live their lives uninhibited by flooding and the accompanying damage.

Choosing Alternative 3 is wise since it provides the protection our people need from the Project Design Flood, while also taking environmental sustainability into account. With such a well-thought plan, I believe your action along the Mississippi River Levees will pay dividends for years to come. I'm happy to lend my full support to Alternative 3.

Accept, sirs, my sincere regards.

Michael Watson

MICHAEL WATSON
Secretary of State
State of Mississippi

401 Mississippi Street, P.O. Box 136, Jackson, MS 39205 | (601) 359-6342 | secretary@sos.ms.gov

JOHN BEL EDWARDS
GOVERNOR

THOMAS F. HARRIS
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

October 13, 2020

Mark Henry Lahare
U.S. Army Corps of Engineers
CEMVN-PDC-C
7400 Leake Avenue,
New Orleans, Louisiana, 70118-3651
Via e-mail: mark.h.lahare@usace.army.mil

RE: **C20200126,** Coastal Zone Consistency
U.S. Army Corps of Engineers
Direct Federal Action
Draft Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement (MRL)
St. James, St. John the Baptist, St. Charles, Orleans, Jefferson, St. Bernard, and Plaquemines Parishes, Louisiana

Dear Mr. Lahare:

The Office of Coastal Management has received the above referenced federal application for consistency review with the approved Louisiana Coastal Resources Program (LCRP) in accordance with Section 307(c) of the Federal Coastal Zone Management Act of 1972, as amended. The proposed activity is currently in the development phase, and includes project features or alternatives which will be finalized only after additional planning and design. Therefore, review of this determination has proceeded per NOAA regulations on federal consistency at 15 CFR §930.36(d) for "phased consistency determinations."

After careful review, this office finds that **this phase** of the project, as proposed in the application, is consistent with the LCRP. Pursuant to federal regulations, consistency determinations must be submitted for each major decision in subsequent phases of the project that are subject to Federal discretion. The federal agency shall ensure that the activity under development continues to be consistent to the maximum extent practicable with the management program until such plans are finalized.

In order to fully review the activities addressed by this consistency determination, a clear description and depictions of proposed Work Items and an assessment of their potential coastal impacts must be provided. Information necessary for OCM review includes the locations of proposed construction, dredge and fill areas, access routes, work and staging areas, borrow sources, and rights-of way, with associated dimensions; volumes of material excavated and volume and source of any material used as fill; cross sections depicting areas of excavation and fill in wetlands; and estimates of wetland impacts, including those resulting from access to and staging for the work site(s). Direct impacts from project Work Items in the Louisiana coastal zone will require mitigation for any loss of coastal wetlands.

Coastal land loss is a significant indirect impact from the confinement of the Mississippi River to its channel. Despite the clear benefits of flood control to Louisiana, a reassessment of the secondary and cumulative impacts resulting from the Mississippi River levees is overdue and should be incorporated into this project.

As planning for the proposed work proceeds and detailed information is developed, please provide additional consistency determinations as appropriate to ensure compliance with the LCRP. Please understand that this concurrence letter specifically does not authorize any construction or other activities which may have reasonably foreseeable effects on coastal land use, water use, or natural resources.

If you have any questions concerning this review please contact Jeff Harris of the Consistency Section at (225) 342-7949 or jeff.harris@la.gov .

Sincerely,

/S/ Charles Reulet
Administrator
Interagency Affairs/Field Services Division

CR/MH/jdh

Cc: Mike Thron, COE-MD
Dave Butler, LDWF
Marrill McKarry, St. James Parish
Devin Foil, St. John The Baptist Parish
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www.leanweb.org

October 12, 2020

District Engineer
U.S. Army Corps of Engineers Vicksburg District
4155 Clay Street
Vicksburg, Mississippi 39183-3435

To Whom It May Concern,

The **Louisiana Environmental Action Network** (LEAN) submits the following comments on the Draft Supplement II to the Final Environmental Impact Statement for the Mississippi River and Tributaries Project, Mississippi River Mainline Levees (MRL).

LEAN is a non-profit organization whose mission is to foster cooperation and communication between individual citizens and corporate and government organizations in an effort to assess and mend the environmental problems in Louisiana, and to create and maintain a cleaner and healthier environment for all of the inhabitants of this state.

The Mississippi River is the central landscape and hydrological feature of this region, and impacts the lives of residents in multiple ways. The MRL interacts in numerous ways with the concerns of flood risk reduction, water quality, and the quality of life for the people of Louisiana.

Environmental Justice (EJ)

We support the continued prominence given to the issue of Environmental Justice in the SEIS II Main Report (MR) and Appendix 16. As the SEIS II notes (MR p. 69-70), this prominence reflects the change in federal government policy instituted by Executive Order 12898 (1994), *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, which directed that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

The central role of the National Environmental Policy Act (NEPA) in this process is also highlighted in the SEIS II, which cites the Council on Environmental Quality (CEQ) Report (1997), *Environmental Justice Guidance under the National Environmental Policy Act*, and the guidance provided by the EPA Report "Promising Practices for EJ Methodologies in NEPA

Reviews" (2016). The Federal Interagency Working Group on Environmental Justice (EJ IWG) established the NEPA Committee in 2012 pursuant to the *Memorandum of Understanding on Environmental Justice and Executive Order 12898* (2011). The core provision of NEPA is for public participation in the environmental decision-making process. LEAN is especially committed to low-income and minority communities achieving full participation in this process.

The SEIS II points out that over half of the counties and parishes in the SEIS assessment area have 20 percent or more of their residents living below the poverty level. For Louisiana this includes Concordia Parish in the COE Vicksburg District (MVK) and Orleans Parish in the COE New Orleans District (MVN), though 6 of the 12 parishes in the assessment area have poverty levels near 20% of their population (Appendix 16, p. 7).

Table 7 in Appendix 16 (p. 12-17) lists EJ communities within 0.6 miles of 56 project segments in the MVN, excluding borrow sites, defining these as communities with either at least 50 percent of the population identifying as a minority or 20 percent or more of the population living below the poverty level within a 0.5 mile buffer of the proposed work. The SEIS II states that "well over half of the MVN projects are near non-EJ communities, while 42 of the projects are near EJ communities showing that the Work Items impact both communities and to a greater extent, non-EJ communities." (p. 117)

The SEIS II concludes that many of the EJ impacts from construction under the preferred alternative are considered indirect and temporary, though some could last as long as 5 years (or as short as 6 months), and that there are no direct, high adverse disproportionate impacts to EJ communities from MVN levee repairs (p. 117), and that project benefits from flood risk reduction would be felt by all residents, EJ and non-EJ, in the assessment area. (p. 119)

<u>Hazardous, Toxic, and Radioactive Waste (HTRW) Evaluation</u>

The SEIS II Main Report states (p. 73) that site assessments were conducted to assess the potential for HTRW materials within the footprints of the proposed 143 Work Items following the guidelines and procedures outlined in the USACE Engineering Regulation No. 1165-2-132 (1992) and the American Society for Testing and Materials (ASTM) E 1527-13, Standard Practice for Environmental Site Assessments (1997), with the objective of identifying HTRW problems early in the design of Work Items to ensure appropriate consideration of those problems during the detailed design process.

The SEIS II HTRW assessment includes a review of HTRW Phase I Environmental Database Review Corridor Reports and State and Federal databases, including RCRA, TRI, and Superfund), and site reconnaissance to determine if recognized environmental conditions (RECs) are within the proposed Work Item footprints.

The SEIS II concludes that "Overall… no HTRW issues currently exist within the proposed Work Item footprints within the MVN. Based on land-use history, agency coordination, and field inspection, the risk of encountering HTRW throughout the MVN assessment area was determined to be low." (p. 74) Given the history of this area, in particular the sections of the corridor from Baton Rouge south, we urge the Corps to ensure that a thorough evaluation is done.

Much of LEAN's work in the Mississippi River Corridor for the past 30 years has involved the heavy industrial footprint of the numerous industrial facilities located along the river, which includes their impacts on local communities which fall into the EJ category, including releases of and legacy problems from hazardous, toxic, and radioactive wastes, as well as improper disposal of those substances. A striking example of the latter can be found in the Devil's Swamp Area north of Baton Rouge, where a large wetland area that functions as natural flood control infrastructure also contains significant hazardous waste deposits from years of dumping of PCB and mercury. State agencies have issued advisories and warnings against consuming fish from this area for decades.

Multiple activities and trends converge in the Mississippi River Corridor. Along with the levee system, industrial facilities continue to be sited, often in close proximity to EJ communities, and in some cases coastal restoration projects that are designed to utilize the river. Several have applied to the Louisiana Department of Environmental Quality (LDEQ) for permits for construction or expansion recently. An example of this situation is the proposed site for the Plaquemines Liquids Terminal (PLT) (LDEQ Agency Interest Number 217532), which would be located near the small community of Ironton, Louisiana, and the planned site for the Mid-Barataria Sediment Diversion Project. The Phillips 66/Alliance Refinery (LDEQ AI No.2418), located in Belle Chasse, Louisiana is also in close proximity.

In our comments to LDEQ on the PLT facility Air Quality Permit application (2020), we referenced levee issues involving Ironton, La. Plaquemines Parish has a non-federal levee that was incorporated after Hurricane Katrina into the "New Orleans to Venice" federal levee system managed by the U.S. Army Corps of Engineers. News stories in 2017 described how the MR&T levee extending south of New Orleans was scheduled to drop from a 50 year to a 25 year level of protection before it reached Ironton, if funding to raise it were available.

We stated in our PLT comments to LDEQ that "It is of vital importance to the Ironton community that levee reaches protecting them are built to the same height and level of protection as those around nearby facilities. If Ironton's levees are at a lower height than the reaches to their north and south, including those protecting the adjacent site for the proposed [PLT] facility, they would be at risk of greater exposure from floods."

Two of the SEIS II Work Item areas in the MVN are listed as connecting to Ironton - #138, Alliance to Ironton, LA, Levee Item 61.5-R, and Item #139, Ironton to Deer Range, LA, Levee, Item 58-R. Both describe raising the levee an average of 2 feet. Site Assessments for HTRW were carried out for both Work Items - Alliance to Ironton, LA, and Ironton to Deer Range, LA. Both found no REC's within the right-of-way (ROW) for both sections, though the assessment for the first states that "several historical REC's exist in the vicinity of the project feature."

In both cases, the SEIS II states that "when the final SEIS II is completed, ROD [Record of Decision] is signed, and funding allocated, then a final full Phase I ESA [Environmental Site Assessment] would be executed on the project feature prior to construction."

Water Quality

The SEIS II notes that nutrient loading remains a major water quality problem for the Mississippi River. Loading of nitrogen (N) and phosphorus (P) is a long-standing trend that has fueled the growth of a large annual area of low-oxygen (hypoxia) in the Gulf of Mexico that poses a threat to the health of coastal and offshore fisheries.

Catchments in the middle Mississippi and Ohio River Basins are identified (MR, p. 53) as delivering the highest nitrogen yields, and the "central region of the MARB" as delivering the highest phosphorus yields. The largest sources of nitrogen are assigned to inputs from manure, fertilizer, and legume crops, with high phosphorus inputs coming from "areas with a high concentration of crop and animal agriculture and wastewater treatment plants." The SPARROW model for the MARB [Mississippi-Atchafalaya River Basin] that the SEIS II references also shows that while the Lower Mississippi region of the MARB is not the largest area of loading, it does include watersheds that are significant sources, such as the Ouachita River Basin in northeast Louisiana.

The SEIS II states that trace metal samples in the Lower Mississippi River were not collected as frequently in recent decades as in earlier ones (p. 54). Data collected at the Thebes and St. Francisville stations during the decade of 2000 included concentrations for arsenic, cadmium, chromium, copper, iron, led, nickel, selenium, lithium, silver and zinc, but no data for mercury.

These substances were discharged for decades by facilities into the Mississippi River. A LEAN Report from 2009 described data showing that the ExxonMobil Chemical Plant in Baton Rouge was listed as discharging Ethylbenzene, Phenols, Toluene, Lead, Mercury, and Nickel into Monte Sano Bayou, the southernmost tributary of the Mississippi River, while the Lion Copolymer was listed as discharging Mercury. ExxonMobil manages a dormant facility that still releases residual amounts of these substances into Monte Sano Bayou (LDEQ AI 1395). Regulatory requirements for monitoring of these substances are now included in LDPES permits.

Climate Change

The SEIS II acknowledges the potential of climate change to significantly impact the levee system, both in high water events on the river and sea-level change at its mouth. A 2018 assessment by the Corps concluded that the "meteorological and hydrological underpinnings of the MR&T [planning and design for] PDF [Project Design Flood] are found to be adequate." (MR, p. 14)

We urge the Corps to continue to incorporate the most up to date projections for these trends, especially in light of the impacts of 2019's record Mississippi River high water event. More frequent and prolonged flood events, in conjunction with periodic severe drought periods, which climate models forecast for the Mississippi River Basin, will obviously impact the sustainability of the MR&T project and other parts of the system's infrastructure.

Sincerely,

Marylee Orr
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References

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October 13, 2020

Submitted via MRL-SEIS-2@usace.army.mil

Colonel Robert A. Hilliard
Commander, Vicksburg District
U.S. Army Corps of Engineers
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Vicksburg, Mississippi 39138-3435

Re: Draft Supplemental Environmental Impact Statement (SEIS) II to the 1976 Final Environmental Impact Statement and 1998 SEIS I, Mississippi River and Tributaries Project, Mississippi River Mainline Levees

Dear Col. Hilliard:

The undersigned 56 conservation, civic, and faith organizations and businesses appreciate the opportunity to comment on the above-referenced Draft Supplemental Environmental Impact Statement (SEIS II). The SEIS II provides a critical opportunity for developing meaningful, comprehensive long-term flood damage reduction solutions that can both protect Mississippi River communities and restore vital wildlife habitat. However, instead of examining such opportunities, the draft SEIS II rubber stamps a decades-old approach to the Mississippi River Mainline Levee project that fails to comply with basic legal requirements. Our organizations urge the US Army Corps of Engineers (Corps) to go back to the drawing board and develop a comprehensive approach to reducing flood damages along the Mississippi River based on an SEIS II that complies with the nation's critically important environmental laws.

Recommendations for a Meaningful Analysis of Alternatives

Our organizations recognize the importance of the Mississippi River Mainline Levee system and the need to address deficiencies in that system. However, providing meaningful, long-term flood damage reduction requires use of modern solutions that address the underlying causes of flood risks. To develop these solutions—and comply with the National Environmental Policy Act—the SEIS II should carefully analyze the full suite of activities that have fundamentally changed the form and function of the Mississippi River and its floodplain and coastal wetlands, the extensive body of science and data developed since the 1998 SEIS I; and the significant implications of our rapidly changing climate.

The Corps should then consider a full array of solutions to address those underlying causes, including natural and nature-based flood damage reduction measures, levee setbacks, ecosystem restoration actions, and improved navigation management actions—virtually of all which can be carried out under existing Congressional authorities. In developing this approach, the Corps should carefully assess a combination of at least the following actions:

(1) **Obtaining all levee and berm construction material from non-wetland locations.** Wetlands are a vital national resource that provide multiple benefits to people and wildlife, including reducing flood damages. Wetlands should not be destroyed for use as construction material, and obtaining construction material from non-wetland sources should be mandatory for this project.

(2) Realigning segments of the levee system farther away from the river and using other natural infrastructure approaches wherever possible. Levee setbacks give a river more room to spread out during flood events. Such setbacks have been used along the Mississippi River to reconnect at least 50,000 acres of land to the River.[1] The Corps should assess these and other natural infrastructure approaches, including restoring floodplain and coastal wetlands to protect vulnerable communities, and expanding and restoring wetland buffers on the riverside of the levees to improve the integrity and effectiveness of the levee system.

(3) Modifying management of the Mississippi River & Tributaries floodways to reduce flood risks. The MR&T floodways are designed to be used during large flood events to reduce flood risks and flood damages. The SEIS II should examine whether the MR&T floodways can be operated more regularly to reduce flood risks and create fish and wildlife habitat, and should examine whether an alternative approach to the current 70/30 split of flow between the Mississippi and Atchafalaya Rivers could assist in reducing flood risks associated with increased sedimentation below the Old River Control Structure.

(4) Utilizing sediment diversions to reduce flood risks and advance coastal wetland restoration. Sediment and freshwater diversions can reduce flood risks and are an important tool for restoring coastal wetlands. The SEIS II should examine whether new sediment and freshwater diversions could be implemented in the future, and whether existing and planned structures could be better utilized to reduce flood risks and advance coastal wetland restoration. The SEIS II should also examine options for transporting sediment from the stretch below the Old River Control Structure to use in rebuilding coastal wetlands.

(5) Modifying and/or removing targeted river training structures to reduce flood risks. River training structures (wing dikes, bendway weirs, and chevrons constructed to reduce navigation dredging costs) have significantly increased flood heights in broad stretches of the Mississippi River while also destroying important fish and wildlife habitat. The SEIS II should evaluate options for removing and modifying some of these structures to reduce flood risks, which the Corps has acknowledged could be done at some locations without impacting navigation.

Given the significance of the SEIS II to public safety and the environment, the Corps should engage the National Academy of Sciences to carry out the independent external peer review required by 33 U.S.C. § 2343. This peer review should include an evaluation of the long-term effectiveness of the alternative recommended by the Corps; whether the selected alternative will protect and restore the functions of the Mississippi River and its floodplain and coastal wetlands; and whether the proffered skeleton mitigation plan will be ecologically successful.

Critical Problems with the Draft SEIS II

The draft SEIS II does not comply with the National Environmental Policy Act, the Clean Water Act, the mitigation requirements for civil works projects, or the Independent External Peer Review Requirements. The SEIS II also fails to comply with the longstanding National Water Resources Planning

[1] "Numerous levee setbacks have been required through the years because of the evermoving Mississippi River. Since 1915, levee setbacks have continually increased acreages to lands between the Mississippi River mainline levees. To date, the approximate cumulative total is 50,000 acres of land added between the levees. A 1996 study of levees in the Vicksburg District indicated that 17 major levee setbacks since 1915 have resulted in 43,000 acres being added to the riverside flood plain." 1998 Supplement I, Project Report at 10.

Policy, which requires that all water resources projects protect and restore the environment, including by protecting and restoring the functions of natural systems. 42 USC 1962–3. The many failings of the SEIS II include, but are not limited to, the following:

(1) The draft SEIS II fails to meaningfully evaluate alternatives. Instead of evaluating long-term flood damage reduction solutions that can both protect communities and restore vital wildlife habitat, the SEIS II rubber stamps use of the same approach that was adopted in 1998 for at least the next 50 years.[2] This approach—identified in the SEIS II as the "avoid and minimize" alternative—establishes criteria for ranking potential locations that will be dug up so the soil can be used for construction material, based on land use and locations that could avoid and minimize the adverse environmental effects resulting from excavating the soil. Critically, however, this approach does not require that construction material be obtained from non-wetland areas. While our organizations appreciate the establishment of criteria to attempt to avoid and minimize adverse impacts to wetlands, efforts to avoid and minimize adverse impacts to wetlands and other aquatic resources are required as a matter of law under Clean Water Act § 404. As a result, such avoid and minimize efforts must be carried out regardless of the alternative selected.[3]

(2) The draft SEIS II fails to meaningfully evaluate impacts. Despite identifying the precise locations of 146 proposed work items, the SEIS II provides only the most general assessment of possible impacts to wetlands and wildlife. For example, despite the Mississippi River's role as a critical migration corridor for "more than 40 percent of the waterfowl that breed in North America," the SEIS II bases its entire assessment of waterfowl impacts on just one species of waterfowl—the mallard. SEIS II at 36, 80, and Appendix 2. The SEIS II must assess all "reasonably foreseeable" direct, indirect and cumulative environmental impacts, and may not delay that obligation until the development of site-specific environmental assessments.[4]

(3) Our organizations appreciate the care that has gone into developing a mitigation framework for the project, however this framework does not satisfy the mitigation requirements applicable to civil works projects. 33 U.S.C. § 2283(d). The SEIS II must include a specific mitigation plan (that must include specific activities, ecological success criteria, a monitoring plan and a contingency plan if the mitigation is not successful). The SEIS II also must identify specific mitigation lands

[2] SEIS at 21. "Based on traditional funding allocations, these Work Items would likely begin in 2020 or 2021 and extend beyond 50 years."

[3] The only other alternative examined in any level of detail—the "traditional construction" alternative—would obtain construction material from the nearest possible location, regardless of impacts to wetland resources. This alternative was rejected in the 1998 SEIS I and would violate the explicit requirements of Clean Water Act § 404 because it would take no steps to avoid and minimize adverse impacts to wetlands and other aquatic resources.

[4] 40 C.F.R. § 1508.8 (this citation is to the original CEQ NEPA regulations which are fully applicable to this project); e.g., Kern v. U.S. Bureau of Land Mgmt., 284 F.3d 1062, 1072 (9th Cir. 2002); Save Our Ecosystems v. Clark, 747 F.2d 1240, 1246 n. 9 (9th Cir.1984) ("Reasonable forecasting and speculation is . . . implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry,'" quoting Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n, 481 F.2d 1079, 1092 (D.C. Cir.1973)); City of Davis v. Coleman, 521 F.2d 661, 676 (9th Cir. 1975) ("the purpose of an [EIS] is to evaluate the possibilities in light of current and **contemplated** plans and to produce an informed estimate of the environmental consequences. . . . Drafting an [EIS] necessarily involves some degree of forecasting." (emphasis added)).

and provide the basis for the Corps' determination that those lands will be available. 33 U.S.C. § 2283(d). None of these details are included in the draft SEIS II.

(4) Our organizations have been unable to locate any reference to an independent external peer review being carried out for the SEIS II, despite the fact that such a review is mandatory for this project. 33 U.S.C. § 2343. The draft SEIS II proposes 143 work items across portions of seven states that will be carried out over the next 50 years at a cost to taxpayers of at least $2.08 billion. SEIS II at iv, 21. Independent external peer review is mandatory for all project studies (including environmental impact statements) examining projects that will cost more than $200 million, including mitigation costs. 33 U.S.C. §§ 2343(a)(3), 2343(l)(1).

(5) The Corps' timeline for completing the SEIS II precludes a legitimate consideration of comments on the draft submitted by Federal and State agencies, Tribes, or members of the public. At the October 1, 2020 virtual public hearing on the draft SEIS II, the Corps announced that the final SEIS II would be released on or about October 30—just 13 working days after the close of the public comment period on October 13. It is not possible to consider public comments and make necessary changes to the draft SEIS II under this timeline.

Our organizations and businesses urge the Corps to go back to the drawing board and develop a comprehensive approach to reducing flood damages along the Mississippi River based on an SEIS II that complies with the nation's critically important environmental laws.

Sincerely,

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LOWER MISSISSIPPI
RIVERKEEPER®

October 12, 2020

District Engineer
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To Whom It May Concern,

The Lower Mississippi Riverkeeper (LMRK) welcomes the opportunity to comment on the Draft Supplement II (SEIS II) to the Final Environmental Impact Statement (FEIS) for the Mississippi River & Tributaries Project (MR&T) Mainline Mississippi River Levees (MRL).

LMRK's work is focused on furthering three primary objectives:

1. Prevent and Reduce Pollution entering the Mississippi River
2. Protect the health of communities who depend on the Mississippi River and its water for drinking, bathing, cooking, fishing and recreating.
3. Promote and encourage recreation, environmental education and stewardship on the Lower Mississippi River.

Purpose and Mission of the SEIS II

The U.S. Army Corps of Engineers (USACE) states that the Work Items identified in the SEIS II are "remedial measures to control seepage and/or raise and stabilize deficient sections of the existing [Mississippi River] levees and floodwalls to maintain the structural integrity and stability of the MRL system."

LMRK supports flood risk reduction for the communities who live along and in proximity to the Mississippi River and its tributaries. We also note that considerable time has passed and a high degree of change to the river system has happened since the 1976 FEIS and 1998 SEIS I that the SEIS II is intended "to supplement and, as necessary, augment," as the USACE states in the Public Notice for the project.

Alternatives and Strategies

One area where this is strikingly evident is in the SEIS II's treatment of natural or nature-based flood risk reduction. Alternative 5, "Nature-Based Alternative," is presented as one option among 6 (No Action, Borrow Sources from Most Effective Means, Borrow Sources from Avoid and Minimize Ranking Process, Nonstructural Alternative, Nature-Based, and Levee Setback) which are mutually exclusive. There seems no consideration of collateral benefits from combining some options, based on site-specific opportunities. Nature-based flood risk reduction such as reconnecting the river to a floodplain and/or restoring/protecting wetlands, Nonstructural alternatives, and Levee setbacks can each help sustain the levee system.

Floodplain and wetland reconnection with a portion of the river flow during high water occurs naturally in some areas and is being re-engineered in others. In both cases, this hydrological reconnection can help take pressure off the levee system during high water events, slowing velocity and reducing impacts on levee stability.

The 2018 Water Resources Development Act (WRDA) passed by Congress included a provision authorizing funding of a Lower Mississippi River Restoration Study (Section 1202), aimed at restoration of wetland habitat in a series of river reaches between Cape Girardeau and Baton Rouge. The study and the restoration projects envisioned were not conceived as being in conflict with the MR&T mission of protection against the Project Design Flood.

The SEIS II states that the Refined 1973 MR&T Project Flood Flowine is the basis for design of the levee system under construction, with revision of the Flowline from Cairo, IL to Cape Girardeau having been done in response upward changes in stage-discharge relationships on the Upper Mississippi River that were revealed in the 1993 and 1995 floods. A flowline assessment in response to the 2011 Greater Mississippi River Basin Flood was completed in 2018, but concluded that "the meteorological conditions associated with the 1955 hypo flood still characterized the storm event that generates and defines the PDF.

The Public Scoping Period for the project was carried out in 2018. Hence that process and the benchmarks cited above all occurred prior to the 2019 high water event. The unprecedented onset and duration of that event would worthy of being integrated into the MR&T FEIS process, especially since the record duration for opening the Bonnet Carre Spillway, following an unprecedented number of openings, led to major water quality impacts on the Mississippi Gulf Coast and on Louisiana's osyter fishery.

A combination of alternatives, especially utilization of nature-based measures, seems called for in the wake of the 2019 high water event, especially since another significant high water event is quite possible before completion of construction measures for levee raising and upgrades. Water storage and flood risk reduction are included among the functions and values of wetlands in the Mississippi River Valley (p. 41)

Mitigation Opportunities

The majority of borrow sites are proposed in cropland areas, but a number would involve bottomland hardwood and even marsh areas. Clearly, the latter two require added evaluation.

Three of the Morville-Black Hawk, LA sites (Items 330-R, 326-R, and 320-R) in the MVK District involve large acreage areas of bottomland hardwood for proposed borrow areas of 22 acres, 36 and 67 acres, and 38 acres, respectively.

In the MVN District, Item 51-L, Phoenix to Bohemia, LA, proposes to source a 19 acre borrow site on the landside of the levee totaling 19 acres of bottomland hardwood wetland and marsh in an area important for the state's land loss problem, and where a number of publicly funded restoration projects have been undertaken and are planned.

Major opportunities for conservation will be provided by the Mitigation/Mitigation Planning process in the MRL work. These opportunities involve major resource areas highlighted in the SEIS II, such as protection of agricultural land, wetlands, and forested areas. These areas on the landside along the mainline levee near major metropolitan areas such as Baton Rouge and New Orleans are threatened with loss to development on a large and ongoing scale.

The SEIS II states that once mitigation tracts are identified, a tract-specific mitigation plan would be developed in coordination with an interagency team of USFWS, EPA, respective State wildlife agency, and respective State water agency. We support the interagency approach, but recommend inclusion of State agricultural agencies as well to assist in potential farmland mitigation/protection sites.

Mitigation Bank Credit is is listed as one of the compensatory mitigation benefits from restoration (p. 140), but Section 5.2.2 - Mitigation Banks in In-Lieu-Fee Programs - apparently limits this option to consideration by the USACE of purchase of creds from approved mitigation banks and in-lieu-fee programs in the impacted watershed as a "reasonable compensatory mitigation alternative." As is the case with USACE Public Notices for permit applications, what defines the impacted watershed is left rather vague.

Many of the areas proposed for Work Items may lack nearby approved mitigation banks, and it is critical that mitigation of land and water resources is carried out close to where the impacts occur. We suggest the USACE explore creation of a mitigation bank(s) specifically designed to address the impacts of MRL work, where mitigation would be done in close proximity to levee and borrow work.

The riverside/batture areas vary substantially along the Lower Mississippi River in terms of their size and offer important conservation opportunities. The USDA Mississippi River Batture Initiative carried out several years ago engaged in restoration and protection of such areas in the lower river region, while the Lower Mississippi River Conservation Committee (LMRCC) has focused on restoration efforts between the levees. Some of the National Wildlife Refuges managed by USFWS lie within the batture area or in floodplains along the mainstem river and tributaries. We encourage

the USACE to work with these agencies to develop extensive mitigation plans for the MRL system.

Recreation Opportunities

Promoting recreation, environmental education, and stewardship on the Lower Mississippi River are priorities of LMRK, working with partners like the Rivergator project to develop a guide to the Lower Mississippi River Water Trail (https://www.rivergator.org/about-us/). The value of recreation for the economy and quality of life, as well as environmental benefits, figures prominently in the Lower Mississippi River Resource Assessment (LMRRA) carried out by the MVM and partner groups like the LMRCC, Nature Conservancy, and others. (https://www.mvm.usace.army.mil/Media/News-Releases/Article/586210/corps-of-engineers-releases-final-mississippi-river-resource-assessment-report/)

The SEIS II highlights the importance of "the vast array of recreational resources" available from Cape Girardeau to Head of Passes (p. 74), and specifies that this includes "all lands and waters" between the MRL and 3000 feet landside. The Main Report cites the importance of the Land and Water Conservation Fund (LWCF) in protecting and providing public areas for outdoor recreation, both consumptive and non-consumptive, and Appendix 17 lists some of the areas and investments carried out with LWCF in the MRL corridor.

Clearly there are potential intersections and coordination between the Mitigation Planning Process and development/improvement of recreational opportunities in the MRL work corridor, and we urge the USACE to fully investigate these.

Water Quality

Utilizing the opportunities provided by nature-based strategies, mitigation planning, and recreational areas can also provide a collateral benefit in improvement of water quality where those efforts result in reconnection of the river with natural floodplains and restoration of hydrologically connected wetlands. This benefit can also help address the key water quality issue for the mainstem river and its discharge area in the Gulf of Mexico - nutrient loading upstream causing the spread of hypoxia offshore.

Where waters are conveyed and held in floodplains and wetlands, nutrient processing and sediment deposit will occur to some degree, depending on flow velocity. In 2019, high nutrient loads along with high water levels impacted Lake Pontchartrain and the Mississippi Gulf Coast, causing harmful algal blooms (HAB) as well as hypoxic zones. (The Mississippi Gulf Coast was also impacted by red tides flowing from the east.)

These same measures as noted above can help take pressure off the levee system during high water events, and would indicate a potential for collateral benefits from integrating multiple strategies in the MRL repair and upgrade effort under the MR&T.

Sincerely,

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The mission of Lower Mississippi RIVERKEEPER® (LMRK) is to protect, preserve and restore the ecological integrity of the Mississippi River Basin for current users and future generations through advocacy and citizen action. The LMRK is a member of the Waterkeeper Alliance.

Comments On The

Draft Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS),
as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (1998 SEIS)

Submitted By

The National Wildlife Federation

October 13, 2020

Submitted by email to: MRL-SEIS-2@usace.army.mil

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The National Wildlife Federation appreciates the opportunity to comment on the Draft Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (1998 SEIS)

The SEIS II provides a critical opportunity for developing meaningful, comprehensive long-term flood damage reduction solutions that can both protect Mississippi River communities and restore vital wildlife habitat. However, instead of examining such opportunities, the Draft SEIS II rubber stamps an approach to the Mississippi River Mainline Levee project that fails to comply with basic legal requirements and rolls back protections that have been in place since 1998. The National Wildlife Federation urges the U.S. Army Corps of Engineers (Corps) to go back to the drawing board and develop a comprehensive approach to reducing flood damages along the Mississippi River through an SEIS II that complies with the nation's vitally important environmental laws.

The National Wildlife Federation is the nation's largest conservation education and advocacy organization with six million members and supporters and affiliate conservation organizations in 52 states and territories. The Federation has a long history of working to protect and restore the Mississippi River and its floodplain and delta wetlands, and the rich array of fish and wildlife that depend on those vital resources.

General Comments

The National Wildlife Federation recognizes the importance of the Mississippi River Mainline Levee system and the need to address deficiencies in that system. However, providing meaningful, long-term flood damage reduction requires modern solutions that address the underlying causes of flood risks.

To develop these solutions—and comply with the National Environmental Policy Act—the SEIS II should carefully analyze the underlying causes of increased flood risks, including the role of the full suite of Corps activities that have fundamentally changed the form and function of the Mississippi River and its floodplain and coastal wetlands; the extensive body of science and data developed since the 1998 SEIS I; and the significant implications of our rapidly changing climate. The Corps should then consider a full array of solutions to address those underlying causes, including a combination of natural and nature-based flood damage reduction measures, levee setbacks, ecosystem restoration actions, and improved navigation management actions—virtually of all which can be carried out under existing Congressional authorities. Regrettably, the Draft SEIS II does none of these things.

Instead of a supplemental environmental impact statement that carefully assesses underlying causes and meaningful flood damage reduction solutions, the Corps has produced a Draft SEIS II that does not comply with the National Environmental Policy Act, does not comply with the Clean Water Act, does not comply with the mitigation requirements for civil works projects, does not comply with the Independent External Peer Review requirements, and does not comply with the longstanding National Water Resources Planning Policy. That policy requires that <u>all</u> water resources projects protect and restore the environment, including by protecting and restoring the functions of natural systems. 42 USC 1962–3.

Detailed Comments

A. The Corps Should Go Back To The Drawing Board And Develop And Adopt A Fundamentally New Approach To Sustainably Reducing Flood Risks Along The Mississippi River

As highlighted above, providing meaningful, long-term flood damage reduction requires use of modern solutions that address the underlying causes of flood risks. To develop these solutions—and comply with the National Environmental Policy Act—the SEIS II should carefully analyze the underlying causes of increased flood risks, including the role of the full suite of Corps activities that have fundamentally changed the form and function of the Mississippi River, its floodplain, and its coastal wetlands; the extensive body of science and data developed since completion of the 1998 SEIS I; and the significant implications of our rapidly changing climate.

The Corps should then carefully consider a full array of solutions to address those underlying causes, including a combination of at least the following measures (in addition to addressing critical levee deficiencies)—virtually of all which can be carried out under existing Congressional authorities:

(1) Obtaining <u>all</u> levee and berm construction material from non-wetland locations. Wetlands are a vital national resource that provide multiple benefits to people and wildlife, including reducing flood damages. Wetlands should not be destroyed for use as construction material, and obtaining construction material from non-wetland sources should be mandatory for this project.

(2) Realigning segments of the levee system farther away from the river and using other natural infrastructure approaches wherever possible. Levee setbacks give a river more room to spread out during flood events. Such setbacks have been used along the Mississippi River to reconnect at least 50,000 acres of land to the River.[1] The Corps should assess these and other natural infrastructure approaches, including restoring floodplain and coastal wetlands to protect vulnerable communities, and expanding and restoring wetland buffers on the riverside of the levees to improve the integrity and effectiveness of the levee system.

(3) Modifying management of the Mississippi River & Tributaries floodways to reduce flood risks. The MR&T floodways are designed to be used during large flood events to reduce flood risks and flood damages. The SEIS II should examine whether the MR&T floodways can be operated more regularly to reduce flood risks and restore fish and wildlife habitat, and should examine whether an alternative approach to the current 70/30 split of flow between the Mississippi and Atchafalaya Rivers could assist in reducing flood risks associated with increased sedimentation below the Old River Control Structure.

[1] "Numerous levee setbacks have been required through the years because of the evermoving Mississippi River. Since 1915, levee setbacks have continually increased acreages to lands between the Mississippi River mainline levees. To date, the approximate cumulative total is 50,000 acres of land added between the levees. A 1996 study of levees in the Vicksburg District indicated that 17 major levee setbacks since 1915 have resulted in 43,000 acres being added to the riverside flood plain." Mississippi River Mainline Levees Enlargement and Seepage Control Supplement No. 1 to the Final Environmental Impact Statement Mississippi River and Tributaries Project Mississippi River Levees And Channel Improvement, Final July 1998, Project Report at 10 (available at https://www.mvk.usace.army.mil/Portals/58/docs/PP/MRL_SEIS/1998_MRL_SEIS_Volume1.pdf).

(4) Utilizing sediment diversions to reduce flood risks and advance coastal wetland restoration. Sediment and freshwater diversions can reduce flood risks and are an important tool for restoring coastal wetlands. The SEIS II should examine whether new sediment and freshwater diversions could be implemented in the future, and whether existing and planned structures could be better utilized to reduce flood risks and advance coastal wetland restoration. The SEIS II should also examine options for transporting sediment from the stretch below the Old River Control Structure to use in rebuilding coastal wetlands.

(5) Modifying and/or removing targeted river training structures to reduce flood risks. River training structures (wing dikes, bendway weirs, and chevrons constructed to reduce navigation dredging costs) have significantly increased flood heights in broad stretches of the Mississippi River while also destroying important fish and wildlife habitat. The SEIS II should evaluate options for removing and modifying some of these structures to reduce flood risks, which the Corps has acknowledged could be done at some locations without impacting navigation.

Given the significance of the SEIS II to public safety and the environment, the Corps should engage the National Academy of Sciences to carry out the independent external peer review required by 33 U.S.C. § 2343. This peer review should include an evaluation of the long-term effectiveness of the alternative recommended by the Corps; whether the selected alternative will protect and restore the functions of the Mississippi River and its floodplain and coastal wetlands; and whether the proffered skeleton mitigation plan will be ecologically successful.

B. The Recommended Alternative Is Prohibited By The Clean Water Act

The recommended alternative in the Draft SEIS II is prohibited under Section 404 of the Clean Water Act because the Corps: (1) has not clearly demonstrated that there is no "practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem"; and (2) has not taken "appropriate and practicable" steps to minimize potential adverse impacts on the aquatic ecosystem.[2] 40 C.F.R. §§ 230.10(a) and (d). This is due in part to the lack of information provided in the Draft SEIS II, and this lack of information also precludes an assessment of whether the recommended alternative would violate the other prohibitions established by the 404(b)(1) Guidelines.[3]

The Clean Water Act 404(b)(1) Guidelines prohibit the Corps from discharging dredged or fill material into any regulated "waters of the United States," including wetlands, unless the Corps has clearly demonstrated that there is no "practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem."[4] Under the Guidelines:

[2] The Clean Water Act 404(b)(1) Guidelines, which establish these requirements and prohibitions, unquestionably apply to this project. 33 CFR § 336.1(a)("Section 404 of the CWA governs the discharge of dredged or fill material into waters of the U.S. Although the Corps does not process and issue permits for its own activities, the Corps authorizes its own discharges of dredged or fill material by applying all applicable substantive legal requirements, including public notice, opportunity for public hearing, and application of the section 404(b)(1) guidelines.")
[3] The 404(b)(1) Guidelines also prohibit discharges of dredge or fill material that: (1) "will cause or contribute to significant degradation of the waters of the United States"; (2) violate applicable toxic effluent standards or prohibition under Clean Water Act § 307 and cause or contribute to violations of state water quality standards; or (3) result in a likelihood of the destruction or adverse modification of formally designated critical habitat. 40 C.F.R. § 230.10(b) and (c).
[4] 40 C.F.R. § 230.10(a).

> "An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.[5]

Practicable alternatives include "activities which do not involve a discharge of dredged or fill material," as well as "discharges of dredged or fill material at other locations" where such discharges would result in fewer impacts to the aquatic environment.[6] An alternative that is not the least costly alternative may very well be the least environmentally damaging alternative (the "LEDPA").[7]

The 404(b)(1) Guidelines create a strong presumption that less environmentally damaging alternatives exist for non-water-dependent activities that involve a discharge into wetlands and other "special aquatic sites":[8]

> "Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in subpart E) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not ''water dependent''), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise."[9]

The Clean Water Act 404(b)(1) Guidelines also require that the Corps take "appropriate and practicable" steps to minimize potential adverse impacts on the aquatic ecosystem and establish a sequence of steps that the Corps must take to achieve this goal.[10] The Corps must first demonstrate that it has done everything possible to avoid adverse impacts in the first instance. The Corps must then demonstrate that it has taken specific steps to minimize adverse impacts that could not be avoided. Finally, the Corps must demonstrate that it has developed—and will carry out—compensatory mitigation to replace the functions and values of aquatic habitat impacts that cannot be avoided or minimized.[11]

The Corps has not demonstrated that the recommended alternative is the LEDPA alternative, including by failing to demonstrate by "detailed, clear, and convincing information" that it is not practicable to

[5] 40 C.F.R. § 230.10(a)(2).
[6] 40 C.F.R. § 230.10(a)(1).
[7] Louisiana Wildlife Federation, Inc. v. York. 761 F.2d 1044, 1048 (5th Cir. 1985) (noting that the Corps had properly chosen "alternatives that reduced both the applicants' profit and the economic efficiency of their proposed operations in order to preserve other environmental values.").
[8] Special aquatic sites include wetlands, mud flats, and riffle and pool complexes that are deemed to be so ecologically valuable that their degradation or destruction may represent an irreversible loss of valuable aquatic resources. 40 C.F.R. § 230.1(d).
[9] 40 C.F.R. § 230.10(a)(3).
[10] 40 C.F.R. § 230.10(d).
[11] These sequencing requirements were reconfirmed in the 1990 Mitigation Memorandum of Agreement between EPA and the Corps: "The Corps . . . first makes a determination that potential impact[s] have been avoided to the maximum extent practicable; remaining unavoidable impacts will then be mitigated to the extent appropriate and practicable by requiring steps to minimize impacts; and, finally, compensate for aquatic resource values." 1990 Memorandum of Agreement between EPA and the Corps, The Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines, at II.C.

obtain construction material from non-wetland areas.[12] The National Wildlife Federation stresses that borrow pits are <u>not</u> water dependent because access or proximity to a special aquatic site is not needed to fulfill that activity's basic purpose—which is to obtain construction material. As such, the Corps must overcome the strong presumption that practicable alternatives exist for locating borrow pits in non-wetland areas. The Corps also has not demonstrated that it has taken "appropriate and practicable" steps to minimize potential adverse impacts on the aquatic ecosystem.

These failures derive from the many problems with the Draft SEIS II and the preliminary 404(b)(1) evaluation that are discussed throughout these comments. For example:

(1) The Draft SEIS II clearly lacks "sufficient information"[13] to make a reasonable judgment that the recommended alternative is in fact the LEDPA because the Draft SEIS II fails to evaluate a full range of reasonable alternatives and fails to identify the full extent of adverse impacts. Moreover, neither the Draft SEIS II nor the preliminary 404(b)(1) evaluation demonstrate that:

   a. Less damaging alternative locations for obtaining construction material are not available or are impracticable;
   b. Less damaging alternative locations for obtaining construction material are prohibitively expensive;
   c. Less damaging practicable borrow pit configurations are not available;
   d. Less damaging levee configurations are not available;
   e. Less damaging alternatives, including some or all of the components highlighted in Section A of these comments are not available; or
   f. Additional practicable steps cannot be taken to further minimize adverse impacts.

(2) The Draft SEIS II provides little to no information on the steps taken to avoid adverse impacts in the first instance, as clearly required by the Clean Water Act. Indeed, the Corps appears to have done little more than propose a set of non-mandatory criteria for ranking possible locations for obtaining construction material—criteria that in fact prioritize destruction of ecologically significant wetlands in direct violation of the Clean Water Act404(b)(1) Guidelines.

    The Draft SEIS II borrow pit criteria prioritize locating borrow pits in ecologically valuable riverside wetlands over less ecologically valuable, non-wetland locations: **4 of the top 5** priority borrow pit location criteria target riverside wetlands (as discussed below, prior-converted croplands can retain vital wetland functions); and **5 of the total 8** priority locations target riverside wetlands. These non-mandatory ranking criteria are also less protective of wetlands than the ranking criteria adopted by the Corps in the 1998 SEIS I. *See* Table 1.

[12] Greater Yellowstone Coalition v. Flowers, 359 F.3d 1257, 1269 (10th Cir. 2004) (internal quotations and citation omitted); Utahns for Better Transp. v. DOT, 305 F. 3d 1152, 1186-87 (10th Cir. 2002). See also Sierra Club v. Flowers, 423 F. Supp. 2d 1273, 1352 (S.D. Fla. 2006), vacated on other grounds, Antwerp, 526 F.3d 1353, 1363-64, n.8, 1365-69 (dissenting) (would affirm CWA violation for failure to apply the presumption and independently verify alternatives analysis).
[13] 40 C.F.R. § 230.6(c).

Indeed, the Draft SEIS II criteria establish the "most preferable" location for borrow pits in ecologically valuable riverside lands described as "Riverside prior-converted cropland" despite the clear acknowledgement in the Draft SEIS II that riverside lands are riverside lands are far more likely to be of high ecological value due to their connection to the river. Draft SEIS II at 19, 102. As recognized in the Draft SEIS II: "Areas subject to Mississippi River flooding or those that receive a seasonal flood pulse are inherently more valuable than those that are not (Junk et al. 1989)" while "the ecological resources landside of the MRL are in sub-optimal condition due to the general loss of BLH habitat and connection with the Mississippi River, with the exception of a few isolated, relatively small patches of BLH." Draft SEIS II at 142. The Draft SEIS II also recognizes the higher ecological value of riverside lands by prioritizing those lands for mitigation.[14] Draft SEIS II at 143.

Prior converted cropland can retain vitally important wetland characteristics, as acknowledged in the Corps' Regulatory Guidance Letter 90-07:

> "Prior converted cropland" is defined by the SCS (Section 512.15 of the National Food Security Act Manual, August 1988) as wetlands which were both manipulated (drained or otherwise physically altered to remove excess water from the land) and cropped before 23 December 1985, to the extent that they no longer exhibit important wetland values. Specifically, prior converted cropland is inundated for no more than 14 consecutive days during the growing season. Prior converted cropland generally does not include pothole or playa wetlands. In addition, wetlands that are seasonally flooded or ponded for 15 or more consecutive days during the growing season are not considered prior converted cropland.[15]

Making riverside prior-converted cropland the top priority for the location of borrow pits is also a significant rollback to the borrow pit ranking priority adopted by the Corps in the 1998 SEIS I, which recommended riverside prior-converted cropland only if "landside cropland from willing sellers" <u>and</u> "landside cropland when riverside locations were unavailable" could not be utilized. The remainder of the 1998 SEIS I borrow pit location ranking criteria are also more protective of wetland resources than the criteria provided in the Draft SEIS II. *See* Table 1, below.

[14] "Therefore, compensatory mitigation would focus on areas that remain connected to the Mississippi River (*e.g.*, batture land or hydrologically connected areas) and on areas in watershed basins that continue to experience seasonal flood pulses (*e.g.*, frequently flooded and impounded/backwater areas)." Draft SEIS II at 142. "Mitigation Zone 1: Riverside frequently flooded Mississippi River connected lands (*e.g.*, batture lands)". Draft SEIS II at 143.
[15] U.S. Army Corps of Engineers Regulatory Guidance Letter 90-07 (available at https://www.nap.usace.army.mil/Portals/39/docs/regulatory/rgls/rgl90-07.pdf).

Table 1. Borrow Pit Location Prioritization Criteria 2020 Draft SEIS II and 1998 SEIS I

Priority Rank	2020 Draft SEIS II Borrow Pit Prioritization[16]	1998 Final SEIS I Borrow Pit Prioritization[17]
1	**Riverside prior-converted cropland**	Landside cropland from willing sellers
2	Landside cropland from willing sellers	Landside cropland when riverside locations were unavailable
3	**Riverside farmed wetlands (cropland)**	Riverside prior-converted cropland
4	**Riverside farmed wetlands (pasture)**	Riverside tree plantations
5	**Riverside herbaceous wetlands** not in federal conservation programs	Riverside farmed wetlands (cropland)
6	Riverside forested non-wetlands not in federal conservation programs	Riverside farmed wetlands (pasture)
7	**Riverside forested wetland** not in federal conservation programs	Riverside herbaceous wetlands
8	Landside/Riverside cropland condemnation	Riverside forested nonwetland
9		Riverside forested wetland.
10		Landside and riverside bottom-land hardwoods with black bear presence.
11		Landside cropland condemnation

(3) The Draft SEIS II fails to provide information on the acreage extent of wetland impacts, making it extremely difficult for the public to understand the true scope of the impacts to these critical aquatic resources. The acreage information that is provided is buried in the Draft SEIS II, with for example, the first reference to the total number of forested wetland acres impacted by the project not mentioned until page 150 of the Main Report.[18]

[16] The Draft SEIS II criteria that prioritize locating borrow pits in wetland areas are highlighted in bold.
[17] Mississippi River Mainline Levees Enlargement and Seepage Control Supplement No. 1 to the Final Environmental Impact Statement Mississippi River and Tributaries Project Mississippi River Levees And Channel Improvement, Final July 1998, Volume II, Appendix 5, Attachment B at 3 (available at https://www.mvk.usace.army.mil/Portals/58/docs/PP/MRL_SEIS/1998_MRL_SEIS_Volume2.pdf).
[18] While the Draft SEIS II does provide acreage impacts to BLH and forested lands earlier in the document, those land use classifications include both wetland and non-wetland habitats. E.g., Allen, J.A., Keeland, B.D., Stanturf, J.A., Clewell, A.F., and Kennedy, H.E., Jr., 2001 (revised 2004), A guide to bottomland hardwood restoration: U.S. Geological Survey, Biological Resources Division Information and Technology Report USGS/BRD/ITR–2000-0011, U.S. Department of Agriculture, Forest Service, Southern Research Station, General Technical Report SRS–40, 132 p. at 2 (available at https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs040.pdf) ("Under the wetlands classification system used by the U.S. Fish and Wildlife Service (Cowardin and others, 1979), bottomland hardwoods are in the palustrine system, forested wetland class, and primarily either in the broad-leaved deciduous or needle-leaved deciduous subclasses. It is recognized, however, that not all bottomland hardwoods may be classified as

(4) The lack of wetland acreage information makes it impossible to verify whether or not the functional assessments in the Draft SEIS II account for all wetland impacts from the project. This is highly problematic, including because the Draft SEIS II functional assessments require acreage inputs in the calculation process. For example, many of the acres deemed unsuitable for inclusion in the DUD analysis likely provide significant habitat and other values but it is not possible to determine whether those impacts were in fact accounted for in the functional assessments. According to the Draft SEIS II, more than 90% of the proposed Work Item footprints (6,762 of 7,283 acres of Alternative 3 construction footprints) were deemed to be unsuitable habitat for foraging waterfowl because "they lacked flooded conditions or were flooded for more than 18 inches in depth." Draft SEIS at 28.

(5) The limited acreage information that is provided is presented in a confusing manner and the partial acreage impact numbers provided in one section of the Draft SEIS II often cannot be reconciled with numbers provided in a different section. For example, the Draft SEIS II states that the "preferred alternative would impact 655 acres of riverside forested wetlands and 351 acres of landside forested wetlands, primarily through borrow source acquisition and levee improvement features," for a total of 1,006 acres of forested wetland impacts (no information is provided in this section regarding non-forested wetland acre impacts, so total wetland acre impacts could be higher). Draft SEIS II at 150. However, the preliminary 404(b)(1) evaluation, which according to the Corps does <u>not</u> include borrow pit impacts, identifies 871.9 acres of wetland impacts (and 4.1 acres of open waters). Draft SEIS II, Appendix 3 at 3. A comparison of these numbers would suggest that borrow pits would impact 134 acres of wetlands. However, this number cannot be reconciled with the fact that the project will include at least 292 acres of borrow pits in riverside wetlands that provide "suitable" duck habitat; and that the entire project is projected to require 1,402 acres of borrow pits, the vast majority of which will be located on the riverside of the levee where wetlands are prevalent.[19] Draft SEIS at 102 and 83 at Table 4-5.

(6) The recommended alternative includes 110 <u>more</u> acres of riverside borrow pits than the traditional construction alternative, even though riverside lands are far more likely to be of high ecological value due to their connection to the river.[20] Draft SEIS II at 102. The higher ecological value of riverside lands is clearly acknowledged in the Draft SEIS II: "Areas subject to Mississippi River flooding or those that receive a seasonal flood pulse are inherently more valuable than those that are not (Junk et al. 1989)" while "the

jurisdictional wetlands under the jurisdiction of section 404 of the Clean Water Act (U.S. Army Corps of Engineers, 1987), as there are several methodologies for identifying wetlands.")

[19] Draft SEIS II at 102 ("Construction of levee enlargements, haul roads, seepage berms, and slope flattening requires borrow material. Excavation of borrow material creates depressions that typically fill with water for part or all of the year. Total acres created are almost identical between the two alternatives: 1,403.3 for Alternative 2 and 1,402 acres for Alternative 3 (Table 4-21). However, Alternative 2 has 525.6 acres landside compared to 414.3 landside for Alternative 3. Conversely, Alternative 3 has 987.7 acres riverside compared to 877.7 riverside for Alternative 2. In addition to new open water habitats being created from borrow areas, other types of work (e.g., construction of haul roads, levee enlargements, installation of relief wells etc.) would result in either fill or deepening of minor (<4 acres) amounts of existing open water habitats (Table 4-21).")

[20] Id.

ecological resources landside of the MRL are in sub-optimal condition due to the general loss of BLH habitat and connection with the Mississippi River, with the exception of a few isolated, relatively small patches of BLH." Draft SEIS II at 142. The Draft SEIS II also recognizes the higher ecological value of riverside lands by prioritizing those lands for mitigation.[21] Draft SEIS II at 143.

(7) The recommended alternative fails to demonstrate that there are no alternatives to the extensive use of ecologically significant wetlands for borrow pits in the portion of the state of Louisiana located in the Vicksburg District. This area, Concordia Parish Louisiana, is the location of the overwhelming majority of duck habitat lost to borrow pits for the entire project, despite the fact that just 12 of the 143 Work Items are located in Concordia Parish. Draft SEIS II, Appendix 4 at 36. The borrow pits in Concordia Parish Louisiana account for 94.7% of the acres of suitable duck habitat and 81.8% of the total DUD values that will be lost to borrow pits for the entire project.[22] Draft SEIS II at 84. The Draft SEIS II fails to explain why it is not practicable to impact fewer acres of wetland habitat critical to waterfowl for these 12 work items.

(8) The Draft SEIS II appears to have ignored potential locations for borrow pits that were more than ½ mile distance from either side of the existing levee. Non-wetland and/or non-forested areas may well be available for use as borrow pits in landside areas outside the ½ mile buffer zone evaluated in the Draft SEIS II, but no effort was made to locate any such sites.

(9) The Draft SEIS II provides virtually no information on actions that will be taken to minimize impacts that cannot be avoided (other than a general discussion of basic best management practices for construction and acknowledging that the Corps could work with landowners to attempt to improve the ecological value of individual borrow pits).

(10) The Draft SEIS II also does not—and cannot—properly assess the extent to which adverse impacts can be avoided through mitigation because it does not meaningfully evaluate the full range and extent of direct, indirect, and cumulative adverse environmental impacts that will result from the project.[23] Moreover, while the National Wildlife Federation appreciates the work that has gone into developing a mitigation framework for the project, this framework does not satisfy the mitigation requirements established by the Clean Water Act or the mitigation requirements applicable to civil works projects, as discussed in detail in Section D of these comments.

[21] "Therefore, compensatory mitigation would focus on areas that remain connected to the Mississippi River (*e.g.*, batture land or hydrologically connected areas) and on areas in watershed basins that continue to experience seasonal flood pulses (*e.g.*, frequently flooded and impounded/backwater areas)." Draft SEIS II at 142. "Mitigation Zone 1: Riverside frequently flooded Mississippi River connected lands (*e.g.*, batture lands)". Draft SEIS II at 143.
[22] Project-required borrow pits in Concordia Parish account for: 371.7 acres of lost duck habitat out of a total of 392.4 acres of duck habitat lost to borrow pits for the entire project; and 542,614 lost DUD out of a total of 662,951 DUD lost to borrow pits for the entire project. Draft SEIS II at 84.
[23] A legally adequate NEPA mitigation analysis is essential for ensuring that the Corps can meet Clean Water Act 404 requirements because, as the Corps and EPA have made clear, it is essential to understand the full extent of the impacts to be able to develop compensatory mitigation that is capable of compensating for aquatic resource functions lost to a project. See, e.g., 33 CFR § 332.3(a)(1) and 40 CFR § 230.93(a)(1).

Importantly, the preliminary 404(b)(1) evaluation also clearly fails to comply with the Clean Water Act. Among other problems, that evaluation completely fails to consider the impacts resulting from the digging up of vital wetlands so that the wetland soil can be used for construction material. As noted above, the project will destroy extensive areas of wetlands in this manner. Obtaining construction material from wetlands unquestionably triggers the requirements of Clean Water Act Section 404, as it requires extensive actions, including the use of heavy equipment, that will result in the discharge of dredged material within the wetlands being dug up. The Corps' limitation of the 404(b)(1) evaluation to the discharge of dredged material "at levee enlargement, slope flattening, and berm construction sites" demonstrates a fundamental misunderstanding of the Clean Water Act and the 404(b)(1) Guidelines. Draft SEIS II, Appendix 3 at 3.

The Draft SEIS II also appears to suggest that the 14-page 404(b)(1) evaluation can somehow satisfy the Clean Water Act Section 404 review requirements for each of the 143 work items that will be carried out across portions of seven states over at least the next 50 years.[24] Such an approach, however, would violate the Clean Water Act because absent a Section 404 (and a Section 401) review for each work item, the Corps cannot demonstrate that the site-specific action is the LEDPA alternative, that the site-specific action has properly employed required avoid-and-minimize techniques, or that the site-specific action meets the other requirements established by the 404(b)(1) Guidelines.

C. The Draft SEIS II Does Not Comply With NEPA

The National Wildlife Federation notes that all references to the Council on Environmental Quality (CEQ) NEPA regulations in these comments refer to the CEQ NEPA regulations issued in 1978—as these are the regulations that properly apply to this NEPA process. While the Council on Environmental Quality recently issued new NEPA regulations, those new regulations are facially invalid and under legal challenge (including by the National Wildlife Federation) in multiple courts.[25]

The 1978 CEQ regulations, which were issued with the benefit of extensive public outreach and significant public input, carefully follow the clear and unambiguous language of NEPA, explicitly stated Congressional intent, and case law that was well-established at the time they were written.[26] The Corps' agency-specific NEPA regulations also refer directly to, and incorporate the 1978 CEQ NEPA regulations.

[24] The Draft SEIS II also appears to suggest that only a single programmatic Section 401 review will be carried out for each state, which would not meet the requirements of the Clean Water Act. See Draft SEIS II at 168 (emphasis added)("As previously discussed, Section 401 State water quality certifications **would be pursued programmatically** with each Work Item, as scheduled according to annual Congressional appropriation funding, during the detailed design and construction of each Work Item, to account for the exact timing and relevant site-specific information.") The SEIS II should clarify that Clean Water Act Section 401 State Water Quality Certification reviews will be carried out for <u>each</u> work item.

[25] Legal challenges to the new CEQ NEPA regulations include: Alaska Community Action on Toxics v. CEQ, 3:20-cv-05199 (N.D. Cal.); State of California v. CEQ, 3:20-cv-06057 (N.D. Cal.); Envtl. Justice Health All. v. CEQ, 1:20-cv-06143 (S.D.N.Y); Wild Virginia v. CEQ, No. 3:20-cv-00045 (W.D. Va.); and Citizens for Community Improvement v. CEQ, 1:20-cv-02715-TJK (D.D.C.).

[26] 43 Fed. Reg. 55990 (November 22, 1978); *see e.g.*, 38 Fed. Reg. 10856, 10865 (CEQ "adds additional language to former section 4 to emphasize that NEPA expands the traditional mandates of agencies covered by the Act" to comport with both "legislative history of the Act, see, e.g., Hearings on S. 1075, S. 237, and S. 1752 Before Senate Committee on Interior and Insular Affairs, 91st Cong., 1st Sess. 206 (1969); 115 Cong. Rec. (part 30) 40416 (1969) (remarks of Senator Jackson), *and by early and consistent judicial opinion*. See, e.g., Calvert Cliffs v. Atomic Energy Commission, 2 ERC 1779, 1780–81 (D.C. Cir. 1971); Zabel v. Tabb, 1 ERC 1449, 1457-59 (5th Cir. 1970)); *see also*, Jamison E. Colburn, *Administering the National Environmental Policy Act*, 45 ENVTL. L. REP. NEWS & ANALYSIS 10287,

We also note that the SEIS II NEPA process should follow the 1978 CEQ NEPA regulations because the scoping process was initiated years before either the issuance or the effective date of the new CEQ NEPA Regulations; the Draft SEIS II was well underway before the issuance or effective date of the new CEQ NEPA Regulations; and the Draft SEIS II was released for public comment before the effective date of the new CEQ NEPA Regulations.[27] Under these circumstances, it would be both unfair to the public and inappropriate to claim reliance on the new CEQ regulations even if those regulations were not facially invalid (as noted above, these new CEQ regulations are not facially valid).

NEPA requires that each EIS "[r]igorously explore and objectively evaluate all reasonable alternatives."[28] This requires a "**thorough consideration of all appropriate methods of accomplishing the aim of the action**" and an "**intense consideration of other more ecologically sound courses of action**."[29] Importantly, "the discussion of alternatives must be undertaken in good faith; it is not to be employed to justify a decision already reached."[30] The analysis of alternatives is the "heart of the environmental impact statement."[31]

While an EIS need not explore every conceivable alternative, it must rigorously explore all reasonable alternatives that are consistent with its basic policy objective and that are not remote or speculative. A viable but unexamined alternative renders an EIS inadequate.[32] An alternative may not be disregarded merely because it does not offer a complete solution to the problem.[33] An alternative also may not be disregarded because it would require additional Congressional authorization. To the contrary, the alternatives analysis must "[i]nclude reasonable alternatives not within the jurisdiction of the lead agency."[34]

10308 (2015); Council on Environmental Quality: Statements on Proposed Federal Actions Affecting the Environment; Interim Guidelines, April 30, 1970, Sections 5(b) and 7(a) (filed with Fed. Reg. May 11, 1970), available in *Environmental Quality*, The First Annual Report of the Council on Environmental Quality, Transmitted to Congress, August, 1970, p. 288 (available at https://www.slideshare.net/whitehouse/august-1970-environmental-quality-the-first-annual-report-of); Council on Environmental Quality, Guidelines, Preparation of Environmental Impact Statements, 38 Fed. Reg. 20550, 20551 (August 1, 1973).

[27] As the Corps is aware, the scoping process for the Draft SEIS II was initiated on July 13, 2018 and a Notice of Availability for the Draft SEIS II was published in the Federal Register on August 28, 2020. The new CEQ NEPA regulations were not issued until July 16, 2020, with an effective date of September 14. 85 Fed. Reg. 43304 (July 16, 2020).

[28] 40 C.F.R. § 1502.14.

[29] Environmental Defense Fund, Inc. v. Corps of Engineers of U.S. Army, 492 F.2d 1123, 1135 (5th Cir. 1974) (emphasis added).

[30] Citizens Against Toxic Sprays, Inc. v. Bergland, 428 F.Supp. 908, 933 (D.Or. 1977).

[31] 40 C.F.R § 1502.14.

[32] E.g. Muckleshoot Indian Tribe v. U.S. Forest Service, 177 F.3d 800, 810, 814 (9th Cir. 1999).

[33] Natural Resources Defense Council, Inc. v. Morton, 458 F.2d 827, 836 (D.C. Cir. 1972).

[34] 40 C.F.R. § 1502.14(c); Natural Resources Defense Council v. Morton, 458 F.2d 827, 834-36 (D.C. Cir. 1972) (alternative sources of energy had to be discussed, despite federal legislation indicating an urgent need for offshore leasing and mandating import quotas; Department of Interior had to consider reasonable alternatives to offshore oil lease which would reduce or eliminate the need for offshore exploration, such as increased nuclear energy development and changing natural gas pricing, even though that would require Congressional action); Environmental Defense Fund v. Froehlke, 473 F.2d 346 (8th Cir. 1974) (acquisition of land to mitigate loss of land from river channel project must be considered even though it would require legislative action).

In comparing and analyzing potential alternatives, the Draft SEIS II must examine, among other things, the direct, indirect, and cumulative environmental impacts of the different alternatives, the conservation potential of those alternatives, and the means to mitigate adverse environmental impacts.[35] A robust analysis of project impacts is essential for determining whether less environmentally damaging alternatives are available.

Direct impacts are caused by the action and occur at the same time and place as the action. Indirect impacts are also caused by the action, but are later in time or farther removed from the location of the action.[36] Cumulative impacts are:

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."[37]

A cumulative impact analysis ensures that the agency will not "treat the identified environmental concern in a vacuum."[38] All "reasonably foreseeable" direct, indirect and cumulative environmental impacts must be analyzed.[39] "If it is reasonably possible to analyze the environmental consequences in an EIS...the agency is required to perform that analysis."[40]

Notably, an EIS must evaluate "reasonably foreseeable" site-specific impacts even if an EIS is being carried out at the programmatic level or where environmental assessments may be carried out in the future to advance individual project components.[41] The Corps may not evade this requirement by saying these impacts will be examined through later environmental reviews.[42]

An EIS must utilize "quantified or detailed information" when analyzing impacts.[43] The DEIS may not rely "on conclusory statements unsupported by data, authorities, or explanatory information."[44] This is because:

> "A conclusory statement unsupported by empirical or experimental data, scientific authorities, or explanatory information of any kind not only fails to crystalize the issues, but affords no basis

[35] 40 C.F.R. § 1502.16.
[36] 40 C.F.R. § 1508.8.
[37] 40 C.F.R. § 1508.7.
[38] Grand Canyon Trust v. FAA, 290 F.3d 339, 346 (D.C. Cir. 2002).
[39] 40 C.F.R. § 1508.8.
[40] Kern v. U.S. Bureau of Land Mgmt., 284 F.3d 1062, 1072 (9thCir.2002).
[41] *Colorado Environmental Coalition v. Office of Legacy Management*, 819 F. Supp. 2d. 1193, 1209 (D. Colo. 2011), reconsideration granted in part on other grounds, 2012 U.S. Dist. LEXIS 24126 (D. Colo. Feb. 27, 2012) (concluding that future site-specific mining activity was reasonably foreseeable at the lease stage because mining had previously taken place on the same public lands and thus must be reviewed at the programmatic leasing stage.)
[42] Kern v. U.S. Bureau of Land Mgmt., 284 F.3d at 1072.
[43] Neighbors of Cuddy Mountain v. U. S. Forest Service, 137 F.3d 1372, 1379 (9th Cir. 1998); Ecology Center v. Castaneda, 574 F.3d 652, 666 (9th Cir. 2009) (requiring "quantified or detailed data"); Natural Resources Defense Council v. Callaway, 524 F.2d 79, 87 (2d Cir. 1975).
[44] Id.

for a comparison of the problems involved with the proposed project and the difficulties involved in the alternatives."[45]

Accordingly, the DEIS must supply supporting data and authorities, and explain how and why it has drawn the conclusion it has reached. "General discussion of an environmental problem over a large area" also is not sufficient and cannot satisfy NEPA.[46]

An EIS also must be based on "high quality" science and information and the agency preparing the EIS must "insure professional integrity, including scientific integrity, of the discussions and analysis in environmental impact statements."[47] Importantly, if information that is essential for making a reasoned choice among alternatives is not available, the agency **must** obtain that information unless the costs of doing so would be "exorbitant."[48]

The Corps must also candidly disclose the risks of its proposed action and respond to adverse opinions held by respected scientists:[49]

> "'Where scientists disagree about possible adverse environmental effect, the EIS must inform decision-makers of the full range of responsible opinion on the environmental effects.' Where the agency fails to acknowledge the opinions held by well respected scientists concerning the hazards of the proposed action, the EIS is fatally deficient."[50]

These steps are critical for ensuring that that an EIS conducts an "informed and meaningful" consideration of the alternatives, as required by law:

> "NEPA's requirement that alternatives be studied, developed, and described both guides the substance of environmental decisionmaking and provides evidence that the mandated decisionmaking process has actually taken place. "Informed and meaningful consideration of alternatives – including the no action alternative – is . . . an integral part of the statutory scheme.[51]

[45] Seattle Audubon Society v. Moseley, 798 F. Supp. 1473, 1479 (W.D. Wash. 1992), aff'd 998 F.2d (9th Cir. 1993); see also, e.g., Klamath-Siskiyou Wildlands Ctr. v. BLM, 387 F.3d 989,995-996 (9th Cir. 2004) ("generalized or conclusory statements" in cumulative effects analyses do not satisfy NEPA); Friends of the Earth v. Army Corps of Engineers, 109 F. Supp. 2d 30, 38 (D.D.C. 2000) (ruling that the Corps must "provide further analysis" to satisfy NEPA because the Corps did not provide "the basis for any" of its claims that the project would have an insignificant impact or that fish and other organisms would simply move to other areas); Sierra Club v. Norton, 207 F. Supp. 2d 1310, 1335 (S.D. Ala. 2002) (stating "Defendant's argument in this case would turn NEPA on its head, making ignorance into a powerful factor in favor of immediate action where the agency lacks sufficient data to conclusively show not only that proposed action would harm an endangered species, but that the harm would prove to be 'significant'").

[46] South Fork Band Council v. U.S. Dept. of Interior, 588 F.3d 718 (9th Cir. 2009); Neighbors of Cuddy Mountain v. U.S. Forest Service, 137 F.3d 1372, 1379-80 (9th Cir. 1998).

[47] 40 C.F.R. § 1502.24 ("Agencies shall insure professional integrity, including scientific integrity, of the discussions and analysis in environmental impact statements"); Earth Island Inst. v. U.S. Forest Service, 442 F.3d 1147, 1159-60 (9th Cir. 2006) (quoting 40 CFR §1502.24).

[48] 40 C.F.R. § 1502.22.

[49] Seattle Audubon Soc'y v. Mosely, 798 F.Supp. 1473, 1482 (W.D. Wash. 1992) (citing Friends of the Earth v. Hall, 693 F.Supp. 904, 934, 937 (W.D.Wash. 1988).

[50] Friends of the Earth v. Hall, 693 F. Supp. 904, 934 (W.D. Wash. 1988) (citations omitted).

[51] Bob Marshall Alliance v Hodel, 852 F.2d 1223, 1228 (9th Cir. 1988) (internal citations omitted).

1. The Analysis Of Alternatives Does Not Comply With NEPA

The Draft SEIS II violates NEPA because it fails to evaluate highly reasonable alternatives and fails to evaluate an appropriate range of alternatives. As discussed in Section C.2. of these comments, the Draft SEIS II also fails to provide an informed and meaningful consideration of the alternatives that it does evaluate, including by failing to meaningfully evaluate the alternatives' direct, indirect, and cumulative impacts.

As noted above, the SEIS II provides a critical opportunity for developing meaningful, comprehensive long-term flood damage reduction solutions that can both protect Mississippi River communities and restore vital wildlife habitat. However, instead of examining such opportunities, the draft SEIS II rubber stamps an approach to the Mississippi River Mainline Levee project that fails to comply with basic legal requirements and rolls back protections that have been in place since 1998.

Despite the extensive reach of the project, and the significant implications for public safety and the health of the environment, the Draft SEIS II examines only two alternatives in any level of detail:

(1) The "avoid and minimize" alternative, which establishes criteria for ranking potential locations that will be dug up so the soil can be used for construction material, based on land use and locations; and

(2) The "traditional construction" alternative, which includes the exact same work items as the "avoid and minimize" alternative, but would obtain construction material from the nearest possible location, regardless of impacts to wetland resources.

Each of the other alternatives mentioned in the Draft SEIS II were dismissed out of hand, based in part on an inappropriate consideration of each of those alternatives as an all-or-nothing approach to reducing flood risks.

As discussed in Section B of these comments, both the "avoid and minimize" and "traditional construction" alternatives are prohibited by the Clean Water Act 404(b)(1) Guidelines. The "avoid and minimize" alternative prioritizes obtaining construction material from ecologically valuable riverside wetlands over less ecologically valuable, non-wetland locations; and relies on non-mandatory borrow pit ranking criteria that are less protective of wetlands than the ranking criteria adopted by the Corps in the 1998 SEIS I. *See* Section B and Table 1 of these comments.

The "traditional construction" alternative makes no effort at all to avoid impacts to wetlands and other aquatic sites as required by law. To the contrary, it is based on obtaining construction material from the nearest possible location, regardless of impacts to wetland and other aquatic resources. Notably, this traditional construction approach was rejected in the 1998 SEIS I. Indeed, it appears that this alternative was considered for the sole purpose of justifying selection of the recommended "avoid and minimize" alternative in direct violation of the longstanding NEPA mandate that "the discussion of alternatives must be undertaken in good faith; it is not to be employed to justify a decision already reached."[52]

[52] Citizens Against Toxic Sprays, Inc. v. Bergland, 428 F.Supp. 908, 933 (D.Or. 1977).

The National Wildlife Federation urges the Corps to comprehensively examine and adopt the alternative outlined in Section A of these comments to provide comprehensive long-term flood damage reduction solutions that can both protect Mississippi River communities and restore vital wildlife habitat.

As noted in Section A of these comments, evaluating and developing these alternatives requires a careful assessment of the underlying causes of increased flooding along the Mississippi River. Without understanding the causes, it is not possible to develop solutions that can produce long-term and sustainable flood damage reduction benefits. The National Wildlife Federation refers the Corps to the scoping comments that we submitted in connection with the SEIS II for information on some of the critical issues to analyze in connection with assessing these underlying causes.[53] These scoping comments are incorporated by reference as though fully set forth herein.

2. The Analysis Of Impacts Does Not Comply With NEPA

The Draft SEIS II fails to meaningfully evaluate the direct, indirect, and cumulative impacts of this extensive project. It provides only the most general discussions of potential impacts to a limited number of resources and fails to evaluate "reasonably foreseeable" site-specific impacts despite having identified the locations of every work item and the likely locations of every borrow pit.

The following are some of the many problems with the analyses of adverse impacts in the Draft SEIS II.

(a) Wetlands

Impacts to wetlands, including complete destruction of many hundreds of acres and changes to the extent and duration of inundation on many more acres, are a major impact from the project. Such losses and impacts will also result in significant adverse impacts to fish and wildlife species—and indeed, such losses are the primary drivers of the functional losses identified in the Draft SEIS II functional assessments.

Despite the importance of properly assessing impacts to wetlands—including site-specific impacts—the Draft SEIS II provides only the most general information on wetland impacts and the information that is provided is both confusing and contradictory, as discussed in Section B of these comments. The Draft SEIS II also fails to take into consideration the many changes that have impacted the hydrology, ecology, flow patterns, and uses of the Mississippi River and its floodplain and coastal wetlands since the 1998 SEIS I. Each of these changes can result in significant direct, indirect, and cumulative impacts to wetlands and other special aquatic sites and as a result, should be analyzed in the Draft SEIS II.

The failure to fully evaluate impacts to wetlands and other aquatic resources fundamentally taints all other impact analyses in the Draft SEIS II.

(b) Waterfowl and Birds

The Mississippi River is a vital migration corridor for "40 percent of the Mississippi Flyway's waterfowl and 60 percent of all U.S. bird species." Draft SEIS II at 26. Despite the significance of the Mississippi

[53] National Wildlife Federation Scoping Comments on Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement, October 15, 2018. These comments are incorporated by reference as those fully set forth herein.

River migration corridor and the vital importance of wetlands and forested habitats to the multitude of waterfowl species that rely on this corridor, the Draft SEIS II bases its entire assessment of waterfowl impacts on just one species of waterfowl—the mallard. SEIS II at 36, 80, and Appendix 2. The analysis of Impacts to bird species is also severely limited—considering the impacts to only 8 species.[54] Draft SEIS II at 92. Just 4 avian species were considered in the assessment of impacts to terrestrial habitats. Draft SEIS II at 30.

Failure to look at a truly representative sampling of waterfowl and bird species prevents assessment of impacts to species that have different life-cycles, habitat needs, and food source needs. The food source, breeding, resting, migratory, and other patterns of many waterfowl and bird species are entirely different, which can cause species to react to impacts in fundamentally different ways. For example, species that eat fish will respond differently to a loss of wetlands that provide critical fish habitat than species that do not eat fish. Hawks and raptors have fundamentally different food source, breeding, and other life cycle needs than waterfowl and songbirds. And the list of differences goes on and on.

The aggressively limited number of species considered in the waterfowl and bird analyses render the Draft SEIS II inadequate. These problems are greatly amplified by the many problems with the wetland analysis discussed throughout these comments.

(c) Mammals

Like the assessments of impacts to waterfowl and birds, the assessment of impacts to mammals is far too limited to meaningfully account for impacts to mammal species. While the Draft SEIS II does examine impacts to numerous species of bats, just two mammal species were considered in connection with the evaluation of impacts to terrestrial habitat (mink and fox squirrels). Draft SEIS II at 30. It is not clear whether mammal species were considered in connection with the assessment of impacts to wetlands.

(d) Amphibians and Reptiles

Despite the importance of wetlands to amphibian and reptile populations, the Draft SEIS II does not assess the project's impacts to those species. Indeed, the Draft SEIS II does not mention amphibian species and references only one reptile species (the Alligator Snapping Turtle). It is critical that the SEIS II analyze impacts to amphibians and reptiles given the dire conditions of many of these species.

For example, amphibians in general are at critical risk worldwide. In the United States, the IUCN Red List of Threatened Species lists 56 amphibian species and 37 reptile species as known to be critically endangered, endangered, or vulnerable.[55] Worldwide, at least 1,950 species of amphibians are threatened with extinction of which 520 species are critically endangered, 783 are endangered, and 647

[54] The Draft SEIS II does provide a highly limited discussion of some additional at-risk species and does provide a limited assessment of listed species.
[55] IUCN Red List version 2013:2, Table 5: Threatened species in each country (totals by taxonomic group), available at http://cmsdocs.s3.amazonaws.com/summarystats/2013_2_RL_Stats_Table5.pdf (visited on November 24, 2013.)

species are vulnerable. This represents 30 percent of all known amphibian species.[56] In 2004, scientists estimated that most of 1,300 other amphibian species are also threatened though sufficient data are currently lacking to be able to accurately assess the status of those species.[57]

A recent study demonstrates the increasingly dire conditions of amphibians worldwide:

> "Current extinction rates are most likely 136–2707 times greater than the background amphibian extinction rate. These are staggering rates of extinction that are difficult to explain via natural processes. No previous extinction event approaches the rate since 1980 (Benton and King, 1989).
>
> Despite the catastrophic rates at which amphibians are currently going extinct, these are dwarfed by expectations for the next 50 yr (Fig. 1). If the figure provided by Stuart et al. (2004) is true (but see Pimenta et al., 2005; Stuart et al., 2005), one-third of the extant amphibians are in danger of extinction. This portends an extinction rate of 25,000–45,000 times the expected background rate. Episodes of this stature are unprecedented. Four previous mass extinctions could be tied to catastrophic events such as super volcanoes and extraterrestrial impacts that occur every 10 million to 100 million years (Wilson, 1992). The other mass extinction seems to be tied to continental drift of Pangea into polar regions leading to mass glaciation, reduced sea levels, and lower global temperatures (Wilson, 1992). The current event far exceeds these earlier extinction rates suggesting a global stressor(s), with possible human ties."[58]

Recent studies also point to the role of global climate change in promoting potentially catastrophic impacts to amphibian populations. For example:

- Global climate change will result in changes to weather and rainfall patterns that can have significant adverse effects on amphibians. Drought can lead to localized extirpation. Cold can induce winterkill in torpid amphibians. It is possible that the additional stress of climate change, on top of the stresses already created by severe loss of habitat and habitat fragmentation may jeopardize many amphibian species.[59]

- Recent studies suggest that climate change may be causing global mass extinctions of amphibian populations. Particularly alarming is the fact that many of these disappearances are occurring in relatively pristine area such as wilderness areas and national parks.[60] One recent study suggests

[56] IUCN Red List version 2013:2, Table 3a: Status category summary by major taxonomic group (animals), available at http://cmsdocs.s3.amazonaws.com/summarystats/2013_2_RL_Stats_Table3a.pdf (visited on November 24, 2013).
[57] Science Daily, Amphibians In Dramatic Decline; Study Finds Nearly One-Third Of Species Threatened With Extinction (October 15, 2004), available at http://www.sciencedaily.com/releases/2004/10/041015103700.htm (visited on November 24, 2013).
[58] McCallum, M. L. (2007). "Amphibian Decline or Extinction? Current Declines Dwarf Background Extinction Rate. *Journal of Herpetology* 41 (3): 483–491. doi:10.1670/0022-1511(2007)41[483:ADOECD]2.0.CO;2.
[59] Sjogren, P. 1993a. Metapopulation dynamics and extinction in pristine habitats: A demographic explanation. Abstracts, Second World Congress of Herpetology, Adelaide, Australia, p. 244; Sjogren, P. 1993b. Applying metapopulation theory to amphibian conservation. Abstracts, Second World Congress of Herpetology, Adelaide, Australia, p. 244-245.
[60] Pounds, J. A., and M. L. Crump. 1994. Amphibian declines and climate disturbance: The case of the golden toad and the harlequin frog. Conservation Biology 8:72-85; Lips, K. R. 1998. Decline of a Tropical Montane Amphibian

that climate change has allowed the spread of a disease known as chytridiomycosis which has led to extinctions and declines in amphibians. Climate change has allowed this disease to spread by tempering the climate extremes that previously kept the disease in check.[61] About two-thirds of the 110 known harlequin frog species are believed to have vanished during the 1980s and 1990s because of the chytrid fungus *Batrachochytrium dendrobatidis.* Other studies indicate that amphibians may be particularly sensitive to changes in temperature, humidity, and air and water quality because they have permeable skins, biphasic life cycles, and unshelled eggs.[62]

- Climate change may also affect amphibian breeding patterns.[63] Amphibians spend a significant part of the year protecting themselves from cold or shielding themselves from heat. They receive cues to emerge from their shelters and to migrate to ponds or streams to breed from subtle increases in temperature or moisture. As the earth warms, one potential effect on amphibians is a trend towards early breeding, which makes them more vulnerable to snowmelt-induced floods and freezes common in early springs. Some studies already indicate a trend towards earlier breeding in certain amphibian species.[64]

- Increases in UV-B radiation in the northern hemisphere due to ozone depletion is also having an adverse impact on amphibians.[65] One study suggests that ultraviolet-B (UV-B) radiation adversely affects the hatching success of amphibian larvae.[66] High levels of UV-B also induced higher rates of developmental abnormalities and increased mortality in certain species (*Rana clamitans* and *R. sylvatica*) than others that were shielded from UV-B.[67] UV-B also can have detrimental effects on embryo growth.

The failure of the Draft SEIS II to evaluate impacts to amphibians and reptiles renders the Draft SEIS II inadequate.

Fauna. Conservation Biology 12:106-117; Lips, K., F.Brem, R. Brenes, J.D. Reeve, R.A. Alford, J. Voyles, C. Carey, L. Livo, A. P. Pessier, and J.P. Collins 2006. Emerging infectious disease and the loss of biodiversity. Proceedings of the National Academy of Sciences 103:3165-3170.

[61] Pounds, J.A., M.P.L. Fogden, J.H. Campbell. 2006. Biological response to climate change on a tropical mountain. Nature 398, 611-615.

[62] Carey, C., and M. A. Alexander. 2003. Climate change and amphibian declines: is there a link? Diversity and Distributions 9:111-121.

[63] Carey, C., and M. A. Alexander. 2003. Climate change and amphibian declines: is there a link? Diversity and Distributions 9:111-121.

[64] Beebee, T. J. C. 1995. Amphibian Breeding and Climate. Nature 374:219-220; Blaustein, A. R., L. K. Belden, D. H. Olson, D. M. Green, T. L. Root, and J. M. Kiesecker. 2001. Amphibian breeding and climate change. Conservation Biology 15:1804-1809; Gibbs, J. P., and A. R. Breisch. 2001. Climate warming and calling phenology of frogs near Ithaca, New York, 1900-1999. Conservation Biology 15:1175-1178.

[65] Blumthaler, M., and W. Ambach. 1990. Indication of increasing solar ultraviolet-B radiation flux in alpine regions. Science 248:206-208; Kerr, J. B., and C. T. McElroy. 1993. Evidence for large upward trends of ultraviolet-B radiation linked to ozone depletion. Science 262:1032-1034.

[66] Blaustein, A. R., P. D. Hoffman, D. G. Hokit, J. M. Kiesecker, S. C. Walls, and J. B. Hays. 1994a. UV repair and resistance to solar UV-B in amphibian eggs: A link to population declines? *Proceedings of the National Academy of Science* 91:1791-1795.

[67] Grant, K. P., and L. E. Licht. 1993. Effects of ultraviolet radiation on life history parameters of frogs from Ontario, Canada. Abstracts, Second World Congress of Herpetology, Adelaide, Australia, p. 101.

(e) Cumulative Impacts, Including the Impacts of Climate Change

An extensive body of science demonstrates that the earth's climate is changing and that this change is causing significant increases in sea level rise and more frequent and extreme weather events. The Draft SEIS II should fully analyze and account for this information and changed conditions that have significant implications for the long-term effectiveness of flood damage reduction measures and the long term health and viability of coastal and riverine wetlands and the fish and wildlife that rely on those resources.

For example, climate change is implicated in significant changes in precipitation in the Mississippi River basin. In March 2005, the U.S. Geological Survey reported upward trends in rainfall and stream flow for the Mississippi River.[68] In 2009, the U.S. Global Change Research Program issued a report showing that the Midwest experienced a 31% increase in very heavy precipitation events (defined as the heaviest 1% of all daily events) between 1958 and 2007.[69] That study also reports that during the past 50 years, "the greatest increases in heavy precipitation occurred in the Northeast and the Midwest."[70] Models predict that heavy downfalls will continue to increase:

> Climate models project continued increases in the heaviest downpours during this century, while the lightest precipitation is projected to decrease. Heavy downpours that are now 1-in-20-year occurrences are projected to occur about every 4 to 15 years by the end of this century, depending on location, and the intensity of heavy downpours is also expected to increase. The 1-in-20-year heavy downpour is expected to be between 10 and 25 percent heavier by the end of the century than it is now. . . . Changes in these kinds of extreme weather and climate events are among the most serious challenges to our nation in coping with a changing climate.[71]

In March 2012, Midwest regional assessments were issued that provide important technical input into the National Climate Assessment.[72] In 2013, Regional Climate Trends and Scenarios were issued for the Midwest U.S. showing that for the Midwest region, annual and summer trends for precipitation in the 20th century are upward and statistically significant; the frequency and intensity of extreme precipitation in the region has increased, as indicated by multiple metrics; and models predict increases in the number of wet days (defined as precipitation exceeding 1 inch) for the entire Midwest region, with increases of up to 60%.[73] In March 2019, the Corps issued a report pointing to increasing precipitation trends in the Mississippi River Valley and a subsequent increase in river flood frequency and magnitude over the last few decades.[74]

[68] USGS Fact Sheet 2005-3020, Trends in the Water Budget of the Mississippi River Basin, 1949-1997.
[69] Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009, at page 32 (available at http://nca2009.globalchange.gov/).
[70] *Id*.
[71] *Id*.
[72] The Midwest regional assessment can be accessed at http://glisa.msu.edu/great_lakes_climate/nca.php (visited January 22, 2014).
[73] Kunkel, K.E, L.E. Stevens, S.E. Stevens, L. Sun, E. Janssen, D. Wuebbles, S.D. Hilberg, M.S. Timlin, L. Stoecker, N.E. Westcott, and J.G. Dobson, 2013: Regional Climate Trends and Scenarios for the U.S. National Climate Assessment. Part 3. Climate of the Midwest U.S., NOAA Technical Report NESDIS 142-3, 95 pp. (available at http://scenarios.globalchange.gov/regions/midwest).
[74] Bill Frederick Senior National Weather Service Meteorologist & NWS Liaison at the Mississippi Valley Division, Precipitation Trends in the Mississippi River Watershed (March 2019) (available at https://www.mvd.usace.army.mil/Portals/52/docs/Precipitation%20Trends.pdf).

The impacts of climate change are also particularly significant for migratory birds, which are affected across their migratory routes by changes in water regime, mismatches with food supply, sea level rise, and habitat shifts, changes in prey range, and increased storm frequency.[75] As recognized by the United Nations Environment Program and the Convention on the Conservation of Migratory Species of Wild Animals, migratory wildlife is particularly vulnerable to the impacts of climate change:

> As a group, migratory wildlife appears to be particularly vulnerable to the impacts of Climate Change because it uses multiple habitats and sites and use a wide range of resources at different points of their migratory cycle. They are also subject to a wide range of physical conditions and often rely on predictable weather patterns, such as winds and ocean currents, which might change under the influence of Climate Change. Finally, they face a wide range of biological influences, such as predators, competitors and diseases that could be affected by Climate Change. While some of this is also true for more sedentary species, migrants have the potential to be affected by Climate Change not only on their breeding and non-breeding grounds but also while on migration.
>
> Apart from such direct impacts, factors that affect the migratory journey itself may affect other parts of a species' life cycle. Changes in the timing of migration may affect breeding or hibernation, for example if a species has to take longer than normal on migration, due to changes in conditions *en route*, then it may arrive late, obtain poorer quality breeding resources (such as territory) and be less productive as a result. If migration consumes more resources than normal, then individuals may have fewer resources to put into breeding . . . .
>
> * * *
>
> Key factors that are likely to affect all species, regardless of migratory tendency, are changes in prey distributions and changes or loss of habitat. Changes in prey may occur in terms of their distributions or in timing. The latter may occur though differential changes in developmental rates and can lead to a mismatch in timing between predators and prey ("phenological disjunction"). Changes in habitat quality (leading ultimately to habitat loss) may be important for migratory species that need a coherent network of sites to facilitate their migratory journeys. Habitat quality is especially important on staging or stop-over sites, as individuals need to consume large amounts of resource rapidly to continue their onward journey. Such high quality sites may [be] crucial to allow migrants to cross large ecological barriers, such as oceans or deserts.[76]

[75] UNEP/CMS Secretariat, Bonn, Germany, Migratory Species and Climate Change: Impacts of a Changing Environment on Wild Animals (2006) at 42-43 (available at http://www.cms.int/publications/pdf/CMS_CimateChange.pdf).

[76] UNEP/CMS Secretariat, Bonn, Germany, *Migratory Species and Climate Change: Impacts of a Changing Environment on Wild Animals* (2006) at 40-41 (available at http://www.cms.int/publications/pdf/CMS_CimateChange.pdf).

Despite the highly significant implications of climate change on the Mississippi River and the fish and wildlife that rely on it, the Draft SEIS II includes only one paragraph that discusses climate change, which it does only by referencing a 2018 assessment by the Corps:

> The assessment (USACE 2018a) also evaluated climate change and sea level rise (SLR). In terms of climate change, after conducting a regional literature review and evaluating the currently available data for the Mississippi River basin, the assessment found that "the meteorological and hydrological underpinnings of the MR&T PDF are found to be adequate" (USACE 2018a). The assessment evaluated the sensitivity to SLR through the simulation of the "high" SLR scenario following the guidance of ER 1100-2-8162. The assessment demonstrated that the maximum expected influence of SLR under the "high" scenario would range from 0.1 feet at Baton Rouge to 1.1 feet at Venice. Additional information associated with SLR can be found in the results of the assessment (USACE 2018a)."

Draft SEIS II at 14. This single paragraph does not satisfy the clear requirements of NEPA.

Many other significant cumulative impacts must be evaluated in the Draft SEIS II, including the cumulative impact of the vast numbers of Corps-built river training structures on increasing flood heights in portions of the Mississippi River.

As the Corps is aware,[77] extensive peer-reviewed science demonstrates that river training structures have increased flood levels by up to 15 feet in some locations and 6 to 10 feet in broad stretches of the Middle Mississippi River where these structures are prevalent.[78] The impacts of river training structures are cumulative; the more structures placed in the river, the higher the flood stages. Flood stages increase more than 4 inches for each 3,281 feet of wing dike built within 20 river miles downstream:

> [O]ur analyses demonstrate that wing dikes constructed downstream of a location were associated with increases in flood height ("stage"), consistent with backwater effects upstream of these structures. Backwater effects are the rise in surface elevation of flowing water upstream from, and as a result of, an obstruction to water flow. These backwater effects were clearly distinguishable from the effects of upstream dikes, which triggered simultaneous incision and conveyance loss at sites downstream. On the Upper Mississippi River, for example, stages increased more than four inches for each 3,281 feet of wing dike built within 20 RM (river miles) downstream. These values represent parameter estimates and associated uncertainties for relationships significant at the 95 percent confidence level in each reach-scale model. The 95-percent level indicates at least a 95% level of certainty in correlation or other statistical

[77] The National Wildlife Federation recognizes that the Corps disagrees with these findings. However, the Corps' conclusion that river training structures do not affect flood heights has been conclusively disproved by research led by Nicholas Pinter, Ph.D., currently the Shlemon Chair in Applied Geology at the University of California Davis. Dr. Pinter has specifically rebutted the arguments used by the Corps to reject these findings in a series of exchanges published in the Journal of Hydraulic Engineering and in sworn affidavits submitted to the District Court for the Southern District of Illinois. These materials are provided at Attachment B to the National Wildlife Federation Scoping Comments on the SEIS II.

[78] See, e.g., Pinter, N., A.A. Jemberie, J.W.F. Remo, R.A. Heine, and B.A. Ickes, 2010. Empirical modeling of hydrologic response to river engineering, Mississippi and Lower Missouri Rivers. River Research and Applications, 26: 546-571; Remo, J.W.F., N. Pinter, and R.A. Heine, 2009. The use of retro- and scenario- modeling to assess effects of 100+ years river engineering and land cover change on Middle and Lower Mississippi River flood stages. Journal of Hydrology, 376: 403-416.

> benchmark presented, and is considered by scientists to represent a statistically verified standard. Our study demonstrated that the presence of river training structures can cause large increases in flood stage. For example, at Dubuque, Iowa, roughly 8.7 linear miles of downstream wing dikes were constructed between 1892 and 1928, and were associated with a nearly five-foot increase in stage. In the area affected by the 2008 Upper Mississippi flood, more than six feet of the flood crest is linked to navigational and flood-control engineering.[79]

Additional science shows that the Middle Mississippi River has been so constricted by river training structures and levees that it is now exhibiting "the flashy response" to flooding "typical of a much smaller river,"[80] with extremely troubling implications for public safety. In recent comments submitted on the Corps' Regulating Works Project Grand Tower Amended Environmental Assessment, Robert E. Criss, Ph.D., a professor in the Department of Earth and Planetary Sciences at Washington University in St. Louis, concludes:

> The consequences of current management strategy on floodwater levels are clearly shown by data from multiple gauging stations on the Middle Mississippi River (Figures). The Chester and Thebes stations were selected as they are the closest stations to the project area that have long, readily available historical records (USGS, 2016). **These figures conclusively document that floodwater levels have been greatly magnified along the Middle Mississippi River, in the timeframe when most of the in-channel navigational structures were constructed. If these structures are not the cause, then we are left with no explanation for this profound, predictable effect.** That USACE proposes more in-channel construction activities only two months after another "200-year" flood (as defined by USACE, 2004, 2016) occurred in this area proves that their structures and opinions are not beneficial, but harmful.

Dr. Criss also notes that measurements at the Mississippi River at St. Louis and the Missouri River at Herman "document similar damaging and incontestable trends for other river reaches managed in the same manner," in his comments on the Grand Tower Amended Environmental Assessment.

A 2016 Journal of Earth Science study co-authored by Dr. Criss ("Criss and Luo 2016") highlights the cumulative impact of the Corps' excessive channelization of the Middle Mississippi River. As noted above, that study concludes that the Middle Mississippi River has been so constricted by river training structures and levees that it is now exhibiting "the flashy response" to flooding "typical of a much smaller river":[81]

> Ehlmann and Criss (2006) proved that the lower Missouri and middle Mississippi Rivers are becoming more chaotic and unpredictable in their time of flooding, height of flooding, and

[79] Reply Declaration of Nicholas Pinter, Ph.D. in Support of Plaintiffs' Motion for Preliminary Injunction, NWF et al v. Corps of Engineers, Case No. 14-00590-DRH-DGW, (S.D. ILL), 2014; Declaration of Nicholas Pinter, Ph.D. in Support of Plaintiffs' Motion for Preliminary Injunction, Case No. 14-00590-DRH-DGW, (S.D. ILL), 2014. These materials are provided as Attachment B to the National Wildlife Federation Scoping Comments on the SEIS II.
[80] Robert E. Criss, Mingming Luo, River Management and Flooding: The Lesson of December 2015–January 2016, Central USA, Journal of Earth Science, Vol. 27, No. 1, p. 117–122, February 2016 ISSN 1674-487X (DOI: 10.1007/s12583-016-0639-y).
[81] Robert E. Criss, Mingming Luo, River Management and Flooding: The Lesson of December 2015–January 2016, Central USA, Journal of Earth Science, Vol. 27, No. 1, p. 117–122, February 2016 ISSN 1674-487X (DOI: 10.1007/s12583-016-0639-y). A copy of this study is provided as Attachment C to the National Wildlife Federation Scoping comments on the Draft SEIS II.

magnitude of their daily changes in stage. This chaotic behavior is primarily the result of extreme channelization of the river, and its isolation from its floodplain by levees (e.g., Criss and Shock, 2001; GAO, 1995; Belt, 1975). The channels of the lower Missouri and middle Mississippi Rivers are only half as wide as they were historically, along a combined reach exceeding 1 500 km, as clearly shown by comparison of modern and historical maps (e.g., Funk and Robinson, 1974).

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The aftermath of storm Goliath [which led to the December 2015 floods] provides another example in an accelerating succession of record floods, whose tragic effects have been greatly magnified by man. The heavy rainfall was probably related to El Nino, and possibly intensified by global warming. . . . The Mississippi River flood at St. Louis was the third highest ever, yet it occurred at the wrong time of year, and its brief, 11-day duration was truly anomalous. Basically, this great but highly channelized and leveed river exhibited the flashy response of a small river, and indeed resembled the response of Meramec River, whose watershed is smaller by 160×. Yet, only a few percent of the watershed above St. Louis received truly heavy rainfall during this event; the river rose sharply because the water simply had nowhere else to go.

Further downstream, new record stages on the middle Mississippi River were set. Those record stages would have been even higher, probably by as much as 0.25 m, had levees not failed and been overtopped. The sudden drop of the water level near the flood crest at Thebes clearly demonstrates how levees magnify floodwater levels. In this vein, it is very significant that the water levels on the lower Meramec River were highest, relative to prior floods, proximal to a new levee and other recent developments.

Forthcoming calls for more river management, including higher levees and other structures, must be rejected. Additional "remediations" to this overbuilt system will only aggravate flooding in the middle Mississippi Valley (see Walker, 2016).

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In contrast, Goliath's extraordinary rainfall impacted only a tiny fraction of the huge, 1.8 million km2 Mississippi River Basin above St. Louis, yet flooding occurred which was truly remarkable for the high water level, time of year, and brief duration.

This continental-scale river exhibited the flashy response typical of a much smaller river such as the Meramec. This unnatural response is clearly consistent with the dramatic channelization of the middle Mississippi River and its isolation from its floodplain by levees, as clearly pointed out by Charles Belt more than 40 years ago. It is time for this effect to be accepted and for flood risk and river management to be reassessed.[82]

Cumulative impacts, including the cumulative impacts of climate change, must be fully evaluated in the Draft SEIS II.

[82] Id.

3. The Timeline For Finalizing The SEIS II Precludes Consideration Of Public Comments

The Corps has established a timeline for finalizing the SEIS II that precludes a legitimate consideration of comments on the draft submitted by Federal and State agencies, Tribes, and members of the public. At the October 1, 2020 virtual public hearing on the draft SEIS II, the Corps announced that the final SEIS II would be released on or about October 30—just 13 working days after the close of the public comment period on October 13. It is not possible to consider public comments and make necessary changes to the draft SEIS II under this timeline.

NEPA requires a meaningful consideration of public comments that cannot be carried out under the Corps' accelerated timeline.

D. The Draft SEIS II Does Not Comply With Federal Mitigation Requirements

While the National Wildlife Federation appreciates the work that went into developing the conceptual mitigation plan provided in the Draft SEIS II, that conceptual plan does not—and cannot—comply with the mandatory mitigation requirements applicable to civil works projects. To satisfy these requirements, the SEIS II must include a "specific plan to mitigate fish and wildlife losses" that complies with the civil works mitigation requirements established through numerous Water Resources Development Acts and "the mitigation standards and policies established pursuant to the regulatory programs" administered by the Corps.[83]

All losses to fish and wildlife created by a federal water resources project must be mitigated unless the Secretary of the Army determines that the adverse impacts to fish and wildlife would be "negligible."[84] To ensure that this happens, the Corps is prohibited from selecting a "project alternative in any report" unless that report includes a "specific plan to mitigate fish and wildlife losses" that ensures that "impacts to bottomland hardwood forests are mitigated in-kind and harm to other habitat types are mitigated to not less than in-kind conditions, to the extent possible."[85]

Corps mitigation must be monitored until the monitoring demonstrates that the ecological success criteria established in the mitigation plan have been met. The Corps is also required to consult yearly on each project with the appropriate Federal agencies and the states on the status of the mitigation efforts. The consultation must address the status of ecological success on the date of the consultation, the likelihood that the ecological success criteria will be met, the projected timeline for achieving that success, and any recommendations for improving the likelihood of success.[86]

In addition, mitigation lands for Corps civil works projects must be purchased before any construction begins.[87] Any physical construction required for purposes of mitigation should also be undertaken prior to project construction but must, at the latest, be undertaken "concurrently with the physical construction of such project."[88]

[83] 33 U.S.C. § 2283(d).
[84] 33 U.S.C. § 2283(d)(1).
[85] Id.
[86] 33 U.S.C. § 2283(d).
[87] 33 U.S.C. § 2283(a).
[88] Id.

Mitigation plans for water resources projects constructed by the Corps "shall include, at a minimum":

(1) The type, amount, and characteristics of the habitat being restored, a description of the physical actions to be taken to carry out the restoration, and the functions and values that will be achieved;

(2) The ecological success criteria, based on replacement of lost functions and values, that will be evaluated and used to determine mitigation success;

(3) A description of the lands and interest in lands to be acquired for mitigation, and the basis for determining that those lands will be available;

(4) A mitigation monitoring plan that includes the cost and duration of monitoring, and identifies the entities responsible for monitoring if it is practicable to do so (if the responsible entity is not identified in the monitoring plan it must be identified in the project partnership agreement that is required for all Corps projects). Corps mitigation must be monitored until the monitoring demonstrates that the ecological success criteria established in the mitigation plan have been met; and

(5) A contingency plan for taking corrective action in cases where monitoring shows that mitigation is not achieving ecological success as defined in the plan.[89]

To comply with the Clean Water Act section 404 mitigation requirements, Corps mitigation plans <u>also</u>:

(1) Must include a level of detail that is "commensurate with the scale and scope of the impacts."[90]

(2) Must describe "the resource type(s) and amount(s) that will be provided, the method of ecoregion, physiographic province, or other geographic area of interest."[91]

(3) Must describe "the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and the practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the compensatory mitigation project site."[92]

(4) Must describe "the legal arrangements and instrument, including site ownership, that will be used to ensure the long-term protection of the compensatory mitigation project site."[93]

(5) Must describe "the ecological characteristics of the proposed compensatory mitigation project site . . . . This may include descriptions of historic and existing plant communities,

[89] 33 U.S.C. § 2283(d) (establishing all the civil works plan mitigation requirements).
[90] 33 C.F.R. 332.4(c)
[91] 33 C.F.R. § 332.4(c)(2).
[92] 33 C.F.R. § 332.4(c)(3).
[93] 33 C.F.R. § 332.4(c)(4).

historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other site characteristics appropriate to the type of resource proposed as compensation. The baseline information should also include a delineation of waters of the United States on the proposed compensatory mitigation project site."[94]

(6) Must "describe the number of credits to be provided, including a brief explanation of the rationale for this determination," including "an explanation of how the compensatory mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity."[95]

(7) Must provide "[d]etailed written specifications and work descriptions for the compensatory mitigation project, including, but not limited to**,** the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan, including elevations and slopes of the substrate; soil management; and erosion control measures."[96]

(8) Must include "[a] description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed."[97]

(9) Must include "[e]cologically-based standards that will be used to determine whether the compensatory mitigation project is achieving its objectives."[98] Ecological performance standards for assessing whether the mitigation is achieving its objectives is a key element of a legally adequate mitigation plan:

> "Performance standards should relate to the objectives of the compensatory mitigation project, so that the project can be objectively evaluated to determine if it is developing into the desired resource type, providing the expected functions, and attaining any other applicable metrics (e.g., acres)."[99]
>
> "Performance standards must be based on attributes that are objective and verifiable. Ecological performance standards must be based on the best available science that can be measured or assessed in a practicable manner. Performance standards may be based on variables or measures of functional capacity described in functional assessment methodologies, measurements of hydrology or other aquatic resource characteristics, and/or comparisons to reference aquatic resources of similar type and landscape position. The use of reference aquatic resources to establish performance standards will help ensure that those performance standards are reasonably achievable, by reflecting the range of variability exhibited by the regional class of

[94] 33 C.F.R. § 332.4(c)(5).
[95] 33 C.F.R. § 332.4(c)(6).
[96] 33 C.F.R. § 332.4(c)(7).
[97] 33 C.F.R. § 332.4(c)(8).
[98] 33 C.F.R. § 332.4(c)(9).
[99] 33 C.F.R. § 332.5(a).

aquatic resources as a result of natural processes and anthropogenic disturbances. Performance standards based on measurements of hydrology should take into consideration the hydrologic variability exhibited by reference aquatic resources, especially wetlands. Where practicable, performance standards should take into account the expected stages of the aquatic resource development process, in order to allow early identification of potential problems and appropriate adaptive management."[100]

(10) Must describe the "parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting on monitoring results to the district engineer must be included."[101] The mitigation plan must provide for a monitoring period that is sufficient to demonstrate that the compensatory mitigation project has met performance standards, but not less than five years. A longer monitoring period must be required for aquatic resources with slow development rates (e.g., forested wetlands, bogs).[102]

(11) Must describe "how the compensatory mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management."[103]

(12) Must include a "management strategy to address unforeseen changes in site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The adaptive management plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success."[104]

(13) Must describe the "financial assurances that will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with its performance standards."[105]

(14) Must provide for a monitoring period that is sufficient to demonstrate that the compensatory mitigation project has met performance standards, but not less than five years. A longer monitoring period must be required for aquatic resources with slow development rates (e.g., forested wetlands, bogs).[106]

(15) Must include a clear description of compensatory mitigation requirements and include special conditions that "must be enforceable." The special conditions must: "(i) Identify

[100] 33 C.F.R. § 332.5(b).
[101] 33 C.F.R. § 332.4(c)(10).
[102] 33 C.F.R. § 332.6.
[103] 33 C.F.R. § 332.4(c)(11).
[104] 33 C.F.R. § 332.4(c)(12).
[105] 33 C.F.R. § 332.4(c)(13).
[106] 33 C.F.R. § 332.6.

the party responsible for providing the compensatory mitigation; (ii) Incorporate, by reference, the final mitigation plan approved by the district engineer; (iii) State the objectives, performance standards, and monitoring required for the compensatory mitigation project, unless they are provided in the approved final mitigation plan; and (iv) Describe any required financial assurances or long-term management provisions for the compensatory mitigation project, unless they are specified in the approved final mitigation plan. . . . "[107] The "special conditions must clearly indicate the party or parties responsible for the implementation, performance, and longterm management of the compensatory mitigation project."[108]

(16) Must include a "real estate instrument, management plan, or other mechanism providing long-term protection of the compensatory mitigation site must, to the extent appropriate and practicable, prohibit incompatible uses (e.g., clear cutting or mineral extraction) that might otherwise jeopardize the objectives of the compensatory mitigation project."[109]

The Clean Water Act mitigation rule also requires that the mitigation plan for this project ensure that:

(1) Mitigation compensates for the aquatic resource functions that will be lost to the project, and "must be commensurate with the amount and type of impact" caused by the project.[110] Where practicable, mitigation is to compensate for "the suite of functions typically provided by the affected aquatic resource."[111]

(2) The mitigation "project site must be ecologically suitable for providing the desired aquatic resource functions." In determining the ecological suitability of the compensatory mitigation site, the Corps "must consider, to the extent practicable": the hydrological conditions, soil characteristics, and other physical and chemical characteristics; watershed-scale features including aquatic habitat diversity and habitat connectivity; and the size and location of the compensatory mitigation site relative to hydrologic sources (including the availability of water rights) and other ecological features.[112]

(3) Mitigation should be in kind if possible and where out of kind mitigation is utilized, the record must explain why.[113]

(4) Off-site and/or out-of-kind mitigation is appropriate only if on-site/in-kind compensatory mitigation opportunities "are not practicable, are unlikely to compensate for the permitted impacts, or will be incompatible with the proposed project, and an alternative, practicable off-site and/or out-of-kind mitigation opportunity is identified that has a greater likelihood of offsetting the permitted impacts or is environmentally preferable to on-site or in-kind mitigation."[114]

[107] 33 C.F.R. § 332.3(k).
[108] 33 C.F.R. § 332.3(l).
[109] 33 C.F.R. § 332.7(a).
[110] 33 C.F.R. § 332.3(a).
[111] 33 C.F.R. § 332.3(c).
[112] 33 C.F.R. § 332.3(d).
[113] 33 C.F.R. § 332.3(e).
[114] 33 CFR § 332.3(6).

(5) A “mitigation ratio greater than one-to-one” is required “where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site. The rationale for the required replacement ratio must be documented in the administrative record for the permit action.”[115]

(6) Preservation can only be used to provide compensatory mitigation when all the following criteria are met: “(i) The resources to be preserved provide important physical, chemical, or biological functions for the watershed; (ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available; (iii) Preservation is determined by the district engineer to be appropriate and practicable; (iv) The resources are under threat of destruction or adverse modifications; and (v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).”[116]

(7) “The aquatic habitats, riparian areas, buffers, and uplands that comprise the overall compensatory mitigation project must be provided long-term protection through real estate instruments or other available mechanisms, as appropriate.”[117]

(8) The compensatory mitigation requirements must be clearly stated and include special conditions that “must be enforceable.” The special conditions must: “(i) Identify the party responsible for providing the compensatory mitigation; (ii) Incorporate, by reference, the final mitigation plan approved by the district engineer; (iii) State the objectives, performance standards, and monitoring required for the compensatory mitigation project, unless they are provided in the approved final mitigation plan; and (iv) Describe any required financial assurances or long-term management provisions for the compensatory mitigation project, unless they are specified in the approved final mitigation plan….”[118] The “special conditions must clearly indicate the party or parties responsible for the implementation, performance, and longterm management of the compensatory mitigation project.”[119]

(9) To the maximum extent practicable, compensatory mitigation must be implemented “in advance of or concurrent with the activity” causing the impacts. “The district engineer shall require, to the extent appropriate and practicable, additional compensatory

[115] 33 C.F.R. § 332.3(f).
[116] 33 C.F.R. § 332.3(h).
[117] 33 C.F.R. § 332.7(a).
[118] 33 C.F.R. § 332.3(k).
[119] 33 C.F.R. § 332.3(l).

mitigation to offset temporal losses of aquatic functions that will result from the permitted activity."[120]

(10) "The district engineer shall require sufficient financial assurances to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with applicable performance standards."[121]

(11) "For compensatory mitigation projects on public lands, where federal facility management plans or integrated natural resources management plans are used to provide long-term protection, and changes in statute, regulation, or agency needs or mission results in an incompatible use on public lands originally set aside for compensatory mitigation, the public agency authorizing the incompatible use is responsible for providing alternative compensatory mitigation that is acceptable to the district engineer for any loss in functions resulting from the incompatible use."[122]

(12) "Compensatory mitigation projects shall be designed, to the maximum extent practicable, to be self-sustaining once performance standards have been achieved. This includes minimization of active engineering features (e.g., pumps) and appropriate siting to ensure that natural hydrology and landscape context will support long-term sustainability. Where active long-term management and maintenance are necessary to ensure long-term sustainability (e.g., prescribed burning, invasive species control, maintenance of water control structures, easement enforcement), the responsible party must provide for such management and maintenance. This includes the provision of long-term financing mechanisms where necessary."[123]

The SEIS II must include a specific and detailed mitigation plan that satisfies the requirements outlined in this section.

E. The SEIS II Must Be Reviewed By An Independent External Peer Review Panel

The draft SEIS II proposes 143 work items across portions of seven states that will be carried out over the next 50 years at a cost to taxpayers of at least $2.08 billion. SEIS II at iv, 21. The cost, scope, and controversy surrounding this project mandate review of the Draft SEIS II by an Independent External Peer Review (IEPR) panel pursuant to the requirements established by the Water Resources Development Act of 2007.[124]

Independent external peer review is mandatory for all project studies—which specifically include environmental impact statements—that evaluate projects costing more than $200 million, including mitigation costs. 33 U.S.C. §§ 2343(a)(3), 2343(l)(1). The Chief of Engineers must provide information to the public regarding the timing of an IEPR, the entity that has the contract for the IEPR review, and the

[120] 33 C.F.R. § 332.3(m).
[121] 33 C.F.R. § 332.3(n).
[122] 33 C.F.R. § 332.7(a).
[123] 33 C.F.R. § 332.7(b).
[124] 33 USC § 2343.

names and qualifications of the IEPR panel members "not later than 7 days after the date on which the Chief of Engineers determines to conduct a review."[125]

An IEPR must be finalized within 60 days of the close of the public comment period on a draft environmental impact statement.[126] Ideally, a draft IEPR would be provided prior to or concurrently with the release of a draft environmental impact statement to assist the public in identifying areas where the draft could be improved.

Despite the fact that the Draft SEIS II clearly triggers "mandatory" IEPR because it vastly exceeds the $200 million cost trigger for mandatory IEPR review,[127] the National Wildlife Federation has been unable to locate any reference to an independent external peer review being carried out for the SEIS II. Such information should be readily available since as noted above, the Corps must notify the public about the parameters of the IEPR within 7 days of determining that an IEPR is needed and because the IEPR must be finalized within 60 days of the close of the public comment period on the Draft SEIS II.

It is critical that the SEIS II and its recommended alternative be carefully and comprehensively reviewed by an independent external peer review panel before being finalized. Given the significance of the SEIS II to public safety and the environment, the Corps should engage the National Academy of Sciences to carry out the independent external peer review required by 33 U.S.C. § 2343. This peer review should include an evaluation of the long-term effectiveness of the alternative recommended by the Corps; whether the recommended alternative will protect and restore the functions of the Mississippi River and its floodplain and coastal wetlands; and whether the proffered skeleton mitigation plan can ensure implementation of ecologically successful mitigation.

Conclusion

The National Wildlife Federation urges the Corps to go back to the drawing board and develop a comprehensive approach to reducing flood damages along the Mississippi River based on an SEIS II that complies with the nation's critically important environmental laws.

Respectfully submitted,

Melissa Samet
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National Wildlife Federation
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San Anselmo, CA 94960
415-762-8264
sametm@nwf.org

[125] 33 USC § 2343(c).
[126] 33 USC § 2343.
[127] This project also requires IEPR because the Corps' proposal for this project is highly controversial.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

October 13, 2020

District Engineer
Mr. Mike Thron
U.S. Army Corps of Engineers
Vicksburg District
4155 Clay Street
Vicksburg, Mississippi 39138-3435

RE: EPA Comments on the Draft Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (1998 SEIS). CEQ: 20200175.

Dear Mr. Thron:

The U.S. Environmental Protection Agency (EPA) Regions 4, 5, 6, and 7 reviewed the U.S. Army Corps of Engineers (USACE) Vicksburg District's Draft Environmental Impact Statement Supplement II (Draft SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project. This Draft SEIS II is intended to supplement and, as necessary, augment the 1976 EIS and 1998 SEIS while adhering to the primary MR&T goals of providing flood protection from the project design flood and developing an environmentally sustainable project.

EPA is a Cooperating Agency on the MR&T Project. We participated in two public meetings, several interagency meetings and provided agency scoping and pre-draft comments on the proposed project. EPA appreciates the opportunity to work collaboratively with the USACE, and the USACE's inclusion of and efforts to address many of our agency scoping and pre-Draft SEIS II comments.

The USACE evaluates six alternatives and advances three, including a No Action alternative and two Build alternatives ("Conventional Construction" and "Avoid and Minimize"). Alternative 2, "Conventional Construction," evaluates 143 Work Items to be constructed that address levee deficiencies. While Alternative 3, "Avoid & Minimize," addresses the same work items as Alternative 2, it differs in the selection of borrow areas to avoid and minimize adverse environmental impacts from constructing borrow areas in wetlands. The USACE selected Alternative 3 as the preferred alternative.

Based on our review of the Draft SEIS II, EPA concurs that Alternative 3 has the fewest impacts to wetland and aquatic resources and is the appropriate preferred alternative. EPA has enclosed technical comments that identify our concerns with the Draft SEIS II and provide recommendations for consideration. EPA requests that our technical comments be addressed in the Final SEIS II or post record of decision.

Thank you for the opportunity to comment on the proposed project. Please contact Mr. Larry Long of the NEPA Section at (404) 562-9460, or by e-mail at long.larry@epa.gov should you have any questions.

Sincerely,

Mark J. Fite

Mark J. Fite
Director
Strategic Programs Office

Enclosure

Enclosure
EPA Comments on the Draft Supplement II to the Final Environmental Impact Statement, Mississippi River and Tributaries Project, Mississippi River Mainline Levees and Channel Improvement

Background

The Draft SEIS II updates the environmental analysis of the remaining authorized work on the Mississippi River Levee (MRL) features of the Mississippi River & Tributaries (MR&T) project. The USACE identified 143 additional "Work Items" along various reaches of the MRL that required remedial measures to control seepage, raise and stabilize deficient sections of the existing levee and floodwalls. These Work Items constitute the proposed action and are located across portions of seven states: Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi, and Louisiana. EPA's Regional offices have provided on-going technical comments using the USACE's MRL-SEIS GIS platform, which enabled EPA and cooperating agencies to effectively collaborate with the USACE on this proposed project. The USACE has incorporated many of EPA's scoping comments as well as comments captured during the USACE public meetings.

The USACE has identified sections (reaches) of the mainline levee system that require additional improvements, including efforts to control seepage, raise and stabilize deficient levee sections, and maintain the structural integrity of the levee system. The following comments revolve around the review of the Main Report, the Section 404(b)(1) analysis (Appendix 3), the Wetlands Appendix (Appendix 10) and the Mitigation Appendix (Appendix 20).

Section 404(b)(1) Analysis

Alternatives

Of the three alternatives presented, the USACE's preliminary analysis of identifying Alterative 3 (Avoid and Minimize) as the least environmentally damaging practicable alternative appears to be consistent with the guidelines. The Draft SEIS II analysis provides rationale for avoidance and minimization associated with the construction of project components.

Wetland Impacts

Section 5.5.1 states "[t]he preferred alternative would impact 655 acres of riverside forested wetlands and 351 acres of landside forested wetlands, primarily through borrow source acquisition and levee improvement features, resulting in a loss of wetlands function…. , respectively." Forested wetlands will be heavily impacted. Further, EPA believes the use of the Hydrogeomorphic (HGM) assessment was appropriate for the wetlands and is a reasonable estimate of the number of functional capacity units that would be lost as a result of Alternative 3. The USACE stated, and EPA is mindful that, wetland conditions in the project area reflect the historic alterations within the Mississippi River floodplain, including removal of dominant hardwood tree species, conversion of forested wetlands to agriculture, and disruption of natural flood regimes by established flood control projects. EPA recognizes that Alternative 3 decreases the impacts to wetland resources by shifting the location of some borrow areas and other features from forested areas adjacent to the levee to agricultural lands and other cover types, as compared to Alternative 2. EPA recommends the USACE continue to seek non-wetland borrow areas to further avoid impacts to wetlands at the project sites.

Compensatory Mitigation

General Comments

In order to improve the effectiveness and enforceability of the compensatory mitigation proposed, EPA provides the following recommendations:

> Pages 142 & 143 of the main document mention potential compensatory mitigation siting adjacent to drainage ditches would be considered due to their residential populations of fish and fresh-water mussels.
>
> EPA recommends that mitigation siting adjacent to ditches have direct or frequent connectivity to the Mississippi River and account for potential drainage of the restored wetland.

It is understood prior to construction on the proposed work items in the Draft SEIS II that agency coordination will be conducted on each individual work item and associated compensatory mitigation planning. This coordination is an important aspect of this project which EPA fully supports and plans to participate in as the project proceeds. EPA recommends that the Interagency Review Team model be used as the basis for the field team coordination.

Section 5.5.2 states "since proposed mitigation benefits multiple resources, mitigation required to compensate for impacts pursuant to the Clean Water Act (CWA) also compensated for impacts associated with fish and wildlife resources." In order to clarify where compensatory mitigation may be proposed for compliance with CWA 404(b)1 analysis and where compensatory mitigation may be proposed for compliance with other statutes (i.e., WRDA section 906 as amended for Fish and Wildlife habitat), EPA recommends the USACE articulate which aspects of wetland compensatory mitigation are proposed to meet which requirements.

The following discusses aspects of the USACE proposed implementation of the compensatory mitigation requirements consistent with the CWA 404(b)1 guidelines as updated in 2008 with the amendment of Subpart J—Compensatory Mitigation for Losses of Aquatic Resource (the Mitigation Rule) with which EPA has concerns.

Objectives

Given the emphasis of the Mitigation Rule to promote sustainable and resilient compensatory mitigation to replace lost aquatic resource functions, EPA recommends ecological objectives be listed in addition to those already listed in Appendix 10. EPA recommends these ecologically focused objectives be specific, measurable, attainable, repeatable and trackable actions that will be taken to restore each site to the functional level estimated in the USACE analysis. These objectives can then be tracked/monitored throughout the project as performance standards used to establish if the objectives were achieved.

Site Selection

The USACE states that the information presented in Section 5.0 of the Draft SEIS II represents a compensatory mitigation plan according to the requirements of the Rule. However, the Rule assumes that a mitigation project site has been chosen to which the requirements of the Rule apply. This is not the case in this Draft SEIS II as specified on page 138 of the Main Report, which states "specific mitigation tracts have not been identified. Once tracts are selected and acquired, decisions on the implementation of mitigation measures would be made based upon tract-specific parameters such as soil conditions, anticipated hydrology, elevation, etc." In order to ensure the mitigation considered is effective and enforceable, EPA recommends that the Final SEIS II identify when the specific mitigation tracts (especially the alternative borrow areas) would be identified in relation to the proposed start of construction, how the compensatory mitigation analysis would be updated to ensure the mitigation adequately compensates for the unavoidable impacts to waters of the U.S., and what coordination would occur with EPA and other resource agencies on any updates to the mitigation plan.

EPA further recommends that key considerations that need to be updated post record of decision be included in the Final SEIS II, including, but not limited to the following mitigation site characteristics:

- Hydrologic conditions;
- Soil conditions;
- Existing vegetation conditions;
- Reference sites by wetland type;
- Verification of assumptions regarding mitigation site connectivity indicating mitigation sites will be large in size and well connected to other habitats (e.g., HGM variables Vtract, Vcore, Vconnect)

Mitigation site plans

With respect to mitigation site plans, EPA recommends that key considerations that need to be updated post record of decision be included in the Final SEIS II, including, but not limited to:

- Landscape position of the site;
- Surrounding land use;
- Design mitigation site plans to specific site hydro-pattern;
- Baseline hydrologic monitoring;
- Site soil mapping/verification on each site;
- Delineation of geographic boundaries of the project;
- Construction methods, timing, and sequence;
- Source(s) of water, including connections to existing waters and uplands;
- Methods for establishing the desired plant community;
- Plans to control invasive plant species;
- Proposed grading plan, including elevations and slopes of the substrate as well as microtopographic relief;
- Soil management and amendments as needed; and
- Erosion control measures

Performance Standards

In addition to parameters discussed in the Main Report and ecological model variables, EPA recommends that key considerations that need to be updated post record of decision be included in the Final SEIS II, but are not limited to:

- Identification of suitable reference sites against which to compare compensatory mitigation sites
- Vegetation (e.g., species composition, density, growth, cover)
- Soils (e.g. type, bulk density, organic matter content)
- Site specific hydrology (e.g., frequency, duration, timing or each water source)
- Invasive species control (coverage does not exceed 10% of site)
- Monitoring of the mitigation sites should be compared to suitable reference sites

Threatened or Endangered Species

EPA defers to the USFWS for a determination of compliance with Section 230.10(b) impacts to Threatened or Endangered Species. However, we offer the following comments for consideration.

- Regarding the federally endangered gray bat, the main document and Appendix 9 mention "[t]here are no caves within any of the proposed Work Item footprints." As cave surveys have not been conducted within the entirety of the proposed work items, EPA suggests this language be modified to state, "There are no known caves within any of the proposed Work Item footprints." Cape Girardeau is known to have karst limestone, and Missouri has the second highest number of caves in the U.S. We suggest that a habitat management plan that addresses gray bats be provided in the Final SEIS II or prior to construction. We suggest further gray bat coordination with USFWS for Cape Girardeau area work items.

- Though bald cypress has been historically logged out of the Mississippi River Alluvial Valley, forested wetland restoration planning should include a cypress-tupelo component. We recommend that the Final SEIS II distinguish between cypress-tupelo and oak dominated bottomland hardwood (BLH) impacts or restoration.

Maps and Tables

EPA recommends updating some of the information provided in the maps and tables listed below:

- Appendix 01: Levee item B0208 riverside borrow area appears to include BLH impacts. Please revise the wetland impact table and corresponding compensatory mitigation or shift the area to avoid BLH.
- Appendix 01: Map 4 of 64 partially cuts off 22-R work items near RM5. Please update the map to include a complete view of work items near RM5.
- Appendix 03: Table 2 shows 65.02 acres of forested wetland will be impacted in Missouri, but Table 5-2 in the Main Report indicates 74.4 acres of forested wetland impacts in Missouri. This discrepancy in forested wetland acreage impacted needs to be addressed either through explanation or by ensuring the tables are consistent.
- Table 5.3, "Summary of Compensatory Techniques" may need to be modified to include a simple chart listing impacts by acreage and type and mitigation by acreage and type, including

mitigation ratios by habitat type. This change would help decision makers and the public to better understand the totality of the potential impacts, if the project is built.

Community Impacts

The proposed project has the potential to impact communities, including those that are low-income along and within proximity to the river. If acquisition of land is required, EPA recommends that USACE provide equitable compensation and mitigation. EPA also recommends that USACE develop and incorporate a contingency plan within the Final SEIS II in case of events, such as levee failure, occur during levee construction.

From: Craig Gothreaux - NOAA Federal
To: MRL-SEIS-2
Cc: NOAA NEPA - NOAA Service Account; _NMFS ser HCDconsultations
Subject: [Non-DoD Source] MRL SEIS II
Date: Wednesday, October 14, 2020 12:24:47 PM

The NMFS Habitat Conservation Division (HCD) has reviewed the Mississippi River Mainline Levee (MRL) Supplemental Environmental Impact Statement (SEIS II), and does not object to the implementation of the project as proposed.

Thank you for your coordination,
Craig

--

Craig Gothreaux
Fishery Biologist
Southeast Region, Habitat Conservation Division
NOAA Fisheries
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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Louisiana Ecological Services 200 Dulles Drive
Lafayette, Louisiana 70506

October 16, 2020

Colonel Michael C. Derosier
District Commander
U.S. Army Corps of Engineers Vicksburg District
4155 Clay Street
Vicksburg, Mississippi, 39183

Dear Colonel Derosier:

Please reference your agency's Draft Supplemental II Environmental Impact Statement (DSEIS II) that will address remaining work on the Mississippi River mainline levee feature (MRL). Currently the MRL has sections that are structurally deficient to protect against the Project Design Flood (PDF). The Service submits the following comments on the DEIS in compliance with the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.).

USACE's goal for the SEIS II is to provide flood protection from the PDF and develop an environmentally sustainable project. Alternatives to restore the structural integrity of the project will include raising and widening levees, stabilizing floodwalls, and seepage control (e.g., berms, relief wells, and cutoff trenches). USACE has selected the Avoid and Minimize Alternative thus reducing impacts to bottomland hardwoods and has developed a general mitigation plan to offset those losses.

The Fish and Wildlife Service (Service) has found that the DEIS discloses and quantifies impacts to fish and wildlife resources and provides a general mitigation plan to offset losses to those resources. However, the Service does have comments on the DEIS and those comments are presented below.

Page 19, Avoid and Minimize. To help minimize impacts to migratory birds and bats, forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds and breeding bats, when practicable. State specific time frames should be obtained from the local Service office and state conservation agency

Page 85, last paragraph. Correct application of the mink model results in a decrease in bottomland hardwood mitigation because of the increase in value of borrow sites due to the creation of surface water. However, the mink model has previously been modified by USACE to reflect the differing value of surface water areas for channelized water bodies. Future use of the mink HEP model for any impact/mitigation analysis should be predicated on the having the model incorporate aquatic productivity of the adjacent water bodies (e.g., borrow areas) into the model thus reflecting the true value of such areas to the species.

In addition, since the proposed borrow areas value are reducing mitigation of bottomland hardwoods and there is no long-term protection or management requirements of these borrow areas a landowner could fill in the borrow areas or modify them and reduce their value according to the mink model. Therefore, the Service recommends that additional monitoring be included to determine if these borrow areas are still present and functioning as described over the life of the project. If there is a loss of borrow areas then additional mitigation could be incorporated into the project to ensure there is no net loss of functions and values.

Page 141, fourth bullet, tree planting. While seeding and natural regeneration are potential reforestation techniques, based on the Service's experience the most reliable means of re-establishing bottomland hardwoods and achieving planting success criteria is by planting of bare root seedlings that meet local National Resource Conservation Services specifications. The Service recommends against the use of seeding as a reforestation technique for mitigation areas.

In addition to using seedlings, the Service also finds acceptable the planting of RPM trees when needed to establish hard mast tree species. Some natural regeneration may be acceptable but should be very limited because that technique is unlikely to recruit sufficient mast producing species to achieve mitigation success. Use of natural recruitment should be coordinated with the Service and the local state natural resource agency prior to planning the use of this method.

Page 141 - Herbaceous wetland plantings should include species that are beneficial to native pollinators including the monarch butterfly.

Page 143, bullets 1 through 4. In locating lands within each of the mitigation zones the Service recommends implementation of the following sub-hierarchy to further achieve conservation:

a. areas that provide benefits to species listed as threatened or endangered under the ESA or areas that protect or are within their designated critical habitat,
b. areas that provide benefits to at-risk species or Birds of Conservation Concern (https://www.lmvjv.org/conservation-tools-summary), and
c. lands adjoining or in close proximity to lands held for conservation, especially public lands.

In addition, when feasible, mitigation located in zones 2 through 4 should also be located in areas that would preserve or restore off channel flood storage areas thus providing additional flood risk reduction benefits in line with Engineering with Nature concepts as well as providing habitat for fish and wildlife.

Page 145, Mitigation Bank Credits. Purchase of credits from mitigation banks should follow the same hierarchy presented in the DEIS as well as the Service's above sub-hierarchy.

If credits are purchased from a mitigation bank an assessment of the banks credits would need to be undertaken using the same technique used to determine impacts. A review of that assessment should be undertaken by the local Service office and the State natural resource agencies prior to its finalization.

Page 151, Mitigation Zone 3. If mitigation is done in Zone 3 there will be a net loss of Duck Us Days (DUDs). It this situation occurs USACE should coordinate with the Service and state natural resource agencies to determine if additional mitigation for these resource losses are justified.

Page 153, Site Protection Instrument. If mitigation lands are purchased for inclusion within a publicly managed area those lands may need to meet certain requirements; the proposed land managing agency should be contacted prior to purchase of such lands to ensure those requirements are met. Funding for management and oversight should be provided on an annual basis to the agency managing mitigation lands.

Page 153, second to last paragraph. This paragraph indicates that USACE mitigation lands are intended to be placed in a perpetual conservation status. Service mitigation policy specifies that mitigation should remain as long as the impacts occur on the landscape. Therefore, the Service recommends that word intends be replaced with planned.

Page 154, Credit Determination Methodology. This section should indicate that the Service and the state natural resource agencies will be involved in the determination of credits.

Page 154, Mitigation Work Plan. Under Sec 7(a)1 of the ESA the Service recommends that mitigation areas should also include, to the extent feasible, management to provide habitat for listed bats. Management actions should be continually updated in coordination with the Service and other natural resource agencies as habitat needs become better understood.

Page 155, third to last paragraph, second sentence. This sentence should reflect that the 5 year monitoring intervals during the 0 – 20 year period would only start after attainment of initial and intermediate success criteria.

Page 155, Ecological Performance Standards. The Service recommends that details of Ecological Performance Standards be developed in coordination with the Service and state natural resource agencies.

Page 156, Vegetation. Because hardmast seeds are typically not easily dispersed the Service recommends that percent survivor of planted seedlings by soft and hardmast be determined during monitoring events during the first 10 years to ensure adequate hardmast is recruited into mitigation areas and that a variety of soft mast species are also recruited. This is especially important in areas where those species are part of the impact assessment and mitigation analysis.

Page 157, Phase 1, Adaptive Management Report. Based on previous experience, the Service recommends that the monitoring reports for each event determine if implementation of mitigation is progressing successfully or if changes are required to ensure success. Waiting 5 years post planting to determine the need for remedial action may result in greater efforts and potentially greater costs to achieve success, in addition to a longer time period to achieve mitigation. Failure to achieve initial success early in the mitigation phase may result in the need to modify mitigation plans (e.g., expansion of mitigation areas, purchase of credits, etc.) to ensure no net loss is achieved.

Page 157, Scenario B, Partial Success. The Service acknowledges that some resources or functions may be over compensated in comparison to others; nonetheless, if a resource or function has not attained success, the overall success may not be achieved because of the influence of that variable on the overall success. Therefore, remedial action to achieve success for that resource or function should be implemented or an equivalent amount of mitigation credits should be purchased or implemented to offset the non-attainment.

Similarly, use of mitigation tracts that have achieved anticipated or greater levels of functions and values to offset tracts that are not in attainment could result in a net loss in functions and values if the functions and values at either or both areas do not continue to obtain their anticipated levels of functions and values. Therefore, the Service recommends that USACE prior to deciding to exchange resources or functions as a means of attaining overall success first consult with the Service and state natural resource agencies to ensure no net loss of resources or functions occurs.

Appendix 2 and 6

Given the Mink model should be refined it may be appropriate to re-evaluate the benefit or value of borrow pits during post project monitoring and evaluation to determine if additional mitigation may be recommended for impacts to bottomland hardwood habitats.

Appendix 9

Page 7 - The chronology of typical reproductive activities of bald eagles varies in parts of the United States (US). The information provided is for the southeast region; the upper portions of the MRL probably fall more in line with the dates for the northern US. The bald eagle management guidelines should be referenced for better chronology (https://www.fws.gov/migratorybirds/pdf/management/nationalbaldeaglenanagementguidelines.pdf).

We look forward to assisting the USACE in the completion of this study. Should you have any questions regarding our comments, please contact David Walther (337/291-3122) of this office.

Sincerely,

Joseph A. Ranson
Field Supervisor
Louisiana Ecological Services Office

Attachment

cc:
FWS, ES, Jackson, MS
FWS, ES, Columbia, MO
FWS, ES, Conway, AR
FWS, ES, Cookeville, TN
FWS, ES, Frankfort, KY
FWS, ES, Marion, IL

A21-7.3 Addendum: Determination of Acreages for Resource Assessments

The following information provides a description of how the various resource assessments were conducted during evaluation of the SEIS II. Specifically it provides information to clarify what areas were included in the assessments and provides justifications for the assumptions made during the assessment. This information supplements the descriptions provided in the various resource appendices to the SEIS II. A summary table of acreages and associated functional outputs broken out by State is shown below.

Table Addendum-1. Summary table of impacted acreages and associated functional units by State for the Preferred Alternative 3. Acres are shown as a point of reference. Compensatory mitigation is calculated based off of the functional resource assessments not acres.

	Net Losses(-)/ Gains(+)	Wetlands (FCU/HSU)[1]			Waterfowl (DUD)[2]	Terrestrial Wildlife (AAHUs)[3]	Aquatic (HU)[4]
		Forested[5]	Farmed[6]	Marsh[7]	Habitats flooded 18 in. or less[4]	Forested[5]	Open Water
Arkansas	Functional Units	-11,089			-57,001	-394	+65
	Acres	-156	-432	0	-76	-159	+94
Illinois	Functional Units	-546			0	-1	+7
	Acres	-9	-13	0	0	-10	+10
Kentucky	Functional Units	-6			-19	0	+0.1
	Acres	0	-39	0	0	0	+0.3
Louisiana	Functional Units	-16,605			-560,860	-876	+396
	Acres	-536	-390	-5	-392	-380	+692
Mississippi	Functional Units	-8,764			-3,062	-190	+92
	Acres	-166	-117	0	-4	-105	+154
Missouri	Functional Units	-4,691			-41,512	-82	+50
	Acres	74	-128	0	-48	-69	+88
Tennessee	Functional Units	-7,592			-497	-63	+255
	Acres	-65	-527	0	-1	-65	+365
TOTAL	Functional Units	-49,293			-662,951	-1,606	+865
	Acres	-858	-1,646	-5	-522	-789	+1403

[1] Functional Capacity Units calculated from Hydrogeomorphic Manual (HGM) and Habitat Suitability Units from Wetland Value Assessment (WVA) analyses.
[2] Duck-Use-Days (DUD) calculated from waterfowl analyses. DUD is not comparable to other units of measure (FCU, HU, etc.).
[3] Average Annual Habitat Units calculated using Habitat Evaluation Procedures (HEP) analyses on wildlife.
[4] Habitat Units calculated from Borrow Area Habitat Suitability Index Fish Diversity Model (aquatic HUs were gains due to addition of open water associated with borrow areas).
[5] Forested wetland impacts include areas mapped as forested, tree plantations, scrub/shrub wetlands, sandbars, and non-forested wetlands assuming that they could convert into forest over time. All of these lands were assumed to be wetlands for the wetland assessment. Because forested wetlands receive the highest scores within the assessment approach, this represents the most conservative possible tactic for evaluating impacts to wetland resources.
[6] All agricultural cropland, pasture, and bare soil cover types were assumed to be farmed wetlands for the wetland assessment; however, these areas provide limited wetland functions or habitat suitability.
[7] Marsh habitat was brackish marsh.

Wetlands

Determination of assumed wetland acreages for the assessment of potential impacts to wetland resources included in the Draft Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (1998 SEIS).

Purpose: The following provides a description of how the wetland assessment was conducted during evaluation of the SEIS II. Specifically it provides information to clarify what areas were included in the wetland assessment and provides justifications for the assumptions made during the assessment. Examples of implications of alternative assessment approaches are included to help readers understand the potential impact of the selected approach on the study results. This information supplements the descriptions provided in the wetland appendix to the SEIS II document.

Background: Determining the extent of wetlands across the large (7 state) project area posed logistical challenges. In order to address those challenges, several potential approaches to establish the estimated extent of wetlands were considered. First, the completion of detailed wetland delineations across the project extent was deemed impractical due to limitations related to property access, given the hundred (or potentially thousands) of real estate actions that would have been required to obtain right of entries agreements across the project area. Additionally, the final location of levee work items and associated borrow areas had not been determined at the onset of the wetland assessment further preventing the use of a traditional wetland delineation approach.

Second, the application of the procedures utilized during the previous wetland assessment (SEIS I, 1998) were considered. During the 1998 assessment vegetated areas were identified using the recommendation of the 1987 Corps of Engineers Wetland Delineation Manual and the Food Security Act Manual, supplemented by a number of assumptions. Notably, the assessment was limited to those areas dominated by facultative-wetland and obligate plant species; areas dominated by hydric soils; and areas for which gage data suggested that wetland hydrology would be present, although attempts were made to include areas supported by soil saturation on a case by case basis. Additionally, the SEIS I assessment team relied on NRCS to provide data on the extent of wetlands located on active agricultural lands. While we do not disagree with the assumptions made during development of the SEIS I, the current assessment team sought to take a more inclusive approach to evaluate wetland resources.

A third approach was considered that would apply a combination of remote sensing techniques supplemented with on-site wetland evaluations. However, the availability of existing data, time constraints, and the requirement to gain access to the large number of private parcels restricted the implementation of this strategy. Additionally, the assessment team determined that this hybrid approach could still omit inclusion of small wetland areas in the assessment.

Determining assumed wetland extent for the SEIS II report: As a result of the considerations outlined above, the current wetland assessment chose to take a more inclusive approach that would evaluate the maximum extent of wetlands in the project area (i.e. a 0.5 half-mile buffer surrounding all levee work items). This included making assumptions that all areas in the assessment were assumed to be wetlands (i.e., assumed wetlands), excluding open water and developed/urban areas. Those cover types were excluded because they clearly fail to meet the hydrophytic vegetation, wetland hydrology, or hydric soils required for wetland delineation. The following land cover classes were assumed to be wetlands: agricultural croplands, pasture, forest, and marsh.

This approach was selected to include the maximum extent of potential wetlands (i.e., assumed wetlands) in the assessment, since many of the assumed wetland areas would fail to meet the three factors required for wetland identification as described in Environmental Laboratory (1987) and the delineation procedures detailed in USACE (2010). Further, the selected approach does not consider the jurisdictional status of assumed wetlands in the project area, which has the potential to remove wetland areas from consideration including isolated depressions, prior converted croplands, and other features. Implementation of either the traditional wetland delineation approach, the procedures applied in the previous SEIS I, or the hybrid approach would have reduced the extent of acres assessed during the development of the current report.

This approach resulted in a total assumed wetland area of 113,317 acres which was subsequently included in the wetland functional assessment. Of the 113,317 acres of assumed wetlands occur within the 0.5 mile buffer of levee work items, only a small fraction of the assumed wetland area occurs under the physical footprint of the proposed project, and therefore would be subject to alteration. For example, the 0.5 mile buffer associated with levee work item 22-R includes >260 acres of assumed wetlands, yet only 3.6 acres of assumed wetlands are located within the proposed project footprint, and would be subject to potential impacts to wetland resources (Figure X.1). The current wetland mitigation of 1,447 acres proposed for the MRL SEIS II are related to impacted wetlands within these physical footprints; however, we intentionally calculated the total assumed wetland acreages and associated functional scores that could potentially be impacted if certain work item features (e.g. borrow pits) are deemed unsuitable for levee maintenance and must be relocated. In this event, alternate sites within the buffered area would be identified to meet project maintenance goals.

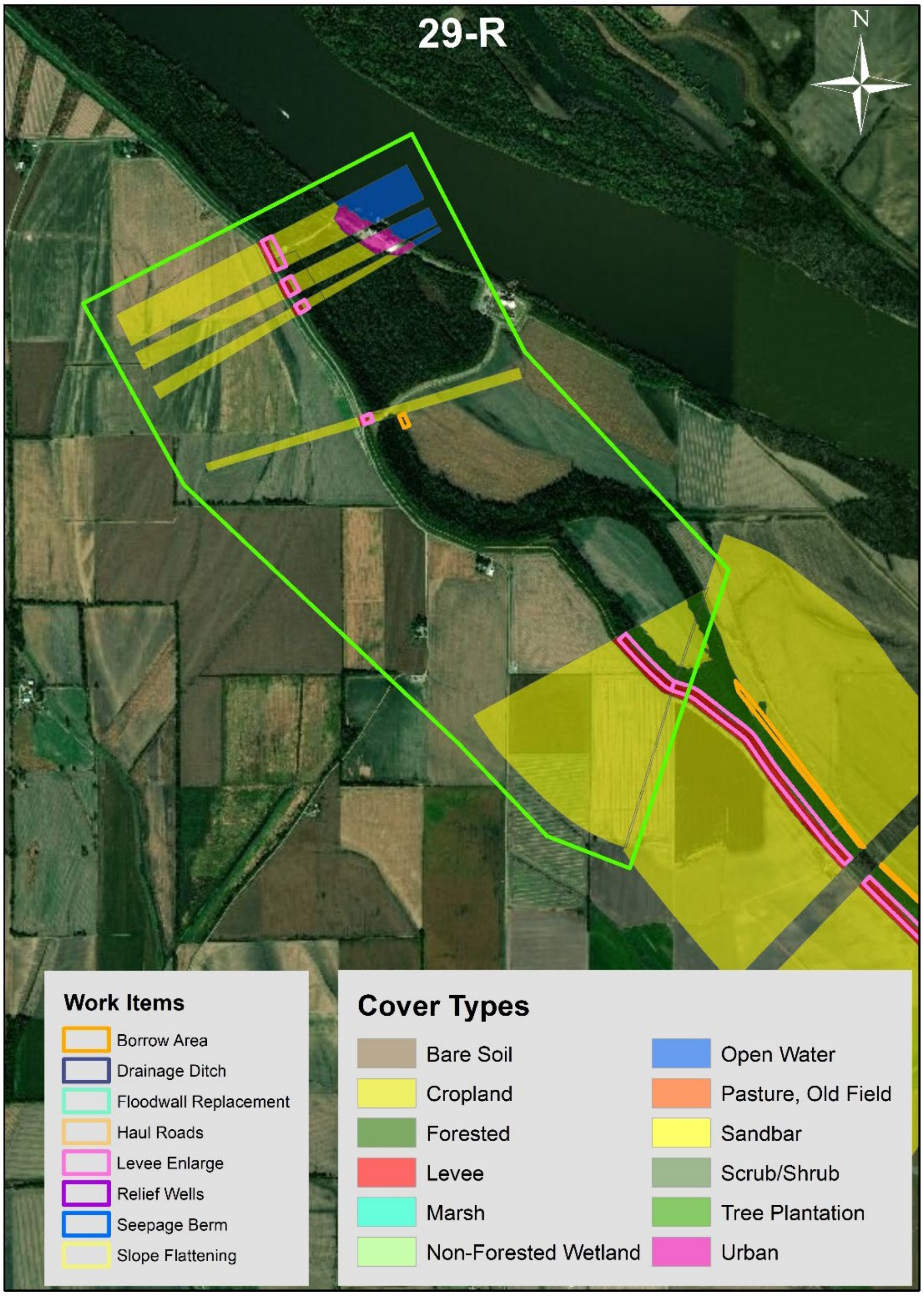

Figure Addendum-1. Levee work item 29-R demonstrates that while >260 assumed wetlands occurred within the 0.5 mile buffer used to assess wetland resources, only a small area (3.6 acres) are subject to potential wetland alteration (i.e., they occur within the physical project footprint).

Extent of assumed wetlands exhibiting forested conditions: The forested land cover class included areas mapped as forested, tree plantations, shrub/scrub wetlands, sandbars, and non-forested wetlands. This selection was made to reflect the potential that these unmanaged areas may mature into forested wetlands via forest succession within the 50 year period of analysis, even if they lack established forests in their current condition. Because forested wetlands receive the highest scores within the assessment approach, this represents the most conservative possible tactic for evaluating impacts to wetland resources. As a result, any potential impacts to assumed areas that are currently non-forested assumed wetlands are captured in the analysis.

Extent of assumed wetlands within agricultural landscapes: The agricultural cropland cover type included all areas under row crop production and recently fallowed fields. The pasture land cover class included managed areas mapped as pastures, old fields, and bare soil due to evidence ongoing disturbance that would preclude the development of forested conditions during the period of analysis. While these areas provide limited (and in some cases zero) wetland functions or habitat suitability, they were assumed to be wetlands for the purpose of the assessment and evaluated as such. As a result, any habitat values or wetland functions for these areas were incorporated into the assessment of wetland resources.

Waterfowl

Determination of acreages and value for the assessment of potential impacts to flooded habitats for waterfowl included in the Draft Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (1998 SEIS).

Purpose: The following provides a description of how USACE determined mitigation required for the MRL SEIS II for the waterfowl assessment.

Determining waterfowl habitat acres for the MRL SEIS II report:

Baseline duck-use-days (DUDs) were calculated for each Work Item, by USACE District and by State, and for the entire MRL set of Work Items, from spatial data collected from remote sensing via the 2018 USDA National Agricultural Statistics Service Cropland Data Layer. Waterfowl foraging habitat, regardless of food value, is only of use if available. Food availability is dependent on extent, duration, and depth of flooding. Ducks use relatively shallow water areas, 18 inches or less, for feeding. Using extensive hydrological data (Years 1969-2018), USACE estimated seasonal hectares flooded 18 inches or less for the wintering season using ENVIRO-DUCK model. By incorporating available food resources available to waterfowl with proper feeding depths, USACE calculated the DUDs according to formulas generated within a spreadsheet that are based on energetic values from “A manual for calculating duck-use-days to determine habitat resource values and waterfowl population energetic requirements in the Mississippi Alluvial Valley” (Heitmeyer 2010). This information was used as the baseline for establishing the minimum amount of mitigation acres needed to compensate for loss that includes both acreage and function.

Mitigation DUDs were calculated by generating spreadsheets in Microsoft Excel based on gains in habitat by reestablishing BLH on 1 hectare of existing cleared land. (see Appendix 5 and Table A5-6).

From Appendix 5: Table A5-6. Mitigation in terms of number of duck-use-days across the winter period for waterfowl (mallard) for one hectare of land replanted with average density of oaks in a bottomland hardwood forest over the course of 100 years.

Habitat Type[a]	**Project Life (Years)**	**Nov-Feb Totals**	**Years**	**Total DUD**
SHM-Passively Unmanaged	1-5	6,763.17	5	33,816
Densely populated early-successional forest[b]	6-20	0.00	15	0
BLH-NF, 5% tree gaps and canopy openings, average density, small trees	21-35	6,130.52	15	91,958
BLH-NF, 5% tree gaps and canopy openings, average density, medium trees	36-50	6,602.63	15	99,039
BLH-NF, 5% tree gaps and canopy openings, average density, large trees	51-100	7,074.73	50	353,737
Total number of DUD for mitigation across 100 years for 1 hectare			100	**578,550**

USACE determined that a reduction of 63,122,282 DUDs would be associated with construction activities within MRL SEIS II Work Items over a 100-year project life (see Appendix 5 for detailed calculations). USACE also determined that converting open lands back to bottomland hardwood (BLH) forests with at least 50% oak production would provide 578,550 DUDs/ha as foraging habitat for waterfowl over the 100-year project life. Therefore, USACE would be required to reforest a minimum of 109.1 ha or 269.6 acres to offset losses to foraging habitat for waterfowl within MRL Work Items.

Following complete analyses of natural resources (e.g. wetlands, aquatic resources, terrestrial) within the MRL SEIS II Work Items, it was determined that 1,447 acres of mitigation would be required to offset impacts to resources. For a complete breakout of mitigation, see Table 5-3 in Main Report of MRL SEIS II. Three zones were determined for mitigation, each representing locations upon the landscape and how these areas are expected to be influenced by hydrology. Zone 1 represents riverside frequently flooded Mississippi River connected lands (*e.g.*, batture lands). Zone 2 represents frequently flooded/hydrologically connected landside areas (*e.g.*, frequently flooded and impounded/backwater areas). Zone 3 represents moderately flooded landside areas (*e.g.*, low lying flooded areas landside of the MRL whose hydrologic conditions are dictated by precipitation and landscape position). See Section 5.3 of Main Report for more detailed descriptions of Zones.

USACE determined that Zones 1 and 2 would be conducive for providing the hydrology that would allow for flooding to proper depths for feeding by waterfowl. Under this assumption, USACE proposes to reforest 311 acres (125.86 ha) and 686 acres (277.61 ha) of BLH in Zones 1 and 2 which would result in 72,816,303 DUDs and 160,611,265 DUDS, respectively, over the 100-year project life. The total DUDs generated from mitigation measures of reforesting open lands with BLH would produce a net gain of 170,305,286 DUDs over the 100-year project life or an estimated 1,703,053 DUDs/year.

Forest on the riverside of the Mississippi River levee within the MAV are primarily riverfront or floodplain forests. Floodplain forest are typically in the transition zone between riverfront forest and BLH that generally occurs within the 1-2 year flood frequency zone. Floodplain forest are dominated by elm (*Ulmus* spp.), ash (*Fraxinus* spp.), sweetgum (*Liquidambar styraciflua*), sugarberry/hackberry (*Celtis* spp.), and box elder (*Acer negundo*). Riverfront forest is characterized by more early successional species, such as willow (*Salix* spp.) and silver maple (*Acer saccharinum*) and are associated more within the 1-year flood frequency. Floodplain and riverfront forest communities contribute a great deal less to foraging potential compared to BLH communities because they lack the significant contribution of acorn as a food resource to waterfowl. Furthermore, open agricultural lands provide little contribution to waterfowl compared to native plant communities such as native moist-soil habitats (e.g. herbaceous marsh) or flooded BLH forests. This is because the plants in these monoculture systems either provide little to no energetic contribution to waterfowl (e.g. cotton) or seed deterioration is high, especially if flooded for prolong periods (e.g. soybeans). Therefore, converting croplands and other open areas prone to flooding is highly beneficial not only to restore waterfowl habitat for both feeding and loafing, but also to benefit a wide-range of other wildlife species reliant on BLH floodplain systems.

Terrestrial HEP

Determination of forested acreages for the assessment of potential impacts to forested habitats included in the Draft Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (1998 SEIS).

Purpose: The following provides a description of how we determined mitigation required for the MRL SEIS II for the terrestrial assessment (Habitat Evaluation Procedures-HEP).

Background: In a typical HEP study, a number of evaluation species are chosen for each area that meets a specified standard of homogeneity (i.e., cover type) of interest in the Work Item area. The list of species were chosen because of their presence and dependency on BLH habitat type within the MAV. The HEP analyses did focus on only four avian species, representing cavity-nesting passerines and woodpeckers (Carolina Chickadee, Pileated Woodpecker), raptors (Barred Owl), and waterfowl (Wood Duck). We selected the mink that addresses wetland and aquatic impacts, and fox squirrel that addresses impacts to forest including mast production. The USFWS HSI Blue Book models are limited in terms of appropriate species for analyzing bottomland hardwood forest impacts, though there are a few others (e.g., Hairy Woodpecker, Great Blue Heron, Great Egret, Belted Kingfisher). We chose models that (a) would emulate the prior work completed by Wakeley to maintain consistency with prior work in the same areas, (b) could assist in tracking any changes in habitat over the last few decades, and (c) were certified by the USACE for use in such analyses.

Access to multiple MRL reaches along the Lower Mississippi River by USACE personnel was very difficult due to the 2019 Mississippi River flood events and also delays in obtaining the rights to enter Work Items. USACE attempted to directly sample habitat within Work Items when feasible. However, when Work Items could not be directly sampled, USACE sampled a subset of "surrogate" State and Federal protected lands, even though these properties may support older, larger, and higher quality tracts of BLH than inaccessible Work Item reaches. The inclusion of such areas into the USACE sampling design likely influenced the results by ensuring that final estimates and conclusions reached for mitigation of lost habitat were liberal and erred on the side of caution. In other words, for data from these sites input into the HSI models, final mitigation acreage recommendations are likely to be overestimated rather than underestimated.

Flooding of the MAV in 2018 and 2019 inundated the majority of the Riverside HSUs and delayed fieldwork into the summer of 2019. Although there were some concerns about the effects of persistent floodwaters on vegetation (and hence, habitat for our evaluation species), the repeated measures of sampling at a subset of points indicated no lengthy inundation impacts on overstory canopy closure or midstory cover. In addition, it was anticipated that the persistent river flooding would significantly reduce understory cover, however vegetation responded quickly once floodwaters receded and there was no significant differences between years for this variable. These data are consistent with wetland metrics also measured during the same timeframe in the MAV by Price and Berkowitz (2020).

For effects on existing forested habitats, the Work Item project footprints were intersected with the USACE MRL 2017 land cover layer to determine the presence and acreage of existing forested habitat affected by the project to apply the habitat evaluation procedures methodology outlined in detail within Appendix 6. The USACE MRL 2017 land cover was developed from 2014 false color infrared aerial photography with a 5 m resolution. The minimum mapping unit was 20 acres though smaller areas of land cover were often classified. Land cover classified as forested included all cover types that were beyond the successional stage of scrub/shrub (i.e. bottomland hardwood forest, ridge-slough complex, tree plantations). USACE excluded agricultural areas, urban landscapes, and other open habitats that are not suitable for the target species, and thus would receive an HSI score of "0" because they lack at least one of the variables (see Table A6-3 of Appendix 6) required by the HSI models. Using the above criteria, USACE determined that 35,478 forested acres were located within a 0.5 mile buffer of Work Items; however, only 789 acres were located under the currently proposed Work Item footprints. For the current terrestrial analysis, assessment values used to generate AAHUs were based on the 789 forested acres outlined within Work Item footprints using the USACE MRL 2017 land cover layer.

Determining terrestrial habitat acres for the MRL SEIS II report:

Baseline AAHU's were calculated for each Work Item, by USACE District and by State, and for the entire MRL set of Work Items, from field data collected from 2018-2019. This information was used as the baseline for establishing the minimum amount of mitigation acres (a 1:1 replacement of habitat) needed to compensate for loss that includes both acreage and function.

Mitigation AAHU's were calculated by generating spreadsheets in Microsoft Excel based on gains in habitat by reestablishing BLH on a hypothetical 100 acres of existing cleared land under various management scenarios (see Appendix 6 and Table A6-4).

From Appendix 6: Table A6-4. From Wakeley (2006), "Estimated Benefits Of Establishment Of Bottomland Hardwood Forest Under Various Management Plans."

	Increase in Average Annual Habitat Units (AAHU) per 100 Acres						
Management Plan[a]	Barred Owl	Gray Squirrel[b]	Carolina Chickadee	Pileated Woodpecker	Wood Duck	Mink	Total
			Natural Succession				
MP 1	34.35	25.95	46.8	27.00	0.00	0.00	134.1
MP 2	34.35	25.95	46.8	27.00	62.7	44.55	241.35
MP 3	34.35	25.95	46.8	27.00	62.7	55.65	252.45
			Reforestation with Hard-Mast Trees				
MP 4	34.35	47.85	46.8	27.00	0.00	0.00	156.00
MP 5	34.35	47.85	46.8	27.00	62.7	44.55	263.25
MP 6	34.35	47.85	46.8	27.00	62.7	55.65	274.35

USACE determined that 2,280.7 AAHUs associated with forested habitats within MRL SEIS II Work Items would be impacted due to project construction activities. However, with the construction of borrow pits that would create permanent waterbodies on the landscape, forests which surround these areas would become suitable for mink. Under this assumption, net benefits to mink were calculated into the total project impacts which then resulted in net impacts of 1,605.1 AAHUs rather than the initial 2,280.7. Following complete analyses of natural resources (e.g. wetlands, aquatic resources, waterfowl) within the MRL SEIS II Work Items, it was determined that 1,447 acres of mitigation would be required to offset impacts to resources. For a complete breakout of mitigation, see Table 5-3 in Main Report of MRL SEIS II.

Three zones were determined for mitigation, each representing locations upon the landscape and how these areas are expected to be influenced by hydrology. Zone 1 represents riverside frequently flooded Mississippi River connected lands (*e.g.*, batture lands). Zone 2 represents frequently flooded/hydrologically connected landside areas (*e.g.*, frequently flooded and impounded/backwater areas). Zone 3 represents moderately flooded landside areas (*e.g.*, low lying flooded areas landside of the MRL whose hydrologic conditions are dictated by precipitation and landscape position). See Section 5.3 of Main Report for more detailed descriptions of Zones. Mitigation Plans (MP) 4, 5, and 6 of the terrestrial analysis (see Appendix

6) are associated with Zones 3, 2, and 1, respectively. USACE proposes to include 311, 686, and 450 acres to be reforested to BLH within Zones 1, 2, and 3, respectively. Under this plan, 311 acres would be reforested under the terrestrial MP-6 for a total of 853.2 AAHUs, 686 acres under MP-5 for 1,805.9 AAHUs, and 450 acres under MP-4 for 702 AAHUs. The total 3,361.1 AAHUs that would be gained through mitigation lands would provide a net gain of 1,080.4 AAHUs above those units lost without consideration of benefits from borrow pits to mink, and a net benefit of 1,756 if borrow pit benefits to mink are incorporated. With the incorporation of Zones 1 and 2 (MP-5 and MP-6), 305.6 and 173.1 AAHUs, respectively, will be gained for the mink whereas 102.1 AAHUs will be lost from project impacts resulting in a net gain to mink of 376.6 AAHUs.

Aquatics

Determination of aquatic acreages for the assessment of potential impacts to aquatic resources included in the Draft Supplement II (SEIS II) to the Final Environmental Impact Statement, Mississippi River and Tributaries (MR&T) Project, Mississippi River Mainline Levees and Channel Improvement of 1976 (1976 EIS), as updated and supplemented by Supplement No. 1, Mississippi River and Tributaries Project, Mississippi River Mainline Levee Enlargement and Seepage Control of 1998 (1998 SEIS).

Purpose: The following provides a description of the determination of aquatic acreages used for the aquatic assessment completed for the SEIS II. This information supplements the descriptions provided in the aquatic appendix.

Background: The construction of the 143 additional work items will have minimal long-term effect on existing aquatic habitat within the project area. Thus, only acres of borrow area habitat were considered in the aquatic assessment. This assumption is justified because construction of the 143 work items will occur near the levees when the floodplain is mostly dry, and the river is in-banks. Localized increases in turbidity and suspended solids during construction at near-by waterbodies would be minimized by implementation of best management practices for nonpoint pollution. Project features might cause minor changes in water filtration due to habitat conversion, changes in landside stream discharge and wetness due to inputs from relief wells, and changes in connectivity from feature construction and earthworks. Due to the localized and small scale of the 143 work items relative to the large project area, these effects were considered unmeasurable. Thus, the aquatic habitat analysis was restricted to acres of borrow area.

Determining aquatic habitat acres for the SEIS II report:

The acreage of borrow areas to be constructed were determined from a Geospatial Information File compiling the project footprints established by each district's design professionals. These project footprints were determined to address the unique conditions within each district utilizing expertise in Engineering (Geotechnical, Civil, Hydraulic, and Structural), Relocations, Real Estate, Environmental, and Cultural Resources. Each of the 3 districts utilized data on hand, relying on past MRL design experience, performance data obtained during past flood events, and, when available, geotechnical, or topographical survey data. Once earthwork quantities were established, they were converted into an acreage sufficient to provide the required amount of borrow material. It was assumed that 8’ of suitable material would be available. To account for losses due to clearing and grubbing, compaction, handling, unsuitable material, and site grading, contingencies were added. Because some material losses are fixed in size, larger contingencies were used on smaller projects, while smaller contingencies were used on larger projects. Once size and depth requirements were finalized, locations were selected by the project design team with input from engineering, environmental, cultural resource, and regulatory members. The acreage of new borrow area open water was determined by labeling the borrow area footprints as landside or riverside and summing the acreage of each type.

For effects on existing open water, the project footprints were intersected with the USACE MRL 2017 land cover layer to determine the presence and acreage of existing open water habitat affected by the project. The USACE MRL 2017 landcover was developed from 2014 false color infrared aerial photography with a 5 m resolution. The minimum mapping unit was 20 acres though smaller areas of land cover were often classified. For the aquatic fisheries analysis, effects greater than 0.09 acres were analyzed. Land cover classified as open water includes all aquatic features (borrow pits, scour holes, lakes, and channels) thus 2016 and 2017 National Agriculture Imagery Program images (NAIP 2017) were investigated to determine the type of aquatic feature affected by the project. Open water was assumed to be a borrow area if the feature was generally rectangular, near the levee, and/or had occasional peninsulas or traverses (narrow strips of land separating adjacent open water); any questionable open water was classified as borrow area.

From the project footprints, the acreage of borrow areas proposed is: 1,403.3 acres under the traditional Alternative 2 and 1,402 acres under Avoid and Minimize Alternative 3. Under Alternative 2, 525.6 acres will be landside and 877.7 acres riverside. Under Alternative 3, 414.3 acres occur landside and 987.7 acres riverside. Intersecting the project footprints with USACE MRL 2017 land cover, there was minimal (< 10 acres) impact to existing borrow area open water and acreage of areas to be deepened offset filled acres. Fill for levee enlargements and haul roads results in a loss of borrow area ranging from 3.3 to 4.2 acres. Excavation from relief wells and deepening of existing borrow areas will result in a gain of 4.8 acres. Thus, considering affects to existing borrow area open water, 1,403.9 acres of open water borrow area were used to calculate aquatic habitat benefits under Alternative 2 and 1,403.5 acres under Alternative 3.

Benefits accrued from the additional open water acreage from borrow pit creation were considered ancillary and were not used to offset the unavoidable losses to wetland and terrestrial resources from the construction, operation, maintenance, and repair of the 143 Work Items (Appendix 20 MRL SEIS II). Thus, the impact of changes in size and location of borrow areas to facilitate project construction and to incorporate landowner input would be low. In addition changes may be positive as USACE has prepared an Environmental Design of Mississippi River Levee Borrow Areas for private landowners to encourage the incorporation of forested curving shoreline, shallow and deep water, and islands in borrow areas that would increase the habitat benefits.