



**DEPARTMENT OF THE ARMY
CHIEF OF ENGINEERS
2600 ARMY PENTAGON
WASHINGTON, DC 20310-2600**

12 AUG 2024

DAEN

SUBJECT: Mississippi River, Hatchie-Loosahatchie, Mississippi River Mile 775-736, Tennessee and Arkansas, Aquatic Ecosystem Restoration

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on aquatic ecosystem restoration recommendations for the Mississippi River, Hatchie/Loosahatchie, Mississippi River Mile 775-736, Tennessee and Arkansas. It is accompanied by the report of the Memphis District and Mississippi Valley Division engineers. This study is an interim response to the authorization in the Water Resources Development Act (WRDA) of 2018, Public Law 115-270, Section 1202. The authorization states:

ADDITIONAL STUDIES. (a) LOWER MISSISSIPPI RIVER; MISSOURI, KENTUCKY, TENNESSEE, ARKANSAS, MISSISSIPPI, AND LOUISIANA.— (1) IN GENERAL.—The Secretary of the Army is authorized to carry out studies to determine the feasibility of habitat restoration for each of the eight reaches identified as priorities in the report prepared by the Secretary pursuant to section 402 of the Water Resources Development Act of 2000, titled “Lower Mississippi River Resource Assessment; Final Assessment In Response to Section 402 of WRDA 2000” and dated July 2015. **(2) CONSULTATION. —**The Secretary shall consult with the Lower Mississippi River Conservation Committee during each feasibility study carried out under paragraph (1).

The Hatchie-Loosahatchie Ecosystem Restoration study investigated the first of the eight priority reaches identified. Preconstruction, engineering, and design (PED) activities will continue under the study authority.

2. The reporting officers recommend authorizing a plan that restores ecological structure and function to the mosaic of habitats along the Mississippi River including secondary channels and other aquatic habitat; floodplain forests; and several scarce vegetative communities such as wetlands, rivercane, riverfront forests, and bottom land hardwood forests. The Recommended Plan is the National Ecosystem Restoration Plan and provides positive ecosystem and social benefits by addressing significant and ecologically important habitats in Arkansas and Tennessee. The Recommended Plan includes the following 38 ecological restoration measures and two recreational measures all of which are separable elements that could be implemented independently. The features are summarized below:

a. The plan includes eleven dike notches through both pile and stone dikes to restore connectivity in secondary channels by allowing flow through the dikes at lower river stages.

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b. The plan contains five woody debris traps to collect drifting wood as it floats downstream, creating a diverse habitat for fish and macroinvertebrates. The traps are placed in permanent or near-permanently flowing water in proximity to the island side of secondary channels.

c. The plan contains two bank protection measures, one riprap bank paving measure, and one set of riprap hardpoints to prevent future bank line erosion and forested buffer degradation.

d. The plan includes one river training structure measure to divert additional water into a chute at various river stages and create diverse fish habitat to maintain a navigation channel by directing flow and altering channel geomorphology.

e. The plan contains four grade control structure measures, including two rock weirs, and two stoplog structures to regulate flow to prevent bed erosion, prevent head cutting, and/or regulate water elevations by controlling the energy and velocity of the water as it passes over or through the structures.

f. The plan contains five culvert measures, including concrete box culverts and corrugated metal pipe culverts to enhance the connectivity of waterbodies.

g. The plan includes two swale cleanouts and one channel cleanout to restore connectivity and two earthen berms construction to pond water for moist soil management practices.

h. The plan includes two bridge replacement measures to restore connectivity within the meander scarp by enhancing debris passage.

i. Two recreational features are recommended, trail access improvements at Meeman Shelby Forest and interpretive media in Wolf River Harbor.

j. The plan includes natural vegetation enhancement and restoration to restore vegetation through canopy gapping, cypress-tupelo planting, herbaceous wetland planting, and various forms of reforestation.

3. The Lower Mississippi River Conservation Committee is the non-federal sponsor for the feasibility study through PED. The States of Tennessee and Arkansas will sponsor the construction of features in their respective states. Based on October 2023 price levels, the estimated total project first cost is \$62,124,000. The total project first cost includes the value of lands, easements, rights-of-way, relocations (LERR) estimated to be \$17,576,000. Cost sharing is applied in accordance with the provision of Section 103 of WRDA 1986, as amended (33 U.S.C. § 2213), as follows:

a. The federal share of the project first cost for initial construction is estimated at \$40,295,700 and the non-federal share is estimated at \$21,828,300. Cost shares for the States of Arkansas and Tennessee will be determined during PED and based on the measures implemented

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in each state. The non-federal sponsors will receive credit for the value of LERRDs, included in the estimate, toward the non-federal share.

b. The estimated project first cost for ecosystem restoration features is \$61,558,000. Ecosystem restoration features are cost shared 65 percent federal and 35 percent non-federal. The ecosystem restoration features provide 4,673 Average Annual Habitat Units (AAHU).

c. The estimated project first cost for recreation features is \$566,000. Recreation features are cost shared 50 percent federal and 50 percent non-federal. The recreation measures are economically justified with a benefit to cost ratio greater than 1.0.

d. The current project plan requires a fee estate for the restoration and recreation measures over approximately 2,881 acres of private land and 51 acres of public land. Temporary or perpetual road easements are required over approximately 56 acres of private land. Temporary work area easements are required over an additional 56 acres of private land. About half of the measures and half of the total 3,044 acres required are in Tennessee and half are in Arkansas. Arkansas owns about 9 acres on 5 measures and Tennessee owns about 42 acres on 7 measures. No non-standard estates are anticipated.

e. The annual cost of operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) for the Recommended Plan is estimated to be \$7,500,000. OMRR&R activities include routine inspections and/or improvements to items such as culverts, channels, hardpoints, riprap protection, river training structures road surfaces, recreational features, etc. The non-federal sponsor will be responsible for OMRR&R. Nonmechanical nonstructural features in the Recommended Plan include the following: woody debris traps, earthwork, recreation, and natural vegetation enhancement and restoration. The risk and cost associated with OMRR&R throughout the 50-year period of analysis is considered in the project's Cost Schedule Risk Analysis (CSRA) to ensure the success of the project benefits. The non-federal sponsor responsibility for the operation and maintenance of the nonmechanical nonstructural elements of each restoration site may cease ten years after ecological success has been determined in accordance with Section 2039 of WRDA 2007, as amended (33 U.S.C. § 2330a). Failure to implement the OMRR&R schedule as identified in the CSRA could impact project performance and AAHU outputs. The overall risk to the project from cessation of OMRR&R for the nonmechanical nonstructural features is low as OMRR&R for these features is either unrequired or minimal. The non-structural and non-mechanical features mentioned in this Section have the highest potential for mobility to locations other than identified in the recommended plan. Any decision to move a potential measure would require re-evaluation of the ecosystem restoration benefits, potential habitat impacts, cost changes, and/or increase risk to existing Flood Risk Management and Navigation works.

f. The estimated project first cost includes monitoring and adaptive management costs of \$5,300,000. Cost shared monitoring will occur for up to 10 years beginning upon completion of each separable element.

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4. Based on a 2.75 percent discount rate and a 50-year period of analysis, the equivalent average annual costs are estimated at \$2,432,000. The average annual cost per habitat unit for the restoration is \$521, with an average annual cost per acre of \$799.

5. The Lower Mississippi River (LMR) is one of the largest floodplains in the world, comprised of approximately three million acres and interspersed with secondary channels, meander scarps, and large expanses of forested wetlands. Although the levee system has reduced the footprint of the historic floodplain, the remaining lands and waters between the levees (batture) is high in ecological value reflecting a complex mosaic of diverse aquatic and vegetative habitats. The significance of this ecosystem was documented in the 2000 Aquatic Resources Management Plan, the 2004 Restoring America's Greatest River Plan and the 2016 Lower Mississippi River Resource Assessment. The LMRAA identified eight sections, or reaches, of the LMR, to focus restoration. The recommended plan for the Hatchie-Loosahatchie, Mississippi River Mile 775-736, Tennessee and Arkansas, is the first of the eight identified priority reaches from the LMRAA for large-scale aquatic ecosystem. The recommended plan focuses on addressing historically and technically significant and ecologically important habitats in the states of Arkansas and Tennessee along a 39-mile stretch of the Mississippi River. Included in the recommended plan are 38 different ecological restoration measures and two recreational measures that will benefit 6,282 acres. These habitats support federally listed endangered aquatic species and critical vegetative habitats that host numerous species of conservation concern. Proposed reforestation includes areas mapped as high priority in Lower Mississippi Valley Joint Venture's decision support model. The plan would result in long-term beneficial effects from the breadth of the restoration activities. The plan provides 4,673 average annual habitat units to eight unique habitats, including bottomland hardwood, cypress-tupelo, meander scarp, moist soil, riverfront, seasonally herbaceous wetland, secondary channels, and slough. These habitats support federally listed endangered aquatic species and critical vegetative habitats that host numerous species of conservation concern. This action selection contributes to the hydrologic restoration of meander scarps (rare geological features that no longer occur naturally due to engineering controls along the Mississippi River). Additionally, restoration of technically significant habitat, including cypress-tupelo swamps, moist soil, and seasonally herbaceous rivercane habitat would result from the implementation of the restoration measures. These habitat types provide valuable aquatic and vegetative habitats for a variety of species, such as the federally endangered pallid sturgeon and fat pocketbook mussel and other rare species of conservation concern, such as the alligator gar, a native predator of invasive carp.

6. The restoration's benefits to forested habitats would help provide resiliency to bat populations in the larger Mississippi Alluvial Valley as well as benefitting many neotropical migrants and forest breeding birds. In addition to these direct benefits quantified in the ecological models, the plan has indirect benefits to species that may use adjacent habitats at varying spatiotemporal scales. Wildlife species using restored habitats also benefit from connectivity to adjacent habitats. Wildlife is expected to indirectly benefit from reconnection to an additional approximate 15,000 acres of existing contiguous habitat similar to the habitats being restored

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(e.g., existing forest adjacent to the proposed reforestation area). This land is not included in the RP (acquisition or plan selection analysis).

7. All compliance with required applicable environmental laws and regulations has been completed. Section 401 Water Quality Certifications letters of confirmation have been received from Arkansas and Tennessee and a National Historic Preservation Act Programmatic Agreement has been executed.

8. In accordance with USACE policy on the review of decision documents, all technical, engineering, and scientific work underwent an open, dynamic, and rigorous review process. The comprehensive review process included District Quality Control Review, Agency Technical Review, and Policy and Legal Compliance review to confirm the planning analyses, alternative design and safety, and the quality of decisions. Washington-level review indicates that the plan recommended by the reporting officers complies with all essential elements of the U.S. Water Resources Council's Economic and Environmental Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies, as well as other administrative and legislative policies and guidelines. The views of interested parties, including federal, state, and local agencies, were considered and all comments from public reviews have been addressed and incorporated into the final report documents where appropriate.

9. USACE decision documents recognize cost risk and uncertainty surrounding implementation. All cost estimates will carry a degree of uncertainty. The estimated project first cost for the Recommended Plan at the 80% confidence interval is estimated at \$62,124,000. The estimated project first cost for ecosystem restoration features and recreation features is \$61,558,000 and \$566,000, respectively. This project carries a degree of uncertainty such that if the main drivers described below are realized, the first cost for the Recommended Plan could increase to approximately \$69,000,000. The recommended plan has various construction and non-construction components. These components range from 10 to 30 percent in project definition. The overall recommended plan is at 30 percent design. Based on the recommended project design of the construction components and scope definition of the non-construction components, the estimated project first cost is designated as a Class 3 estimate. The estimated project first cost includes the CSRA contingency value of 32 percent and the LERR contingency value of 20 percent, which equates to 28 percent of the estimated base project cost of \$48,000,000. The cost contingencies are intended to cover cost and schedule increase due to the identified project risks and their probability of occurrence. Changes to assumptions or the basis of design can result in additional risks not currently identified. For the Recommended Plan estimated project first costs, the currently known major uncertainty drivers are the following: 1) real estate acquisition, 2) contract acquisition strategy, 3) construction schedule, 4) hydrologic and hydraulic conditions, 5) level of design, 6) cost estimates 7) planting availability 8) timing of plantings 9) benefit evaluation, and 10) navigation risks. As the project moves into the next phases, USACE will focus risk management and mitigation on the primary cost and other significant risk drivers to the extent within USACE control. However, there still exists the potential for other unanticipated and uncontrollable changes in environmental conditions, economic conditions, and/or acquisition

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of lands, such as in response to induced flooding, that could further increase the estimated project first cost beyond the current estimate and/or necessitate changes in the project's design and construction. Every effort will be made to construct as many separable features as possible under constraints. The project measures will be constructed on lands from willing sellers to the maximum extent practicable. The majority of the technically significant project benefits for the independent measures are forecast to be successfully accomplished on public lands and lands from willing sellers. Any risk of a measure not being constructed due to unwilling sellers is mitigated because the most significant benefits accrue independently on the constructed measures, because the lands potentially affected by unwilling sellers are most likely those that provide lower technical benefits, and because the footprint of some of the measures are relocatable.

10. In full consideration of the risks as documented in the preceding paragraphs in this report, I concur with the findings, conclusions, and recommendations of the reporting officers. Accordingly, I recommend that aquatic ecosystem restoration improvements for Mississippi River, Hatchie/Loosahatchie, Mississippi River Mile 775-736, Tennessee and Arkansas be authorized in accordance with the reporting officers' Recommended Plan at an estimated project first cost of \$62,124,000 with such modifications as in the discretion of the Chief of Engineers may be advisable. The estimated project first cost for ecosystem restoration features and recreation features is \$61,558,000 and \$566,000. Federal implementation of the project for ecosystem restoration and recreation includes, but is not limited to, the following items of local cooperation to be undertaken by the non-federal sponsor in accordance with applicable federal laws, regulations, and policies:

a. Provide the non-federal share of project costs including 35 percent of construction costs allocated to ecosystem restoration and 50 percent of construction costs allocated to recreation, as further specified below:

i. Provide, during design, 35 percent of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

ii. Provide all lands, easements, and rights-of-way, including those required for relocations and placement areas, and perform all relocations determined by the Federal Government to be required for the project; and

iii. Provide, during construction, any additional contribution necessary to make its total contribution equal to 35 percent of construction costs for ecosystem restoration and 50 percent of construction costs for recreation.

b. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) that might reduce the outputs produced by the project, hinder operation, and maintenance of the project, or interfere with the project's proper function;

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- c. Keep the recreation features open and available to all on equal terms;
- d. Ensure that the project or lands, easements, and rights-of-way required for the project shall not be used as a wetlands bank or mitigation credit for any other project;
- e. Operate, maintain, repair, rehabilitate, and replace the project or functional portion thereof at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable federal laws and regulations and any specific directions prescribed by the Federal Government;
- f. Hold and save the Federal Government free from all damages arising from design, construction, operation, maintenance, repair, rehabilitation, and replacement of the project, except for damages due to the fault or negligence of the Federal Government or its contractors;
- g. Perform, or ensure performance of, any investigations for hazardous toxic, and
- h. radioactive wastes (HTRW) that are determined necessary to identify the existence and extent of any HTRW regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9601-§9675, and any other applicable law, that may exist in, on, or under real property interests that the Federal Government determines to be necessary for construction, operation, and maintenance of the project.
- i. Agree, as between the Federal Government and the non-federal sponsor, to be solely responsible for the performance and costs of cleanup and response of any HTRW regulated under applicable law that are located in, on, or under real property interests required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination, without reimbursement or credit by the Federal Government;
- j. Agree, as between the Federal Government and the non-federal sponsor, that the non-federal sponsor shall be considered the owner and operator of the project for the purpose of CERCLA liability or other applicable law, and to the maximum extent practicable shall carry out its responsibilities in a manner that will not cause HTRW liability to arise under applicable law; and
- k. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. §4630 and §4655) and the Uniform Regulations contained in 49 C.F.R. Part 24, in acquiring real property interests necessary for construction, operation, and maintenance of the project including those necessary for relocations, and placement area improvements; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.

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11. The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program or the perspective of higher review levels within the Executive Branch. Consequently, the recommendation may be modified before it is transmitted to the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to Congress, the non-federal sponsor, interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.



SCOTT A. SPELLMON
Lieutenant General, USA
Chief of Engineers