APPENDIX 2

FISH AND WILDLIFE COORDINATION ACT REPORT

Table of Contents

A2-1 FINAL FISH AND WILDLIFE COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Louisiana Ecological Services
200 Dulles Drive
Lafayette, Louisiana 70506
November 05, 2020

Colonel Robert A. Hilliard
District Commander
U.S. Army Corps of Engineers Vicksburg District
4155 Clay Street
Vicksburg, Mississippi, 39183

Dear Colonel Hilliard:

Please reference your agency's Supplemental II Environmental Impact Statement (SEIS 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 report in compliance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); this report represents the Secretary of Interior's report in accordance with Section 2(b) of that act.

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 developed a general mitigation plan to offset those losses.

We look forward to assisting the USACE in the detailed assessment of impacts and the development of mitigation. Should you have any questions regarding our comments, please contact Mr. David Walther (337/291-3122) of this office.

acting 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

FINAL FISH AND WILDLIFE

COORDINATION ACT REPORT ON THE

MISSISSIPPI RIVER AND TRIBUTARIES FLOOD MANAGEMENT SYSTEM,

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT II FOR

THE MISSISSIPPI RIVER MAINLINE LEVEES

U.S. FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES

MISSISSIPPI RIVER BASIN REGION

November 2020

EXECUTIVE SUMMARY

The U.S. Army, Corps of Engineers (USACE) is currently finalizing a Supplemental II Environmental Impact Statement (SEIS II) that addresses remaining work on the Mississippi River mainline levee feature (MRL). The MRL is a project feature of the Mississippi River and Tributaries (MR&T) flood risk management system. Currently the MRL has sections that are structurally deficient to protect against the Project Design Flood (PDF). The Service submits the following report in compliance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); this report represents the Secretary of Interior's report in accordance with Section 2(b) of that act. This report has been coordinated with all of the US Fish and Wildlife Services (Service), Ecological Service offices in the project area and the state fish and game agencies in those states. Their comments, if any, have been incorporated into this report.

USACE's goal for the SEIS II is to provide flood protection from the PDF and develop an environmentally sustainable project. Features 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). This work will be addressed in a second supplement (SEIS II) to the Final Environmental Impact Statement for the MR&T Project filed with the Council of Environmental Quality in 1976 (USACE 1976). The first supplemental EIS (SEIS I) was completed in 1998 (USACE 1998) to address 128 work items in levee reaches with the greatest height deficiencies and areas with observable indications of under seepage. Funding to address these work items continues to be received annually through Congressional appropriations and construction continues. The additional 143 works items needing remediation are addressed in the SEIS II; some items may be combined into larger construction contracts or divided into smaller work contracts during implementation.

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. It is considered the most important component of the MR&T flood risk management system. It assists in protecting the 36,000 square-mile Lower Mississippi River Valley from periodic overflows of the Mississippi River. This alluvial valley ranges in width from approximately 40 to 110 miles and extends through parts of seven states: Missouri, Illinois, Kentucky, Tennessee, Arkansas, Mississippi, and Louisiana. Some of the major metropolitan areas found in the project area include, Cairo, Memphis, Vicksburg, Baton Rouge and New Orleans. The project area includes all lands and waters lying between the mainline Mississippi River levees (and floodwalls), or bluffs where levees are absent, plus a zone extending 3,000 feet landside of the levees.

Implementation of flood control measures and the resulting system of levees, dikes, diversions and canals have significantly altered the landscape. Much of the Mississippi Alluvial Valley (MAV) has been isolated from the Mississippi River's natural flood cycles, which 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 most significant fish and wildlife related problem in the study area is the loss of forested habitat and the alteration of riverine process. The 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.

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. Future fish and wildlife resources within the LMV are effected by five major forces: flood risk management, channel improvements, climate, land use and tributary changes, and other anthropogenic effects including point source effluents

The U.S. Army Engineer Research and Development Center (ERDC), Environmental Laboratory (EL), Wildlife Team, conducted a project wide investigation of potential impacts to terrestrial resources. This investigation included field sampling to provide data for (a) Habitat Evaluation Procedures (HEP) using six target species representative of the range of forested habitats found within the project area; (b) an analysis of potential impacts to waterfowl via the Duck Use Days (DUD) model; (c) an analysis of impacts to wetland functions and values using the Hydrogeomorphic Assessment (HGM); (d) primarily a qualitative analysis of migratory bird habitat lost (acreages are presented) due to the project; and (e) another quantification of acreage lost along with a qualitative analysis for 16 bat species that potentially occur within the project area. In addition, ERDC also conducted an aquatic HEP to evaluate alternatives (i.e., number, size, and morphology of borrow areas) to estimate gains and losses of aquatic habitat for fishes.

USACE examined in detail three alternatives, the No-Action (Alternative 1), the Traditional Construction method (Alternative 2) and the Avoid and Minimize Alternative (Alternative 3). Under the No Action alternative, no new construction would be undertaken to address the 143 known deficiencies but operation and maintenance would continue. Alternative 2, the Traditional Construction would implement the proposed improvements and modifications using the most cost efficient means available. The primary difference between Alternative 2 and Alternative 3 is the method of selecting the borrow source for each work item; for this alternative the selection would be made with an intent to avoid and minimize adverse environmental impacts. Alternative 3, the Avoid and Minimize Alternative, is the Recommended Plan (RP).

By relocating borrow areas to less environmentally damaging areas, Alternative 3 (Avoid and Minimize) reduced impacts to bottomland hardwood wetlands, waterfowl, and wildlife, resulting in 449 fewer acres of forested lands being impacted compared to Alternative 2 (Table 1).

Table 1. Land Cover impacts associated with each alternative.

	Alternative 2 - Traditional Construction		**Alternative 3 - Avoid and Minimize**	
Overall Land Cover	**Total Acreage**	**Percent**	**Total Acreage**	**Percent**
Cropland	1,209	17%	1,675	23%
Forested	1,332	18%	883	12%
Levee	4,061	56%	4,101	56%
Marsh	13	0%	13	0%
Non-forested Wetland	18	0%	15	0%
Open Water	11	0%	10	0%
Pasture, Old Field	162	2%	177	2%
Scrub/Shrub	123	2%	132	2%
Urban	276	4%	275	4%
Total	7,205	100%	7,281	100%

The reduction in acreage impacts by selecting Alternative 3 results in a corresponding decrease in impacts to bottomland hardwood species as shown by the reduced loss of DUDs and AAHUs in the HEP analysis (Table 2). Reduced impacts to wetland functions is presented via the Hydrogeomorphic Manual. Creation of borrow sites results in a net gain in aquatic habitat units for both alternatives. Nonetheless, impacts from this alternative would still result in the loss of 1,606 AAHUs as calculated by HEP, 49,293 FSC/HSU as calculated by HGM and 662,913 duck use days.

Table 2. Summary of impacts and required compensatory mitigation from quantitative assessments of Alternatives 2 and 3.

Method	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)
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 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).

The Service recognizes the need to provide flood risk reduction and has worked with the USACE to minimize damages to fish and wildlife resources and the development of a general compensation plan to mitigate for unavoidable damages while providing flood risk reduction benefits. USACE selected Alternative 3, Avoid and Minimize Alternative, thus minimizing forested impacts. The USACE has also developed mitigation measures for the unavoidable impacts to forested wetlands; approximately 1,447 acres will be purchased and reforested by the USACE throughout the LMV. This mitigation acreage was calculated using the HGM for all states except Louisiana where the WVA was used.

In summary, the Service commends the USACE for selecting Plan 3, the Avoid and Minimize Alternative, which reduces bottomland hardwood losses and compensates for unavoidable adverse impacts and incorporates several environmental design features. The Service looks also forward to participation in the planning and implementation of the project features and mitigation. Therefore, the Service does not object to the measures needed to maintain the integrity of the MRL provided the following recommendations are incorporated in subsequent planning and construction phases:

1. All forested and wetland losses should be mitigated in-kind.

2. The Service recommends the following hierarchy be used to locate mitigation areas:

    a. Mitigation Zone 1: Riverside frequently flooded Mississippi River connected lands (e.g., batture lands).
    b. Mitigation Zone 2: Frequently flooded/hydrologically connected landside areas (e.g., frequently flooded and impounded/backwater areas).
    c. Mitigation Zone 3: Moderately flooded landside areas (e.g., low lying flooded areas landside of the MRL whose hydrologic conditions are dictated by precipitation and landscape position).
    d. Mitigation Zone 4: Mitigation bank

3. 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.

4. 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.

5. Purchase of credits from mitigation banks should follow the same hierarchy presented in recommendations 2, 3, and 4.

6. 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.

7. 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.

8. Funding for management and oversight should be provided on an annual basis to the agency managing mitigation lands.

9. The Service recommends that the above 8 recommendations be applied to any remaining mitigation from the previous SEIS and that implementation of that mitigation should be made a priority.

10. Work items should avoid and/or minimize impacts to public lands and conservation/habitat restoration lands in the project area.

11. 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.

12. 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.

13. Impacts to public lands should be mitigated on the impacted public lands.

14. The Service recommends that borrow pits should be environmentally designed as described in the SEIS to provide maximum benefits to fish and wildlife, and should include:

a. tree plantings around most of the perimeter,
b. native grass plantings along some of the banks,
c. brush piles, constructed with tree limbs from project clearing, in the borrow sites,
d. limbs and tree trunks placed perpendicular along the shore,
e. irregular shorelines,
f. islands,
g. creating/ensuring connectivity to the river (for riverside pits), and
h. variable depths.

15. The Service recommends the following hierarchy to located borrow pits in areas that would generally reduce impacts:

a. Riverside prior-converted cropland
b. Landside cropland from willing sellers
c. Riverside farmed wetlands (cropland)
d. Riverside farmed wetlands (pasture)
e. Riverside herbaceous wetlands not in federal conservation programs
f. Riverside forested non-wetlands not in federal conservation programs
g. Riverside forested wetland not in federal conservation programs
h. Landside/Riverside cropland condemnation

16. The Service recommends that mitigation should be completed in each USACE District prior to the end of the construction period in that District and that compensation lands do not need to be acquired concurrently with each work item. Delays in mitigation implementation should result in the reassessment of impacts to account for the temporal delay. This reassessment should be coordinated with the Service and other natural resource agencies.

17. The Service and the local state fish and wildlife agency should be involved in the detailed design for all levee enlargement projects and all mitigation plans.

18. Each state's Service office and the local natural resource agencies should be again solicited for recommendations regarding the location of mitigation lands once detailed mitigation planning is initiated and should be coordinated with throughout the planning and implementation process.

19. The Service recommends USACE investigate the use of native grassland species as cover for levees. Inclusion of even some native species could help declining grassland bird species and/or pollinators.

20. Under Sec 7(a)1 of the ESA the Service recommends that mitigation areas should include adaptive 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.

21. 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.

22. 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.

23. If construction impacts any publicly managed conservation lands the managing land agency should be notified early in the planning process and should be coordinated with

throughout the design phase. Prior to initiating construction the agency should be informed of construction schedule and contractors should be made aware of any special requirements of the land managing agency. Contractors should contact the managing agency prior to initiating construction.

24. Following construction of a flood risk reduction feature(s) on public conservation lands USACE should notify the managing agency prior to initiating any maintenance activities.

25. 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.

26. Avoid or minimize impacts to migratory bird habitat to the extent feasible.

27. The Service recommends that a qualified biologist inspect proposed work sites for the presence of undocumented colonial nesting waterbirds during the nesting season; USACE should avoid disturbing nests. 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 avoid them during the nesting season.

28. If a bald eagle nest occurs or is discovered within 660 feet of the proposed work item, 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.

The Division of Migratory Birds for the South Atlantic - Gulf Region and the Mississippi Basin Region 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).

29. The Service recommends that borrow areas be designed to leave at minimum a 300-foot wide forested area between the levee toe (excluding the 15 feet required to be cleared and maintained) and the river. Forested areas can provide levees a natural riverside slope protection in line with the Designing with Nature concept. Those forested areas could shield the levee from waves and currents possibly precluding the need for hardened slope protection that can reduce grassland habitat.

30. 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 those reports.

TABLE OF CONTENTS

INTRODUCTION

The U.S. Army, Corps of Engineers (USACE) is currently finalizing a Supplemental II Environmental Impact Statement (DSEIS II) that addresses 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 U.S. Fish and Wildlife Service (Service) submits the following report in compliance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); this report represents the Secretary of Interior's report in accordance with Section 2(b) of that act. This report has been coordinated with all of the US Fish and Wildlife Services (Service), Ecological Service offices in the project area and the state fish and game agencies in those states. Their comments, if any, have been incorporated into this report.

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).

PURPOSE AND AUTHORITY

The flood of 1927 was the most disastrous in the history of the Lower Mississippi River Valley, inundating about 26,000 square miles. This disaster resulted in the Flood Control Act of 15 May 1928 (House Document [HD] 90/70/1), which authorized general and progressive channel stabilization and river regulation from Cape Girardeau, Missouri, to Head of Passes, Louisiana. That authorization created the Mississippi River and Tributaries (MR&T) flood risk management system, which authorized the expenditure of Federal funds for construction of a Federal project to provide flood control in the alluvial valley of the Lower Mississippi River and navigation from Cairo, Illinois to Head of Passes, Louisiana. Local interests were charged with furnishing rights-of-way for levees and minor maintenance after construction. Subsequent legislation have resulted in many modifications to the 1928 Act. The MR&T project has four major features:

1. Levees/Floodwalls (known as the MRL)
2. Tributary Basin Improvements
3. Floodways
4. Channel Improvement and Stabilization

All items addressed in this report fall under the levees and floodwalls feature of the project.

USACE's Memphis, Vicksburg, and New Orleans Districts are jointly proposing to construct remaining authorized work on the MRL feature of the MR&T project. This work will be addressed in the second supplement (SEIS II) to the Final Environmental Impact Statement for the MR&T Project filed with the Council of Environmental Quality in 1976 (USACE 1976). The first supplemental EIS (SEIS I) was completed in 1998 (USACE 1998) to address 128 work items in levee reaches with the greatest height deficiencies and areas with observable indications of under seepage. Funding to address these work items continues to be received annually through

Congressional appropriations and construction continues. Since the SEIS I, USACE has determined that additional reaches of the MRL are deficient, and that remedial measures are required to control seepage and/or raise and stabilize the deficient reaches of levees and floodwalls against the PDF and maintain the structural integrity of the MRL system. These 143 works items are addressed in the SEIS II; some items may be combined into larger construction contracts or divided into smaller work contracts during implementation.

DESCRIPTION OF STUDY AREA

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 most important component of the MR&T flood risk management system. It assists in protecting the 36,000 square-mile Lower Mississippi River Valley from periodic overflows of the Mississippi River. This alluvial valley ranges in width from approximately 40 to 110 miles and extends through parts of seven states: Missouri, Illinois, Kentucky, Tennessee, Arkansas, Mississippi, and Louisiana. Some of the major metropolitan areas found in the project area include, Cairo, Memphis, Vicksburg, Baton Rouge and New Orleans.

The project area for this SEIS is the same as the previous SEIS I, consisting of a corridor of about 2.7 million acres extending along the Mississippi River from Cape Girardeau, Missouri to the Gulf of Mexico. It includes all lands and waters lying between the mainline Mississippi River levees (and floodwalls), or bluffs where levees are absent, plus a zone extending 3,000 feet landside of the levees.

Implementation of flood control measures and the resulting system of levees, dikes, diversions and canals have significantly altered the landscape. Much of the Mississippi Alluvial Valley (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 most significant fish and wildlife related problem in the study area is the loss of forested habitat and the alteration of riverine process. The MAV once supported approximately 24 million acres of floodplain forest, swamps, sloughs and riverine habitat. However, more than 80 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.

The Service provided reports on the previous Environmental Impact Statements and planning documents to assist in their development. Likewise, the Service also provided a Planning-aid Report on March 5, 2019, combined with our Notice of Intent response for this SEIS. That report presented information on Service planning objectives, mitigation, at-risk species, and species listed under the Endangered Species Act.

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 (BLH) 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.

FISH AND WILDLIFE RESOURCE CONCERNS AND PLANNING OBJECTIVES

As presented above the loss and fragmentation of bottomland hardwood has reduced population of wildlife species dependent on this habitat type. Restoration in the MAV has focused largely on the restoration of forested wetlands to benefit breeding land birds, 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 main stem of the 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 species, species, Birds of Conservation Concern).

Therefore, the Service still has concerns about the long-term potential adverse impacts to fish and wildlife resources, public lands, and ongoing species conservation and habitat restoration efforts within the MAV. In order to address the above concerns the Service has previously identified the resources/issues that should be addressed during planning efforts and within the SEIS and recommended the USACE adopt the following planning objectives 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 and their 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 the planning of work items and detailed planning of 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.

DESCRIPTION OF EVALUATION METHODS

The U.S. Army Engineer Research and Development Center (ERDC), Environmental Laboratory (EL), Wildlife Team, conducted a project wide investigation of potential impacts to terrestrial resources. This investigation included field sampling to provide data for: (a) Habitat Evaluation Procedures (HEP) using six target species representative of the range of forested habitats found within the project area; (b) an analysis of potential impacts to waterfowl via the Duck Use Days (DUD) model; (c) an analysis of impacts to wetland functions and values using the Hydrogeomorphic Assessment (HGM); (d) primarily a qualitative analysis of migratory bird habitat lost (acreages are presented) due to the project; and (e) another quantification of acreage lost along with a qualitative analysis for 16 bat species that potentially occur within the project area. As the migratory bird and bat analysis were primarily qualitative no description of those assessments are provided.

In addition, ERDC also conducted an aquatic HEP to evaluate alternatives (i.e., number, size, and morphology of borrow areas) to estimate gains and losses of aquatic habitat for fishes. A Habitat Suitability Index (HSI) model was developed from field data to predict fish species richness as a function of the morphometry and water quality of borrow areas. The HSI score was multiplied by acres of borrow areas created during construction to obtain Habitat Units for each alternative and environmental features incorporated in the design to optimize fish diversity were identified. A Relative Value Index was also calculated from field data collected in 1997 and 2019 to compare the habitat value between riverside and landside borrow areas.

HABITAT EVALUATION PROCEDURE (HEP)

The Service's HEP models (U.S. Fish and Wildlife Service 1980) were developed to help document the quality and quantity of available habitat for fish and wildlife species in a given area. Using HEP analysis the habitat quality and quantity can be measured for baseline conditions and

predicted for future without-project and future with-project habitat conditions. This standardized, species-based methodology allows a numeric comparison of each future condition and hence provides an estimate of project-induced impacts on fish and wildlife resources. For this HEP analysis, only the acreage of direct project impacts were considered.

Species that require important habitat components within BLHs were selected as evaluation species. Evaluation species selected were the Barred Owl, Fox Squirrel, Carolina Chickadee, Pileated Woodpecker, Wood Duck, and Mink.

HEP provides a method for estimating habitat suitability for evaluation elements based on actual field measurements of various parameters that are predicted to be associated with relative population density. Results of the parameter measurements are mathematically combined to obtain a value between 0.0 and 1.0. This value is termed the habitat suitability index (HSI) with 0.0 representing no habitat value for an evaluation species and 1.0 representing optimum habitat value. This is a linear index with the degree of difference between 0.0 and 0.1 being the same as the degree of difference between 0.9 and 1.0.

Habitat units are the product of the evaluation species' habitat suitability index and the acreage of available habitat at a given target year. The habitat unit is the basic unit of HEP for measuring project affects on wildlife. Future habitat units change according to changes in habitat quality (habitat suitability index) or quantity (acres); these changes are predicted for various target years over the project life, for future without-project and future with-project conditions. These values are then summed and averaged over the 50-year period of analysis to determine the average annual habitat units available for each species. The change (increase or decrease) in average annual habitat units under each future with-project condition, compared to future without-project condition, provides a quantitative comparison of project impacts that are expected to occur with each project alternative. An increase in average annual habitat units indicates that the project is beneficial to the evaluation species; a decrease in average annual habitat units indicates that the project is damaging to the evaluation species.

Future without and some future with project assumptions were based on information gathered primarily from the Yahzoo Basin in Mississippi; that river is a tributary to the Mississippi River. Data was collected from bottomlands that had experienced various disturbances and were of various ages. That data was analyzed to develop likely future conditions of existing forests. Data was also gathered from previous mitigation sites of various ages within the MAV. That data was also analyzed and used to predict likely future conditions for proposed mitigation.

Worth noting is how the appropriate use of the mink model decreased the acreage of BLH needed for mitigation. The creation of a borrow pit within/adjacent to a forested wetland land, even if the pit removed forested areas, provided such an increase in habitat value for the mink that it decreased the overall amount of BLH mitigation required. While minks are highly associated with the water/land ecotone the value of an aquatic habitat to a mink varies with the type and productivity of the habitat. The HEP manual acknowledges that different lacustrine habitats may have varying levels of productivity thus value to the mink as a food source but did not account for such differences in the model. Devendorf and Yager (2013) modified the riverine portion of the mink model to account for varying degrees of productivity based on disturbances to that habitat

type; USACE has certified that modification for use in civil work planning. Newly constructed borrow pits initially have very little aquatic productivity but the model does not account for differences in the value of lacustrine habitats. This lack of differentiation allows relatively unproductive aquatic habitat to offset the loss of productive BLHs. The Service acknowledges that as the developer of the model the lacustrine habitat value formula has not been updated to reflect increased knowledge regarding mink habitat. The Service recommends that future use of this model incorporate refinements that reflect the aquatic productivity of lacustrine habitats, especially borrow pits whose value can change through time. Information gathered from borrow pits for the aquatic HEP could be possibly utilized to help determine future habitat conditions and values of borrow sites.

DUCK USE DAYS (DUD)

DUD is a quantitative method to estimate the potential duck-use-days of a habitat. It is based on daily energy requirements of waterfowl species and is used to determine incremental benefits, and impacts of land and water resource development projects on waterfowl habitats and populations in the MAV during the nonbreeding period (September through March). The assessment uses the basic concepts of estimating DUD's from resource abundance in the MAV. The method was developed by the Lower Mississippi Valley Habitat Joint Venture and uses contemporary data on: l) daily energetic expenditure of waterfowl species commonly present in the MAV during the nonbreeding period; 2) estimates of resource values and dynamics in a complete array of MAV habitats and management scenarios; 3) estimates of energy values of specific foods relative to different species; and 4) seasonal and annual probabilities of foods being available to waterfowl. Basically it quantifies the number of days a single individual duck could be supported based on the food resources available in an area and the gains or losses of those food resources based upon impacts of a proposed project.

HYDROGEOMORPHIC ASSESSMENT (HGM)

The HGM assessment utilized two subclass of wetlands types; riverine overbank subclass for sites riverward of the levee (i.e., batture) and the riverine backwater subclass for sites on the protected side of the levee (Murray and Klimas 2013). The HGM method for both subclasses includes evaluation of a combination of 13 off-site and onsite variables. Variable metric data was transformed into variable sub-index scores ranging from 0.0 to 1.0, and wetland functional capacity index (FCI) scores were calculated. The FCI scores were then converted to Functional Capacity Units (FCUs) by accounting for the spatial extent of each land cover type. Average Annual Functional Capacity Units (AAFCUs) are then evaluated over a 50-year period of analysis to determine mitigation requirements in similar approach applied to the AAHUs described above. The average of the six functional scores was selected to determine impacts and mitigation requirements based on recommendation in Smith et al. (2013). This approach yields similar results to the total FCUs method (Smith et al. 2013) and simplifies the wetland resources assessment process by 1) providing a single output for each levee work item (as opposed to six wetland functional scores) and 2) providing an analysis that corresponds to the WVA assessment results (which also yields a single HSI value). Future with mitigation scenarios were based on research and monitoring of past similar mitigation sites (Berkowitz and White 2013; Berkowitz 2013).

FISH AND WILDLIFE RESOURCES

In 2015 USACE with the Service and other non-governmental partners completed the Lower Mississippi River Resource Assessment (USACE 2015a). That assessment described resources within the LMV and stressors to those resources. The following description of resources relies upon that comprehensive report. The LMR floodplain varies in width from 1 to 15 miles; typically being narrower at the distal end. That floodplain provides habitat for birds, mammals, insects, amphibians, reptiles, resident floodplain fish, river fish, and freshwater mussels. Floodplains contain terrestrial and aquatic habitats including forests, canebrakes, side channels, floodplain lakes, natural levees, backwaters, abandoned channels, ridges and swales, manmade water bodies, and tributaries (Baker et al. 1991). Floodplain connectivity, including tributary floodplains are important for not only fish, but also aquatic insects, mussels, turtles, birds, and mammals (Winemiller 2003). The MR&T, including the MRL, system altered the natural patterns of surface water drainage reducing the floodplain area by over 80% from its historic size (Baker et al. 1991). The single most important factor affecting wetlands in the LMV has been the construction of levees to reduce the frequency and duration of flooding. Levees have allowed for the large-scale conversion of forested wetlands to agriculture, the growth of urban areas, and industrial expansion in areas formerly characterized by frequent flooding (USDOI 1994). Fish and other aquatic dependent species no longer have access to millions of acres of foraging, spawning, and nursery habitat. As flood water no longer spreads out over the historic floodplain, there is less opportunity for nutrients to attenuate and for water to percolate through the soil (Winemiller 2003). Wetland quantity and quality has been reduced throughout the valley.

Nonetheless, the current nearly 3 million acre floodplain and remaining backwater areas remain a dynamic freshwater ecosystem interspersed with abandoned channels (e.g., oxbow lakes), meander scars (e.g., sloughs), levee borrow pits, large expanses of forested wetlands, and tributary mouths (Baker et al. 1991). These areas provide a diverse array of aquatic habitat types and are connected to the river at high water.

Historically, most of the MAV was subject to periodic flooding by the Mississippi River and its tributaries. However, hydrologic relationships in the MAV have been altered by water resource developments for flood control and agricultural enhancement (Reinecke et al., 1988). In western Mississippi, for example, a two year flood event originally inundated more than 4.5 million acres. Construction of the MRL reduced the two year flood to approximately one million acres (Galloway 1980). Thus, in western Mississippi alone, the cumulative impacts of the MRL feature has reduced the two year flood event by about 88 percent (Reinecke al.1989). Additionally, the confining effect of the mainline levee system has caused progressively higher flood stages in some areas of the Mississippi River (Tuttle and Pinner 1982).

Flooding about once every two years is necessary to maintain populations of some fish and lack of flooding may result in successive reproductive failures (Barko et al. 2006). Changes in timing and extent of flooded acreage affect migratory waterfowl and shorebirds that dependent on that flooding. The floodplain, at high water, provides nutrition, secure roosting, cover in inclement weather, loafing sites, protection from predators, and isolation for pair formation.

FISHERY RESOURCES

Fishery habitat within the LMV consists of the Mississippi River and its tributaries and side channels, the adjoining floodplain, borrow pits, and oxbow lakes. Approximately one hundred fourteen freshwater fish species have been identified in the project area (USACE 1976). The slack water areas and floodplain are especially important aquatic resources and are used by numerous fish species as spawning areas during annual spring flooding. Utilization of this flooded habitat by insects for larval development provides important food resources for floodplain fish species. Beneficial nutrient input to the aquatic ecosystem combined with the low erosion and run-off are characteristics of these BLH forested wetlands and are factors which in the past resulted in excellent water quality and a highly productive fisheries. Slack water areas outside the main channel are frequently slow moving and shallow, providing important spawning and nursery sites for fishes and abundant food in the form of benthos and plankton. These slack waters are valuable for both commercial and sport fishing.

The BLHs growing in the batture are especially important to various fish species during annual flooding. Fish are especially dependent upon these forested and herbaceous overflow areas for food production, feeding, spawning, and rearing of young. Spring flooding allows recreationally and commercially important fish such as blue, channel, and flathead catfish; largemouth bass; bluegill and other sunfish; white crappie; and buffalo to spawn in the forested wetlands. Lambou (1990) found that of the 95 species of finfish known to occur in the leveed Atchafalaya Basin, Louisiana (a distributary of the Mississippi River), 54 percent use overflow wooded areas for spawning and/or rearing of young, while 56 percent use these areas for feeding. Finfishes moved in and out of the overflow areas in the Atchafalaya Basin in response to the rising and falling of the water level. Others (Welcomme 1979, Welcomme 1985, Holder 1970, Walker 1985, Guillory 1979) have also documented the use of forested overflow areas by fishes.

The lakes and borrow areas also support productive fisheries within the project area. A total of eighty fish species now known from borrow areas suggests an ichthyofauna second in diversity only to the lower reaches of tributary streams. Riverside borrow area communities include several uncommon and imperiled wetland species once characteristic of floodplain ponds (e.g., pugnose minnow, tailight shiner) and oxbow lakes (e.g., paddlefish, alligator gar) (USACE 1998). These relatively stable water bodies have large aquatic populations of plants and animals. The emergent plants around these water bodies are important primary producers in that a significant amount of leaf litter, branches, and other organic matter wash into these lakes and borrow areas during high water conditions, becoming a source of detritus. Flooding recharges and relieves periodic overpopulation and crowding of the oxbow lakes and borrow areas and results in a net export of fish to Mississippi River channel habitats.

The total standing stock of fish averages approximately 600 pounds per acre in borrow pits within the project area, indicating high fishery production. Populations of benthic macroinvertebrates in borrow pits are also comparatively high. Since many benthic organisms are used by various fish species as food, the abundance of benthic organisms is additional evidence of the value of borrow pits as fish habitat. The length of time that borrow pits are flooded annually is the single most important factor that influences population densities, standing stock, and diversity of borrow pit

fishes and benthic macroinvertebrates. The greater the average annual days flooded, the more productive the borrow pits (Cobb et al. 1984). In general, the value of borrow pits to aquatic species increases with time as shorelines and shallow areas are colonized by emergent and aquatic vegetation, relatively steep banks become shallower sloped, depths decrease, and the overall ecological complexity develops. Landside borrow pits that are not subjected to periodic overflow may take more years to increase in value to aquatic species.

WILDLIFE RESOURCES

BLHs are the most common habitat type in the LMV and are one of the most productive habitat types in the continental United States (Clark and Benforado 1981). Previously they were being lost at an alarming rate over most of their range (MacDonald et al. 1979). Between the 1950's and 1970's, nearly 300,000 acres were annually cleared and converted to agriculture (King et al. 2006). Prior to that he MAV contained 24 million acres of BLH forested wetlands. In 1988, there were only five million acres of forested wetlands remaining (U.S. Fish and Wildlife Service 1988). With the exception of a few public areas, the only large remaining contiguous blocks of forested wetlands are found riverside of the MRL. Galloway (1980) contended that in the absence of the MR&T project, BLH clearing would have abated and the dominating hydrologic influence of the Mississippi River would have led to the ultimate reversion of most of the BLH forests.

Loss of connectivity, altered hydrology, altered geomorphology and changes in the biotic community all contributed to landscape changes in the MAV. Soils and hydrologic regime influenced what species occurred in any given area. Common BLH trees species in the floodplain included oak, hickory, pecan, tupelo, bald and cypress; these are vital ecological resources. BLH are unique in structure and composition, and rich in wildlife and plant species. Softwoods such as cottonwood, elm, ash, and hackberry are also present and also provided food and habitat for many wildlife species. Forest types included cypress-tupelo, cottonwood-willow-sycamore, white oak-red-oak-hickory, hackberry-elm-ash, and many others (Klimas 1988). Channelization and levee construction alter flooding regimes and changed these habitats (Stanturf et al., 2000, Gardiner et al. 2005).

Reptiles, amphibians, and many mammals, including the Indiana bat, also depend on BLH forests for cover, food, and successful reproduction. Game species that depend on diversity of habitat include white-tailed deer, wild turkey, squirrel, rabbit, and many species of waterfowl (LMVJV 2007). Many species, like American woodcock, rely on the early successional stages of BLH (Kelley et al. 2008); this habitat type was historically maintained by the meandering river channel.

Bottomland forests can support two to five times as many game animals as nearby mixed pine habitat. Squirrels reach their highest densities in the ideal habitat provided by mature mast trees. Furbearers such as mink, river otter, raccoon, opossum, beaver, bobcat, and gray fox are found in BLHs, swamps, and riparian areas. Many nongame species such as small mammals find ideal habitat in the wooded wetlands of the area. These forested areas also provide important travel corridors for numerous wildlife species. Louisiana black bears depend on large, complex forest structure for forage, nesting or bedding sites, and successful reproduction. The flood tolerant

forest species that now dominate the batture are less complex and not as suitable for black bear.

The importance of BLHs to waterfowl and other birds cannot be over emphasized as over nine-tenths of all the bird species of eastern North America use bottomlands at one time or another (Harris et al., 1984). Forest interior song birds are dependent upon large expanses of BLH forests. Their populations have declined; fragmentation, human disturbances, and high edge to area ratios all contributed to their decline (Robinson et al. 1995).

The BLHs that remain along the Mississippi River are important wetlands for waterfowl. These forested wetlands fulfill special waterfowl habitat requirements not provided by open lands. Wooded habitats produce nutritious foods for waterfowl and provide secure roosting areas, cover during inclement weather, loafing sites, protection from predators, and isolation for pair formation. Eight species of waterfowl regularly use BLH forests (Bellrose and Holm 1994). Additional information on birds is provided in the Migratory Bird section below.

Several species of bats occur within BLHs in the LMV. The decrease in certain bat populations due to the white-nose syndrome, the spread of that disease between bat species and the occurrence of that disease in the LMV are reasons for concern for LMV bat populations. Different bat species will use BLHs having differing characteristics (e.g., closed canopy, open canopy, canopy gaps, relatively open mid-story, etc.) primarily depending on their feeding behavior. Management of mitigation areas should include habitat needs of bats to help compensate for impacts to those species. Clearing of forested lands during bat breeding seasons could impact future year classes. Therefore, clearing should occur during the fall and winter to those impacts.

Public Lands and Lands Designated for Conservation

The Service, state park and conservation agencies, and the U.S. 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. In particular, proposed work items between river miles 820 and 840 (on the left descending bank) along Great River Road in Tennessee are located in close proximity to the Tumbleweed Wildlife Management Area (WMA), White Lake Refuge, Thorny Cypress Public Hunting Area, and Moss Island WMA. These areas are all owned and/or managed by the Tennessee Wildlife Resources Agency (TWRA). USACE should coordinate with TWRA on potential impacts to these state managed areas.

Avoiding and/or minimizing impacts to all 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 USACE, the Service, and the managing natural resource agency in accordance with Section 3(b) of the FWCA for mitigation lands.

The National Resource Conservation Service has undertaken habitat restoration in cooperation with landowners via the Wetland Reserve Enhancement Program (WRP) and the Conservation Reserve Program (CRP). These programs focus on restoring native vegetation species. While the Service has not undertaken a complete accounting of impacts to those conservation lands it does have records that indicate approximately 11 work items since the last SEIS have impacted those restoration areas. While some areas are minor in areal extent others have impacted over 100 acres. These areas should be avoided whenever possible for future work items.

Threatened and Endangered Species

Below is a list of federally-listed threatened and endangered species that could potentially be affected by the MRL construction. Since our draft report the Service has announced that it will list the Eastern black rail as threatened on November 6, 2020. Should the proposed actions by USACE 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
Eastern black rail (*Laterallus jamaicensis jamaicensis)*	Threatened
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 report 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.

Incorporation of management actions that would aid listed species on mitigation lands should be explored and implemented under the authority of Section 7(a)1 of the Endangered Species Act. Currently, the three listed bat species provide the greatest opportunity for habitat management on mitigation lands.

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. As the Service develops proactive conservation strategies with partners for at-risk species, the states' Species of Greatest Conservation Need (defined as species with low or declining populations) will also be considered and included in our conservation recommendations under the FWCA.

The Service's goal is to work with private and public entities on proactive conservation to conserve these species, thereby precluding the need to federally list as many at-risk species as possible. While not all species identified as at-risk will become ESA listed species, their potentially reduced populations warrant their identification and attention in project and mitigation planning.

Discussed below are species currently designated as "at-risk" that may occur within the project area.

Alligator Snapping Turtle

The alligator snapping turtle 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. Because of this and its low fecundity, loss of breeding females is thought to be the primary threat to the species. Creation of borrow pits could provide habitat for this species provided proposed environmental designs are incorporated into the pits (see Description of Tentatively Selected Plan and Other Alternatives section below).

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.

This species may be found in forested habitats throughout the MAV during spring and fall migrations. This imperiled songbird depends 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. Mitigation lands would

provide the opportunity to actively address this species habitat needs in the MAV.

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. 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 (e.g., levees) 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

Because bird nesting colonies are present in the project area the Service recommends 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 (species whose population is in decline) 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. 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 or nesting success could be reduced. 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.

The Service's Lower Mississippi Valley Joint Venture Office, with other federal and state agencies and the private sector through the Partners in Flight initiative (PIF) have developed management objectives to

protect forest breeding birds and their habitat in the MAV. One of the top priorities of this effort was the identification of "bird conservation areas" that would provide habitat for self-sustaining populations of forest breeding birds (Twedt et al. 2006). Included in these areas were forested areas that needed to be preserved and cleared areas that need to be reforested (https://www.lmvjv.org/conservation-tools-summary). Therefore, the Service recommends that these areas be included in the consideration of the location of mitigation areas and in prioritizing the avoidance of impacts.

Bald Eagle

The LMV provides nesting habitat for the bald eagle, 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 Bald and Golden Eagle Protection Act (BGEPA). Bald eagles typically nest in large trees located near coastlines, rivers, or lakes that support adequate foraging from during breeding season. 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:
https://www.fws.gov/migratorybirds/pdf/management/nationalbaldeaglenanagementguidelines.pdf.

Those 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 South Atlantic - Gulf Region and the Mississippi Basin Region of the Service (phone: 404/679-7070, e-mail: permitsR4MB@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).

FUTURE FISH AND WILDLIFE CONDITIONS

Future fish and wildlife resources within the LMV are effected by five major forces: flood risk management, channel improvements, climate, land use and tributary changes, and other anthropogenic effects including point source effluents (USACE 2015a).

The MRL system has disconnected over 80% of the historic river floodplain from the river (Baker et al. 1991), reducing the attenuation of nutrients and contaminants due to flood waters not spreading over the entire floodplain. To varying degrees the depth, timing and duration of the flood events have changed. In addition, the levees have eliminated the river's geomorphic effect on areas outside the active floodplain, changed the effects within the batture and reduced sediment input into coastal wetlands (USACE 2015a). These existing changes in the landscape will continue to occur because of the need to maintain the MRL system.

A review of climatic condition analysis within the MAV indicates there has been an increase in total rainfall and number of days with rainfall. A slight increase in mean streamflow (including the Mississippi River) has been identified but not all studies agree with that finding. An increase in the one day extreme minimum temperatures was found but none was found to exist for maximum temperatures; overall a lack of significant warming has not been found (USACE 2015b). However an apparent shift in the start of spring was identified with spring warming occurring later than in the past.

Future climatic conditions have been predicted to have an increase in the maximum air temperature of 2 to 4 degrees Celsius (C) and average annual temperatures by 2 to 5 degrees C by the end of the century (USACE 2015b). Precipitation may experience a slight increase but overall there is no strong consensus on future precipitation trends. Some studies anticipate a slight decreasing trend in streamflow through the next century but other studies predicted increased flows. With an increase in temperatures water quality in lentic systems could be affected especially during low water periods and/or periods of less rainfall. Increased water temperatures could adversely impact spawning and development of fish species less tolerant to warmer temperatures and may decrease dissolved oxygen levels adversely further impacting less tolerant species. Increased air temperatures could adversely affect the development of some amphibians and could change hatching sex ratios in reptiles with potential long term population implications.

In the LMV the watershed is now primarily agricultural and many of the tributaries have been altered to facilitate drainage (USACE 2015a). These drainage improvements allow the rapid removal of rainfall from the floodplain which has resulted in a change in the timing and duration of flood pulses in the tributary rivers (Baker et al. 2004). The rapid transport of rainfall affords

nutrients less opportunity to attenuate on the floodplain. Channelization in tributary rivers has also altered the geomorphology processes and changed sediment dynamics. The resulting head-cutting has reduced out-of-bank flooding further reducing attenuation of nutrients and decreasing floodplain feeding, spawning, and rearing habitat for fish and wildlife species. Head-cutting will continue until a new equilibrium is attained, however this may not be obtained for many years. The conversion of forests to crop lands has eliminated habitat, created forest patches, reduced travel corridors and altered biotic community structure and function (USACE 2015a). Riverine and smaller lotic habitat restoration has begun to improve fish and wildlife habitat in localized areas throughout the LMV. Continued restoration efforts may depended on funding and priority of competing infrastructure projects (e.g., roads, bridges, drainage, etc.).

A variety of non-native plants and animals have been introduced into the MAV. These include common carp, bighead carp, silver carp, grass carp, northern snakehead, zebra mussels, nutria, feral hogs, purple loosestrife, Eurasian water milfoil, water hyacinth, alligator weed, hydrilla, kudzu, Japanese honeysuckle, mimosa, and privet (USDA 2014). The effect of these non-native species varies but typically they compete with native species for food and other resources thus potentially adversely affecting the population of native species, especially on a local level. Expansion of non-natives species is often limited by natural conditions such as temperature tolerances; warmer temperatures could allow the expansion of non-natives into areas they previously could not inhabit adversely impacting native fish and wildlife resources in those areas.

Changes in water quality could affect amphibians, birds, mammals, and even plants, but there is limited information on these effects. Some studies have shown effects on fisheries especially in side channels and backwaters. The degree of connectivity to the main channel, nutrient concentrations, the presence of macrophytes, and physical factors such as depth can affect water quality in side channels and back water areas. Baker et al. (1991) noted water quality (e.g., dissolved oxygen, turbidity, nutrients, and plankton densities) is one of several important aquatic habitat variables in the LMV. Warmer air temperatures can decrease the ability of water to hold oxygen. Currently, low oxygen levels impact fish species richness and abundance in river backwater areas, river channels, and lakes (Killgore and Hoover 2001). Point sources contribute contaminants to the river. Regulation of point source discharges is the primary means of controlling and/or reducing such contaminants (USACE 2015a).

As previously stated the Mississippi River floodplain is now 80% smaller than it was historically. That loss impacts water quality, habitat and species, therefore, the floodplains of tributary rivers may be of greater importance to fish and wildlife resources since their reduction. There is a need to maintain/restore tributary rivers and their floodplain; better management/restoration could help offset some of the loss of floodplain area and resulting habitat losses. On the main stem Mississippi River, there is a need to restore the quality of habitat within the batture (USACE 2015a). Housing, farms, highways, factories and other developments have significantly increased within the historic floodplain following levee construction. Restoration of BLHs within the LMV has been a focus for many years allowing acreage of that habitat to increase since the last SEIS. Future restoration may depend on classification of jurisdictional wetlands and funding for restoration efforts.

DESCRIPTION OF THE TENATIVELY SELECTED PLAN AND OTHER ALTERNATIVES

USACE examined in detail three alternatives, the No-Action (Alternative 1), the Traditional Construction method (Alternative 2) and the Avoid and Minimize Alternative (Alternative 3).

Under the No Action alternative, no new construction would be undertaken to address the 143 known deficiencies but operation and maintenance would continue. Normal flood fighting activities such as sandbagging and raising mudboxes would also be undertaken during floods. Implementation of this alternative was not chosen because it does allow the authorized purpose of the project to be achieved and could, in the long term, result in a failure of the system and flooding.

Alternative 2, the Traditional Construction would implement the proposed improvements and modifications using the most cost efficient means available. The MRL levees would be constructed to the design grade as determined by the Refined 1973 PDF (Project Designed Flowline). 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 with flattening of levee slopes. Reaches of floodwalls with stability concerns would be replaced or repaired to lower 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. Impacts to wetlands or wildlife habitat would not be avoided or minimized under this alternative, as this plan would require no special configuration or location of borrow areas other than for engineering purposes. Traditional mitigation measures to compensate for losses would be included as required by law and policy. No provisions would be made for drainage, reforestation, or other environmental enhancement features for the borrow areas.

Alternative 3, the Avoid and Minimize Alternative, is the Recommended Plan (RP). The primary difference between Alternative 2 and Alternative 3 is the method of selecting the borrow source for each work item; for this alternative the selection would be made with an intent to avoid and minimize adverse environmental impacts. The MRL levees would be constructed to the design grade as determined by the Refined 1973 PDF. Reaches of the MRL with seepage concerns and stability concerns would be addressed in the same manner as Alternative 2. However, this alternative establishes a method for identifying and ranking potential borrow sources in terms of land use and locations that best avoid and minimize adverse environmental effects from the excavation and placement of borrow material. Environmentally sensitive areas, forested areas of BLHs and wetlands would be avoided whenever practicable and possible. The following is a list of eight (8) different types of land uses that are traditionally used as borrow sources for the MR&T Project. These land uses are ranked in order of most preferable to least preferable, in terms of borrow source locations that generally have the greatest ability to avoid and minimize environmental impacts:

1) Riverside prior-converted cropland
2) Landside cropland from willing sellers
3) Riverside farmed wetlands (cropland)

4) Riverside farmed wetlands (pasture)
5) Riverside herbaceous wetlands not in federal conservation programs
6) Riverside forested non-wetlands not in federal conservation programs
7) Riverside forested wetland not in federal conservation programs
8) Landside/Riverside cropland condemnation

Additional 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. These opportunities would be explored with future phases of the project; however, it is not likely nor assumed that these features would be incorporated into all borrow areas. Furthermore, there would be no site protection instrument to ensure the long-term protection of these sites. As such, these environmental benefits were not assumed to offset any impacts in calculations of compensatory mitigation; but they would provide ecological benefits when implemented. Typically the ability to incorporate these features into borrow sites has been very low.

Construction of each work item would be similar under Alternatives 2 and 3. Upon receipt of Congressional appropriated funding, detailed designs and plans and specifications would be prepared for each work item. Development of plans and specifications would include the preparation of detailed rights-of-way maps along with identification of the relocations necessary for construction of each item of work. Disturbance from construction will include the footprint of the work items, associated borrow areas, as well as, staging areas, haul roads, and drainage ditches. These features were either identified separately or included in the overall construction footprint. Existing roads would be used, and staging areas would be located in previously disturbed areas to the extent practical

Installation of installation of signage, construction fencing and gates, and best management practices (BMPs) for erosion control would be completed at each work item construction site. A stormwater pollution prevention plan (SWPPP) would be prepared in compliance with EPA and associated state regulations. The SWPPP would outline temporary erosion control measures such as silt fences, retention ponds, and dikes. The construction contract would include permanent erosion control measures such as turfing and placement of riprap and filter material. Additionally, interim flood reduction measures would be included with any alternative during ongoing construction at any of the work item locations, as needed. Funding for detailed design and implementation of the 143 work items would be received through annual Congressional appropriations. Based on traditional funding allocations, these work items would likely begin in 2020 or 2021 and extend for over 50 years. Since detailed designs are not yet available and the work items extend over many years, full environmental compliance for all work items is not anticipated with this SEIS II; however, the framework for achieving environmental compliance is included. With any project alternative, tiered NEPA analyses and initiation of Section 7 consultation under the ESA will be needed for some of these work items over the course of the project life after funding is received and detailed designs are completed.

PROJECT IMPACTS

By relocating borrow areas to less environmentally damaging areas, Alternative 3 (Avoid and Minimize) reduced impacts to BLH wetlands, waterfowl, and wildlife, resulting in 449 fewer acres of forested lands being impacted compared to Alternative 2 (Table 1). The reduction of forested impacts with Alternative 3 was viewed by USACE as a justified tradeoff, as threatened and endangered species, bats, and migratory birds can periodically use the forested BLH habitats during seasonal migrations. Construction of new borrow areas would result in positive gains of aquatic habitat for fish and other aquatic resources with either Alternative 2 or 3, however, excluding riverine species, most species common to lacustrine areas are not under a threat of population decline. Additional 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. While these benefits are not assumed to occur, the aquatic assessment showed that incorporation of these features can increase aquatic habitat values by an additional 40%. The acreage of bat and migratory bird Species of Concern habitat lost was quantified by acreage and is presented in Appendix 1. Also, presentation of impacts by states and USACE districts is found in Appendix 1 by the various assessment methods. Alternative 3 (avoid and minimize) was determined to be the Recommended Plan (RP).

Table 1. Land Cover impacts associated with each alternative.

	Alternative 2 - Traditional Construction		**Alternative 3 - Avoid and Minimize**	
Overall Land Cover	**Total Acreage**	**Percent**	**Total Acreage**	**Percent**
Cropland	1,209	17%	1,675	23%
Forested	1,332	18%	883	12%
Levee	4,061	56%	4,101	56%
Marsh	13	0%	13	0%
Non-forested Wetland	18	0%	15	0%
Open Water	11	0%	10	0%
Pasture, Old Field	162	2%	177	2%
Scrub/Shrub	123	2%	132	2%
Urban	276	4%	275	4%
Total	7,205	100%	7,281	100%

The reduction in acreage impacts by selecting Alternative 3 results in a corresponding decrease in impacts to bottomland hardwood species as shown by the reduced loss of DUDs and AAHUs in the HEP analysis (Table 2). Reduced impacts to wetland functions is presented via the Hydrogeomorphic Manual. Creation of borrow sites results in a net gain in aquatic habitat units for both alternatives. Nonetheless, impacts from this alternative would still result in the loss of 1,606 AAHUs as calculated by HEP, 49,293 FSC/HSU as calculated by HGM and 662,913 duck use days. Reforestation and management of approximately, 1,447 acres would

be needed to mitigate project impacts. This acreage calculation was determined by the HGM method for all states except Louisiana where the WVA was used to determine mitigation acreage.

Table 2. Summary of impacts and required compensatory mitigation from quantitative assessments of Alternatives 2 and 3.

Method	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)
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 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).

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 flood risk reduction 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 (i.e., in-kind mitigation would be recommended). 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 and mitigation can be out-of-kind.

To achieve fish and wildlife resource conservation and help the USACE address the Service concerns regarding fish and wildlife resources in the project area the Service provided planning objectives to guide future project planning efforts (see Fish and Wildlife Resource Concerns and Planning Objectives section).

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 (USACE 1986). 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 during construction of work items.

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. USACE, 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 USACE 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 bird species as well as pollinators.

To help achieve Service presented Planning Objectives, 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.

Compensation lands do not need to be acquired concurrently with each work item, but mitigation should be completed in each USACE District prior to the end of the construction period. 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. Currently, USACE has mitigated most of the 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 previous 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.

Mitigation for the work items would occur through the purchase and restoration of former bottomland hardwood habitat. Mitigation sites would be planted with species suited to the soils and hydrology of the sites. Site hydrology would be restored by various methods including plugging or filling ditches so that the criteria needed to achieve jurisdiction wetland status would be obtained. Local Service offices and state natural resource agencies should be coordinated with during the search for mitigation lands and the detailed planning of mitigation sites.

In coordination with the Service and other fish and wildlife conservation agencies, the USACE should address the Environmental Protection Agency's and the USACE's 12 requirements for each mitigation measure (Appendix 2).

SERVICE POSITION AND RECOMMENDATIONS

The Service recognizes need to provide flood risk reduction and has worked with the USACE to minimize damages to fish and wildlife resources and the development of a general compensation plan to mitigate for unavoidable damages while providing flood risk reduction benefits. USACE selected Alternative 3, Avoid and Minimize Alternative, thus minimizing forested impacts. The USACE has also developed general mitigation measures for the unavoidable impacts to forested wetlands; approximately 1,447 acres will be purchased and reforested by the USACE.

In summary, the Service commends the USACE for selecting Plan 3, the Avoid and Minimize Alternative, which significantly reduces BLH losses and compensates for unavoidable adverse impacts and incorporates several environmental design features. The Service looks also forward to participation in the planning and implementation of the mitigation plan for this project. Therefore, the Service does not object to the measures needed to maintain the integrity of the MRL provided the following recommendations are incorporated in subsequent planning and construction phases:

1. All forested and wetland losses should be mitigated in-kind.

2. The Service recommends the following hierarchy be used to locate mitigation areas:

    a. Mitigation Zone 1: Riverside frequently flooded Mississippi River connected lands (e.g., batture lands).
    b. Mitigation Zone 2: Frequently flooded/hydrologically connected landside areas (e.g., frequently flooded and impounded/backwater areas).
    c. Mitigation Zone 3: Moderately flooded landside areas (e.g., low lying flooded areas landside of the MRL whose hydrologic conditions are dictated by precipitation and landscape position).
    d. Mitigation Zone 4: Mitigation bank

3. 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 area 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.

4. 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.

5. Purchase of credits from mitigation banks should follow the same hierarchy presented in recommendations 2, 3, and 4.

6. 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 Service and the natural resource agencies prior to its finalization.

7. 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.

8. Funding for management and oversight should be provided on an annual basis to the agency managing mitigation lands.

9. The Service recommends that the above 8 recommendations be applied to any remaining mitigation from the previous SEIS and that implementation of that mitigation should be made a priority.

10. Avoid and/or minimize impacts to public lands and conservation/habitat restoration lands in the project area.

11. 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.

12. 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.

13. Impacts to public lands should be mitigated on the impacted public lands.

14. The Service recommends that borrow pits should be environmentally designed as described in the SEIS to provide maximum benefits to fish and wildlife, and should include:

a. tree plantings around most of the perimeter,
b. native grass plantings along some of the banks,
c. brush piles, constructed with tree limbs from project clearing, in the borrow sites,
d. limbs and tree trunks placed perpendicular along the shore,
e. irregular shorelines,
f. islands,
g. creating/ensuring connectivity to the river (for riverside pits), and
h. variable depths.

15. The Service recommends the following hierarchy to located borrow pits:

a. Riverside prior-converted cropland
b. Landside cropland from willing sellers
c. Riverside farmed wetlands (cropland)
d. Riverside farmed wetlands (pasture)
e. Riverside herbaceous wetlands not in federal conservation programs
f. Riverside forested non-wetlands not in federal conservation programs
g. Riverside forested wetland not in federal conservation programs
h. Landside/Riverside cropland condemnation

16. The Service recommends that mitigation should be completed in each USACE District prior to the end of the construction period in that District and that compensation lands do not need to be acquired concurrently with each work item. Delays in mitigation implementation should result in the reassessment of impacts to account for the temporal delay. This reassessment should be coordinated with the Service and other natural resource agencies.

17. The Service and the local state fish and wildlife agency should be involved in the detailed design for all levee enlargement projects and all mitigation plans.

18. Each state's Service office and the local natural resource agencies should be again solicited for recommendations regarding the location of mitigation lands once detailed mitigation planning is initiated and should be coordinated with throughout the planning and implementation process.

19. The Service recommends USACE investigate the use of native grassland species as cover for levees. Inclusion of even some native species could help declining grassland bird species and/or pollinators.

20. Under Sec 7(a)1 of the ESA the Service recommends that mitigation areas should include adaptive 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.

21. 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.

22. 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.

23. If construction impacts any publicly managed conservation lands the managing land agency should be notified early in the planning process and should be coordinated with throughout the design phase. Prior to initiating construction the agency should be informed of construction schedule and contractors should be made aware of any special requirements of the land managing agency. Contractors should contact the managing agency prior to initiating

construction.

24. Following construction of a flood risk reduction feature(s) on public conservation lands USACE should notify the managing agency prior to initiating any maintenance activities.

25. 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.

26. Avoid or minimize impacts to migratory bird habitat to the extent feasible.

27. The Service recommends that a qualified biologist inspect proposed work sites for the presence of undocumented colonial nesting waterbirds during the nesting season; USACE should avoid disturbing nests. 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 avoid them during the nesting season.

28. If a bald eagle nest occurs or is discovered within 660 feet of the proposed work item, 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.

The Division of Migratory Birds for the South Atlantic - Gulf Region and the Mississippi Basin Region 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).

29. The Service recommends that borrow areas be designed to leave at minimum a 300-foot wide forested area between the levee toe (excluding the 15 feet required to be cleared and maintained) and the river. Forested areas can provide levees a natural riverside slope protection in line with the Designing with Nature concept. Those forested areas could shield the levee from waves and currents possibly precluding the need for hardened slope protection that can reduce grassland habitat.

30. 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 those reports.

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APPENDIX 1: SUMMARY OF IMPACTS BY EVALUATION METHODS AND DISTRICTS AND/OR STATES

Table 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[5]	-37,338	-141,330	-1643	295	795	-23,924	-99,029	-540.3	379	673
MVK[6]	-24,141	-550,069	-1108	367	724	-20,386	-545,676	-867.9	347	614
MVN[7]	-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 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] Memphis District

[6]Vicksburg District

[7] New Orleans District

Table 2. Reduced total number of duck-use-days and impacted suitable habitat acreage by state and USACE District associated with implementation of Alternative 2 (traditional construction).

	Memphis		Vicksburg		New Orleans		MAV	
	Total DUD (Nov-Feb)	Acres	Total DUD (Nov-Feb)	Acres	Total DUD (Nov-Feb)	Acres	Total DUD (Nov-Feb)	Acres
Arkansas	67,150	79.6					67,150	79.6
Illinois	6,250	5.9					6,250	5.9
Kentucky	876	0.3					876	0.3
Louisiana			546,522	386.1	92,411	91.9	638,933	478.0
Mississippi	10,152	13.1	3,546	4.3			13,698	17.4
Missouri	56,476	56.6					56,476	56.6
Tennessee	426	1.2					426	1.2
Total	141,330	156.7	550,068	390.4	92,411	91.9	783,809	639.0

Table 3. Reduced total number of duck-use-days and impacted suitable habitat acreage by state and USACE District associated with implementation of Alternative 3 (avoid and minimize).

	Memphis		Vicksburg		New Orleans		MAV	
	Total DUD (Nov-Feb)	Acres	Total DUD (Nov-Feb)	Acres	Total DUD (Nov-Feb)	Acres	Total DUD (Nov-Feb)	Acres
Arkansas	57,001	76.3					57,001	76.3
Illinois	0	0.0						
Kentucky	19	0.0					19	0.0
Louisiana			542,614	371.7	18,246	20.7	560,860	392.4
Mississippi			3,062	4.3			3,062	4.3
Missouri	41,512	48.1					41,512	48.1
Tennessee	497	1.2					497	1.2
Total	99,029	125.6	545,676	376.0	18,246	21	662,951	522.3

Table 4. The number of habitat units (gain/loss) for Alternative 2 and 3 within each USACE District for each of the six target species used in the HEP analysis.

Species	Alternative 2 - Traditional Const.				Alternative 3 - Avoid and Minimize			
	District				District			
	MVK	MVM	MVN	All Districts	MVK	MVM	MVN	All Districts
Carolina Chickadee	-297	-698	-86	-1081	-231	-283	-48	-562
Barred Owl	-369	-584	-132	-1085	-280	-256	-79	-615
Pileated Woodpecker	-196	-324	-41	-561	-153	-155	-26	-334
Fox Squirrel	-309	-401	-104	-814	-239	-150	-79	-468
Wood Duck	-176	-86	-55	-317	-128	-58	-13	-200
Mink	+239	+450	+93	+782	+164	+363	+47	+573
Overall Change in AAHU	-1108	-1643	-325	-3075	-867	-540	-198	-1605

Table 5. The number of habitat units (gain/loss) for Alternative 2 and 3 within each state for each of the six target species used in the HEP analysis.

Alternative 2 - Traditional Construction

Species	States						All States
	Arkansas	Illinois	Louisiana	Mississippi	Missouri	Tennessee	
Carolina Chickadee	-187	-17	-321	-78	-94	-385	-1081
Barred Owl	-168	-16	-393	-124	-89	-294	-1085
Pileated Woodpecker	-105	-10	-192	-57	-56	-140	-561
Fox Squirrel	-106	-8	-327	-91	-43	-239	-814
Wood Duck	-36	-5	-192	-47	-25	-11	-317
Mink	125	40	275	83	165	93	781
Overall Change in AAHU	-477	-18	-1150	-314	-142	-976	-3076

Alternative 3 – Avoid and Minimize

Carolina Chickadee	-154	-9	-235	-44	-62	-58	-562
Barred Owl	-134	-9	-287	-72	-60	-53	-615
Pileated Woodpecker	-81	-6	-146	-33	-38	-31	-334
Fox Squirrel	-88	-4	-258	-60	-28	-31	-468
Wood Duck	-25	-3	-118	-24	-17	-13	-200
Mink	87	29	167	43	123	123	573
Overall Change in AAHU	-394	-1	-876	-190	-82	-63	-1606

Table 6. Bat habitat land cover changes for each alternative.

Alternative 2 – Traditional Construction

Cover Type	Before	Change	After	Percent Change
Open	10,0072.9	-297.9	99,775.0	-0.30
Forest	56,519.5	-960.0	55,559.5	-1.70
Urban (other)	49,558.1	-20.0	49,538.0	-0.04
Water	73,383.3	+1277.9	74,661.2	+1.74

Alternative 3 – Avoid and Minimize

Cover Type	Before	Change	After	Percent Change
Open	102,855.4	-922.5	101,932.9	-0.90
Forest	54,553.7	-330.1	54,223.6	-0.61
Urban (other)	49,873.9	-18.1	49,855.8	-0.04
Water	72,539.9	+1,270.7	73,810.6	+1.75

Table 7. Acreage of habitat according to USGS GAP for species within IPaC that likely will be impacted by work item impacts to forested habitats within MRL SEIS II work items for **Alternative 2** (Traditional Construction). Habitats considered for Rusty Blackbird includes all types of wetlands (e.g., scrub/scrub, marsh, forested, wet meadow).

		District			
Species[a]	Season	MVK	MVM	MVN	All Districts
Bald Eagle	Winter		14.0	11.6	25.6
	Year-round	280.4	231.2	138.3	649.9
Kentucky Warbler	Breeding	248.7	244.3	41.7	534.7
Prothonotary Warbler	Breeding	228.3	105.0	49.8	383.2
	Migration			79.0	79.0
Red-headed Woodpecker	Breeding	31.5	53.0	20.7	105.2
	Winter		3.5		3.5
	Year-round	284.4	272.9	148.9	706.2
Rusty Blackbird	Winter	402.0	520.4	631.1	1553.6
Swallow-tailed Kite	Breeding	182.1		20.4	202.4
Wood Stork	Winter			85.2	85.2

Wood Thrush	Breeding	270.6	249.2	41.1	560.9

[a]

Habitat for cerulean warbler, black rail, and golden-winged warbler was not indicated to occur within Work Items for Alternative 2.

Table 8. Acreage of habitat according to USGS GAP for species within IPaC that likely will be impacted by work item impacts to forested habitats within MRL SEIS II work items for **Alternative 3** (Avoid/Minimize). Habitats considered for rusty blackbird includes all types of wetlands (e.g., scrub/scrub, marsh, forested, wet meadow).

		District			
Species[a]	Season	MVK	MVM	MVN	All Districts
Bald Eagle	Winter	0.0	6.3	11.6	18.0
	Year-round	194.9	148.8	124.5	468.3
Kentucky Warbler	Breeding	172.0	132.8	27.9	332.6
Prothonotary Warbler	Breeding	154.3	26.1	23.5	203.9
	Migration	0.0	0.0	79.0	79.0
Red-headed Woodpecker	Breeding	30.5	45.0	19.9	95.4
	Winter		0.8		0.8
	Year-round	199.0	166.2	135.0	500.2
Rusty Blackbird	Winter	324.7	426.0	644.9	1395.6
Swallow-tailed Kite	Breeding	139.9	0.0	19.3	159.2
Wood Stork	Winter	0.0	0.0	85.2	85.2
Wood Thrush	Breeding	185.3	133.1	27.8	346.2

[a] Habitat for cerulean warbler, black rail, and golden-winged warbler was not indicated to occur within work items for Alternative 3 (avoid/minimize).

Table 9. Summary of wetland FCU/HSU changes in each USACE District comparing the tradition alternative with the avoid and minimize alternative

	Traditional alternative (2)		**Avoid and minimize alternative (3)**	
	Change in FCU/HSU		Change in FCU/HSU	
District	Riverside	Landside	Riverside	Landside
Memphis	-21813	-15525	-11194	-12731
Vicksburg	-19743	-4398	-15523	-4863
New Orleans	-5334	-2721	-997	-3986

Total	-46889	-22644	-27714	-21579

Table 10. Summary of wetland FCU/HSU changes and mitigation requirements in each state comparing the tradition alternative with the avoid and minimize alternative

	Traditional Alternative (2)		**Avoid and Minimize Alternative(3)**	
	Change in FCU/HSU		Change in FCU/HSU	
State	Riverside	Landside	Riverside	Landside
Arkansas	-7030	-6411	-4678	-6411
Illinois	-811	-58	-488	-58
Kentucky	0	-295	0	-6
Louisiana	-16652	-4174	-11166	-5439
Mississippi	-8424	-2945	-5354	-3410
Missouri	-9490	-4382	-3120	-1571
Tennessee	-4482	-4380	-2907	-4685
Total	-46889	-22644	-27714	-21579

Table 11. A summary of the borrow area acres that will be created on the landside or riverside of the levee under Alternative 2 (traditional construction) and Alternative 3 (avoid and minimize) without environmental features. Habitat Suitability Index values were calculated from equation 1, Section 3.2.7. Habitat values used in this analysis were VDI=1.4, maximum depth=7.5 feet, percent area > 5 ft = 23, and average turbidity=24 NTU's resulting in a HSI=0.7. Relative Value Index (RVI) indicating reduced species diversity was applied to all landside borrow areas by multiplying Habitat Units by 0.6.

District	Location (proposed work)	**Alternative 2** (traditional construction)				**Alternative 3** (avoid and minimize)			
		Acres	HSI	RVI	Habitat Units	Acres	HSI	RVI	Habitat Units
Gains (+) of open water due to land cover conversions with new borrow areas									
MVM	Landside (borrow)	+349.5	0.7	0.6	+147	+43.5	0.7	0.6	+18
MVM	Riverside (borrow)	+207.9	0.7		+146	+513.1	0.7		+359
MVK	Landside (borrow)	+77.9	0.7	0.6	+33	+147.6	0.7	0.6	+62
MVK	Riverside (borrow)	+479.7	0.7		+336	+409.6	0.7		+287
MVN	Landside (borrow)	+98.2	0.7	0.6	+41	+223.2	0.7	0.6	+94
MVN	Riverside (borrow)	+190.1	0.7		+133	+65	0.7		+46
TOTAL	Landside (borrow)	+525.6			+221	+414.3			+174
TOTAL	Riverside (borrow)	+877.7			+614	+987.7			+691
NET TOTAL		+1403.3			+835	+1402			+865
Gains (+) or losses (-) of existing open water due to other proposed work									
MVM	Riverside: (fill of open water from levee enlargement)	-0.4	0.7		-0.3	-0.4	0.7		-0.3
MVM	Landside: (excavation from relief wells)	+5.7	0.7	0.6	+2.4	+5.7	0.7	0.6	+2.4

MVK	Riverside: (deepening of existing borrow area)	+0.2	0.7		+0.1	+0.2	0.7		+0.1
MVK	Riverside: (fill of open water from haul roads)	-3.8	0.7		-2.6	-2.9	0.7		-2.0
MVN	Riverside: (fill of open water from levee enlargement)	-0.2	0.7		-0.1	-0.2	0.7		-0.1
MVN	Landside: (fill of open water from levee enlargement)	-0.9	0.7	0.6	-0.4	-0.9	0.7	0.6	-0.4
TOTAL	Landside	4.8			+2.0	4.8			+2.0
TOTAL	Riverside	-4.2			-2.9	-3.3			-2.3
NET TOTAL		**0.6**			**-0.9**	**1.5**			**-0.3**
TOTAL	**Landside**	**+530.4**			**+223**	**+419.1**			**+176**
TOTAL	**Riverside**	**+873.5**			**+611.1**	**+984.4**			**+688.7**
GRAND TOTAL		**+1403.9**			**+834.1**	**+1403.5**			**+864.7**

APPENDIX 2: 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.

A2-2 RESPONSES TO FISH AND WILDLIFE COORDINATION ACT REPORT RECOMMENDATIONS

Recommendation #	***USFWS Recommendations, Final Fish and Wildlife Coordination Act Report, letter dated November 2020***	**USACE Responses**
1	*All forested and wetland losses should be mitigated in-kind.*	As described in Section 5.5.2 of the SEIS II, the proposed vegetated wetland restoration complies with 33 U.S.C. § 2283(d)(1), which requires in-kind mitigation for impacts to BLH forests to the extent possible.
2	*The Service recommends the following hierarchy be used to locate mitigation areas:* *a. Mitigation Zone 1: Riverside frequently flooded Mississippi River connected lands (e.g., batture lands).* *b. Mitigation Zone 2: Frequently flooded/hydrologically connected landside areas (e.g., frequently flooded and impounded/backwater areas).* *c. Mitigation Zone 3: Moderately flooded landside areas (e.g., low lying flooded areas landside of the MRL whose hydrologic conditions are dictated by precipitation and landscape position).* *d. Mitigation Zone 4: Mitigation bank*	This hierarchy is consistent with what is proposed in Section 5 of the SEIS II.
3	*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.*	As described in the SEIS, identification of potential mitigation lands will focus on 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.
4	*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.*	See response to Recommendation #3.
5	*Purchase of credits from mitigation banks should follow the same hierarchy presented in recommendations 2, 3, and 4.*	Coordination with the interagency team would be conducted prior to use of mitigation banks, as described in Section 5 of the SEIS.
6	*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.*	Concur. Coordination with the interagency team would be conducted prior to use of mitigation banks, as described in Section 5 of the SEIS.
7	*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.*	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.
8	*Funding for management and oversight should be provided on an annual basis to the agency managing mitigation lands.*	Funding for management of mitigation lands is dependent on annual appropriations.
9	*The Service recommends that the above 8 recommendations be applied to any remaining mitigation from the previous SEIS and that*	Construction, 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.

	implementation of that mitigation should be made a priority.	Upon identification of any potential mitigation land, detailed tract-specific mitigation plans will be prepared and coordinated with the interagency team.
10	*Work items should avoid and/or minimize impacts to public lands and conservation/habitat restoration lands in the project area.*	Concur. Impacts to public lands and conservation/habitat restoration lands will be avoided and minimized to the extent practical. USACE will continue to seek ways to avoid and minimize impacts to these areas during detailed design. See response to Recommendation #23.
11	*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.*	As described in the SEIS II, USACE would consult with the local USFWS Ecological Services Field Office with each Work Item, pursuant to Section 7 of the Endangered Species Act (ESA), after Congressional appropriations are received and while detailed engineering and construction plans are being developed. USACE will continue to look for ways to avoid impacts to listed species during detailed design. 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.
12	*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.*	See response to Recommendation #11.
13	*Impacts to public lands should be mitigated on the impacted public lands.*	If impacts to public lands are identified during detailed design, the associated coordination, including potential mitigation activities, would be coordinated with the managing agency.
14	*The Service recommends that borrow pits should be environmentally designed as described in the SEIS to provide maximum benefits to fish and wildlife, and should include:* *a. tree plantings around most of the perimeter,* *b. native grass plantings along some of the banks,* *c. brush piles, constructed with tree limbs from project clearing, in the borrow sites,* *d. limbs and tree trunks placed perpendicular along the shore,* *e. irregular shorelines,* *f. islands,* *g. creating/ensuring connectivity to the river (for riverside pits), and* *h. variable depths.*	As described in the SEIS II, environmental features (e.g., irregular shorelines, islands, variable depths, etc.) that could be incorporated into borrow area designs to increase habitat value would be explored with willing landowners and non-Federal sponsors during detailed design and is a key component of the preferred alternative. A brochure was developed in cooperation with USFWS-Lower Mississippi River Conservation Committee, USACE-Vicksburg, Memphis, and New Orleans Districts, and the Engineer Research and Development Center detailing these recommendations and outlining this framework. This brochure will be added to Appendix 21 of the Final SEIS II and will be used to solicit willing landowners.
15	*The Service recommends the following hierarchy to located borrow pits in areas that would generally reduce impacts:* *a. Riverside prior-converted cropland* *b. Landside cropland from willing sellers* *c. Riverside farmed wetlands (cropland)* *d. Riverside farmed wetlands (pasture)* *e. Riverside herbaceous wetlands not in federal conservation programs* *f. Riverside forested non-wetlands not in federal conservation programs* *g. Riverside forested wetland not in federal conservation programs* *h. Landside/Riverside cropland condemnation*	This hierarchy is consistent with the preferred alternative in the SEIS II. USACE will continue to look for ways to reduce impacts during detailed design.

16	*The Service recommends that mitigation should be completed in each USACE District prior to the end of the construction period in that District and that compensation lands do not need to be acquired concurrently with each work item. Delays in mitigation implementation should result in the reassessment of impacts to account for the temporal delay. This reassessment should be coordinated with the Service and other natural resource agencies.*	This approach is consistent with Section 5 of the SEIS II. Phase 2 of the Adaptive Management Plan, includes validation of assumptions and associated uncertainties (including temporal gains and losses), as described in Section 5.6.10.
17	*The Service and the local state fish and wildlife agency should be involved in the detailed design for all levee enlargement projects and all mitigation plans.*	This is consistent with the framework regarding interagency coordination described in the SEIS II.
18	*Each state's Service office and the local natural resource agencies should be again solicited for recommendations regarding the location of mitigation lands once detailed mitigation planning is initiated and should be coordinated with throughout the planning and implementation process.*	Concur. This is consistent with the framework described in Section 5 of the SEIS II.
19	*The Service recommends USACE investigate the use of native grassland species as cover for levees. Inclusion of even some native species could help declining grassland bird species and/or pollinators.*	Vegetative cover for levees follows the guidance from EP 1110-2-118, Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures, 1 May 2019, which applies to all USACE Commands having Civil Works responsibilities.
20	*Under Sec 7(a)1 of the ESA the Service recommends that mitigation areas should include adaptive 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.*	See Response to Recommendation #11.
21	*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.*	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). This refined mink model referenced would allow for a disturbance factor (i.e., heavy, moderate, or none) to be assigned to the proposed borrow areas (or other applicable waterbodies) to show varying levels of benefits to mink that could result from the creation of borrow areas or waterbodies present on the landscape. While mink habitat is not likely to drive mitigation numbers, 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. 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.
22	*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.*	If applicable, a General Plan would 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.

23	*If construction impacts any publicly managed conservation lands the managing land agency should be notified early in the planning process and should be coordinated with throughout the design phase. Prior to initiating construction the agency should be informed of construction schedule and contractors should be made aware of any special requirements of the land managing agency. Contractors should contact the managing agency prior to initiating construction.*	Concur. During detailed designs, if it is identified that there is potential for impacts to publicly managed conservation lands, coordination with the managing agency would occur.
24	*Following construction of a flood risk reduction feature(s) on public conservation lands USACE should notify the managing agency prior to initiating any maintenance activities.*	See responses to Recommendation #10, #13, and #23.
25	*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.*	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.
26	*Avoid or minimize impacts to migratory bird habitat to the extent feasible.*	See response to Recommendation #25. As described in the SEIS, additional 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 was developed in cooperation with USFWS-Lower Mississippi River Conservation Committee, USACE-Vicksburg, Memphis, and New Orleans Districts, and the Engineer Research and Development Center detailing these recommendations and outlining this framework. This brochure will be added to Appendix 21 of the Final SEIS II and will be used to solicit willing landowners.
27	*The Service recommends that a qualified biologist inspect proposed work sites for the presence of undocumented colonial nesting waterbirds during the nesting season; USACE should avoid disturbing nests. 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 avoid them during the nesting season.*	Concur. As described in Section 7.9 of the SEIS, applicable surveys would be conducted and USFWS recommendations and best management practices (e.g., species-specific seasonal buffer restrictions to colonial nesting waterbirds, etc.) would be followed to avoid impacts to any protected birds.
28	*If a bald eagle nest occurs or is discovered within 660 feet of the proposed work item, 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.* *The Division of Migratory Birds for the South Atlantic - Gulf Region and the Mississippi Basin Region 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).*	Concur. As described in Section 4.2.5.2 of the SEIS II, USACE would survey the area for nesting bald eagles, and coordinate with the USFWS per the National Bald Eagle Management Guidelines.

29	*The Service recommends that borrow areas be designed to leave at minimum a 300-foot wide forested area between the levee toe (excluding the 15 feet required to be cleared and maintained) and the river. Forested areas can provide levees a natural riverside slope protection in line with the Designing with Nature concept. Those forested areas could shield the levee from waves and currents possibly precluding the need for hardened slope protection that can reduce grassland habitat.*	USACE acknowledges the benefits of forested buffers between the Mississippi River and borrow areas and levee toes. Besides the benefits provided by slowed velocities and reductions in wave wash, these areas also help to prevent loss of top-bank when river levels drop rapidly. Whenever practicable, a distance of at least 300' is included between the Mississippi River and design elements of MRL projects.
30	*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 those reports.*	This is consistent with the framework outlined in the SEIS II, as described in Sections 1.1 and 4.0.