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## **SUMMARY**

### **S.1 SUMMARY OF IMPACTS**

The primary impact of the project would be a reduction of backwater flooding to both basins. Of 18,120 existing wetland acres subject to backwater inundation, 6,064 acres are forested, 9,700 are cropland, 1,391 are herbaceous fields, and 962 acres are pasture, marsh, and open water.

A major concern of reviewers of the September 2000 Supplemental Environmental Impact Statement (SEIS) was that many of these lands might no longer meet jurisdictional criteria for wetlands after project implementation and, thus, no longer be subject to regulatory controls. Jurisdictional status of most agricultural wetlands would be impacted. Many of those that now meet 15 consecutive days inundation criteria would have reduced inundation and could no longer be considered farmed wetland (FW). Although the project could cause a reduction in backwater inundation of these lands they would still retain wetland characteristics due to headwater flooding, and soil and groundwater conditions. Forestlands would still meet requirements of the Wetlands Delineation Manual and would continue to be subject to the Corps 404 regulatory program. Although wetlands would not be drained, there would be some impairment of functional value based primarily on reduced connectivity to the river. Reduced backwater inundation is the major impact of the proposed project and the focus of the mitigation effort.

The interagency Habitat Evaluation Procedure (HEP) team determined that impacts of reduced backwater inundation would be assessed by measuring mid-spring impacts on fish spawning and rearing habitat within the 2-year floodplain in both basins. The method considers the life history requirements of most fish throughout the entire spawning season and best represents the frequent flood events and habitat changes for a larger number of floodplain and riverine species. As a consequence, mitigation based on these impacts would benefit most of the fish and wildlife. Mitigation of fishery habitat impacts would also serve to compensate for many other impacts relating to wetland function and value.

The mitigation plan includes restoring frequently flooded cropland to BLH and acquiring spring flooding easements on herbaceous land to benefit shorebirds and fish. Benefits to winter waterfowl habitat would be maximized by managing water levels on up to 6,400 acres. In addition to mitigation, the Corps proposes additional measures for major improvement of fishery and aquatic resources in the New Madrid Floodway.

### **S.2 PROJECT OVERVIEW**

The authorized purpose of the project is to provide flood protection in the St. Johns Bayou Basin and New Madrid Floodway. Flood protection will provide for a reduction in flood damages incurred by the region and the nation and will allow for better utilization and greater productivity of existing agricultural lands. Additional benefits would include reductions in the physical and economic impediments that frequent flooding creates in East Prairie, Missouri, and other small communities.

The authority for closing the gap in the Mississippi River levee at the lower end of the floodway is granted under the Flood Control Act of 1954, as part of the Mississippi River Levee feature of the Mississippi River and Tributaries (MR&T) Project.

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The St. Johns Bayou and New Madrid Floodway Project was originally authorized for construction by the Water Resources Development Act of 1986 (PL 99-662), Section 401(a). It was based on the Report of the Chief of Engineers, dated January 4, 1983, which is part of Phase I General Design Memorandum (GDM) documents prepared in response to Section 101(a) of the Water Resources Development Act of 1976 (PL 94-587). The Phase II GDM is based on the Phase I GDM and was prepared by the Office of the Chief of Engineers in accordance with its authority to continue planning and engineering studies on viable projects awaiting authorization. Revisions contained in the Phase II GDM included non-Federal cost-sharing requirements reflected in the authorizing Act, PL 99-662.

The original project was not constructed because the local sponsor could not meet cost-sharing requirements; however, the East Prairie's designation as an Enterprise Community (EC) provided momentum towards implementation of the First Phase of the overall project, and the Water Resources Development Act (WRDA) of 1996 contained provisions regarding Federal cost-sharing exceptions. As a result, U.S. Department of Agriculture (USDA) was allowed to provide funds to East Prairie in order to offset project costs incurred by the local sponsors. This reduced the non-Federal cost to 5 percent. In late Fiscal Year (FY) 1996, funds were reprogrammed to the project to initiate Pre-construction, Engineering and Design (PED) activities associated with this phase. In FY 1997, Congress urged completion of pre-construction activities within six months and provided new-start construction funds.

A Draft Supplemental Environmental Impact Statement (DSEIS) was prepared to supplement both the 1982 St. Johns Bayou/New Madrid Floodway Project Final Supplemental Environmental Impact Statement (FSEIS) and the 1976 MR&T Levees and Channel Improvement FEIS. The DSEIS incorporated environmental resource information and related significant resource priorities and mandates not reflected in previous documents. The impacts of the New Madrid Floodway levee closure were included for detailed evaluation in the DSEIS for the St. Johns Bayou and New Madrid Floodway Project because the closure is interdependent with the construction of other components of the project.

The DSEIS was submitted to the public for review and comment in April 1999. Comments were received from the Department of the Interior U.S. Fish and Wildlife Service (USFWS), Missouri Department of Conservation (MDC), Missouri Department of Natural Resources (MDNR), private environmental advocacy groups, the Environmental Protection Agency (EPA), and the public. In these comments, the agencies requested the Corps to expand and clarify portions of the main report and various appendices such as Alternatives Considered, Water Quality, Wetlands, Economics, and Mitigation. The FSEIS that was filed in September 2000 still did not satisfactorily address many of the concerns of the resource agencies.

The First Phase of the St. Johns Bayou and New Madrid Floodway Project (Alternative 2, Authorized Project) consists of channel enlargement and improvement in the St. Johns Bayou Basin along the lower 4.5 miles of St. Johns Bayou, beginning at New Madrid, Missouri, then continuing 8.1 miles along the Birds Point New Madrid Setback Levee Ditch and ending with 10.8 miles along the St. James Ditch. The first item of work, consisting of selective clearing and snagging, has already been completed along a 4.3-mile reach of the Setback Levee Ditch beginning at the confluence with St. James Ditch. The impacts of that work were evaluated in the Limited Reevaluation Report (LRR) and supporting Environmental Assessment (EA) for the First Phase of the overall project (U.S. Army Corps of Engineers 1997).

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The Authorized Project also includes a 1,000 cubic feet per second (cfs) pumping station that would be located a few hundred feet east of the existing gravity outlet at the lower end of St. Johns Bayou. The 1,500-ft gap in the Mississippi River levee at the lower end of the New Madrid Floodway would be closed. A 1,500 cfs pumping station and gravity outlet structure would be built in the levee closure at the lower end of the New Madrid Floodway. The channel enlargement work and both pumping stations are features of the St. Johns Bayou and New Madrid Floodway Project, and the levee closure is a Mississippi River Levee Project feature. The local sponsor will share costs associated with impacts attributed to the St. Johns Bayou and New Madrid Floodway Project, and other features will be funded under the Mississippi River Levee Project.

The purpose of this Revised Supplemental Environmental Impact Statement is to formulate the various Avoid and Minimize alternatives (3-1, 3-2, and 3-3) that incorporate environmental features to reduce project impacts while maintaining project benefits. These include reducing the width of channel work in St. Johns Bayou from 200 feet (with two-sided excavation) to 120 feet (with one-sided excavation); changing work to the right-descending bank along a portion of the St. James Ditch in order to avoid high-quality woodlands; and eliminating work proposed on the upper 3.7 miles of the St. James Ditch in order to avoid the State-endangered golden topminnow. Additionally, nine transverse dikes would be placed in the lower four miles of St. Johns Bayou, and conservation easements would be placed along all improved channels for bottomland BLH to develop. Gate operations were modified to allow fish passage between the river and the two basins, and mussels would be relocated prior to construction. A 9-foot strip of mussel habitat along one side of the Setback Levee Ditch will be avoided, and a 10-year mussel-monitoring plan would also be developed. Water levels in the lower basin and floodway can be managed to provide flooded land for winter and early spring waterfowl. Alternative levee closure locations for the New Madrid Floodway were also investigated. Finally, an array of pump and gate operations were evaluated for each of the levee closures in order to increase connectivity with the river and minimize fishery impacts

The major impact of the project is reduction of natural spring backwater flooding into the New Madrid Floodway from the Mississippi River. The project would reduce the duration and frequency of Mississippi River backwater and St Johns Basin headwater flooding on a total of 55,000 acres in the St. Johns Bayou Basin and 75,078 acres in the New Madrid Floodway. These acreages are based on the 300-foot National Geodetic Vertical Datum (NGVD) elevation, which is a 30+-year flood event. Of these, there are 6,461 acres of wetlands in the St. Johns Bayou Basin and 11,659 acres of wetlands in the New Madrid Floodway, for a total of 18,120 acres of wetlands. Approximately half of the wetlands are croplands. Total acres affected by other flood events are shown in Table S-1.

**Table S-1. Existing Flood Frequencies and Inundated Acres in St. Johns Bayou Basin and New Madrid Floodway**

<b>St. Johns Bayou Basin</b>		<b>New Madrid Floodway</b>	
<b>Event</b>	<b>Acres</b>	<b>Acres</b>	<b>Total</b>
2-yr	10,056	17,316	27,372
5-yr	30,032	35,381	65,413
10-yr	34,155	53,519	87,674
25-yr	40,073	70,108	110,181
30+-yr	55,000	75,078	130,078

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To compensate for project impacts, seasonally inundated agricultural land would be restored to bottomland hardwoods. Additionally, flood easements would be purchased on herbaceous land. Specific mitigation sites will be selected in cooperation with USFWS and MDC after the Record of Decision has been signed.

USFWS has assisted the Memphis District as a cooperating agency in preparing the Supplemental Environmental Impact Statement (SEIS) and the RSEIS by providing technical assistance on scoping comments and scopes of work for contract studies, conducting wildlife resource studies and analyses, and reviewing and commenting on studies, preliminary drafts, and final reports. USFWS analyses regarding project effects to fish and wildlife resources were incorporated into the SEIS and this document, as is their Coordination Act Report (CAR).

Since the filing of the September 2000 EIS, a major additional avoid and minimize plan has been developed for the New Madrid Floodway. It includes establishing riparian buffers on 64 miles of streams and channels. This plan would be implemented along with whatever flood control alternative is selected.

## **S.3 MAJOR CONCLUSIONS AND FINDINGS**

### **S.3.1 Needs**

The lower New Madrid Floodway has traditionally flooded from Mississippi River backwaters, and the St. Johns Bayou Basin undergoes headwater flooding whenever the St. Johns Bayou control gates are closed during high river stages. While other areas in the Mississippi River Valley benefit from flood control levees, the project area continues to experience difficulties due to a 1,500-ft gap in its levee system. From 1993 to 1997, heavy rains and high Mississippi River stages increased the urgency for some form of flood control in the project area. Agriculture has been severely impacted as a result of frequent flooding in the area, and planting has on occasion been delayed until July. Net farm income is substantially lower than optimum due to crop yield decreases and production cost increases resulting from the flooding. Additionally, floodwaters regularly damage public electric, water, and sewer utilities, and often disrupt businesses, schools, and residences. Flooded roads prevent the normal traffic flow of goods and services within the project area, resulting in economic losses, disruption, and adverse impacts to quality of life. As a result, there is widespread local public support for a project that would provide flood control and benefit environmental resources within the project area.

East Prairie, Missouri, is an area of concern but is only one segment of the overall project for the three-county area. The community has identified flooding as the primary impediment to its future prosperity. The town was designated an EC in December 1994, one of only a handful of such communities across the nation, because it met eligibility criteria regarding size, poverty, unemployment, and general distress. The town specifically chose the St. Johns Bayou and New Madrid Floodway Project as the most beneficial plan to improve quality of life and living conditions for its residents. Pinhook and several other small communities would also benefit socially and economically from the protection that would be provided by a flood control project.

The area's natural resources have been impacted by other flood control work associated with the Mississippi River and Tributaries project. Floods often occur at higher stages than in the past. Closure and gates afford the opportunity to better manage water levels to benefit environmental

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resources and could benefit important natural areas such as Ten Mile Pond Conservation Area and Big Oak Tree State Park. Although the primary purpose of closures and gates would be to protect infrastructure and agricultural lands, the project does afford the capability to protect significant areas from extreme flood events or hold/pulse additional water within channels or in low lying areas for prolonged periods when advantageous to the resource.

## **S.3.2 Alternative Plans**

Nine alternatives were considered during the development of the Supplemental Environmental Impact Statement dated September 2000. These alternatives included Without Project, the Authorized Project, Avoid and Minimize, Ring Levee Around East Prairie, St. Johns Bayou Basin Only, Wildlife Refuge, New Floodway Levee Closure Locations, Silviculture, and Non-Structural. Of these alternatives, the Ring Levee, St. Johns Bayou Basin Only, Wildlife Refuge, additional New Madrid Closure Levee Locations, Silviculture, and the Non-Structural alternatives were eliminated from consideration. The rationale for the eliminated alternatives ranged from not meeting the project purpose to infeasible economic output, a more thorough discussion is provided in Section 2.4.

The Authorized, Avoid and Minimize, and Without Project alternatives were carried forward to detailed analysis. The Without Project alternative is required for comparison purposes. In response to a 26 March 2001 directive from the Assistant Secretary of the Army for Civil Works and in response to U.S. Fish and Wildlife and U.S. Environmental Protection Agency concerns, this RSEIS has been expanded to include evaluation of alternative floodway closures at locations that differ from those considered in the September 2000 SEIS. Four additional levee closure alignment alternatives were considered for the New Madrid Floodway with two of these alternatives being carried through for further analysis. These alternatives were based on Alternative 3-1, the Avoid and Minimize Plan. They are alternatives 3-2 and 3-3. Each of these alternatives is fully described in Section 2.3.2. For the three closure locations carried into detail analysis, varying gate operational scenarios were also analyzed.

## **S.3.3 Rationale for Designation of NED Plan**

The National Economic Development (NED) plan is defined as the plan that reasonably maximizes net beneficial contributions to national economic development. In keeping with recommendations made by USFWS, an array of nonstructural and smaller structural alternatives was investigated to address the project purpose of flood control. Most alternatives determined to be infeasible from a benefit-to-cost standpoint were not recommended for detailed analyses because of the net negative effect they would have on the nation's economy. The exceptions to this are alternatives 3-3.A, 3-3.B, and 3-3.C, which were not economically justified but were carried through detailed analysis.

Alternative 5, which would provide improvements to St. Johns Bayou only, was determined to be feasible from a cost-benefit standpoint. It does not address flood protection for agricultural areas in the New Madrid Floodway and thus does not adequately address the goals of the East Prairie EC. As a result, it forgoes significant economic development opportunities in the nation's production of goods and services and is not the NED plan.

Alternative 3.1-B is the NED plan. The 1,500-foot gap in the New Madrid floodway levee would be closed and improved with a 1,500 cfs pumping station and gravity outlet structure. The proposed

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levee would be located between setback levee mile 35 and 36 and would have a crown elevation of approximately 317 feet NGVD. Average base width would be approximately 302 feet. The footprint would cover approximately nine acres, and approximately 233,00 cy of fill would be required.

Under this alternative, gravity gate operations would include remaining open during the mid-season fish spawning and rearing season (March 1 – May 15) until the Mississippi River reaches 284.4 NGVD. Pumping would commence when water in the sump reached that elevation and would continue until water elevation in the sump dropped to 283.4 NGVD.

For St. Johns Bayou Basin, a 1,000 cfs pumping station would be constructed several hundred feet to the east of the existing gravity outlet structure on St. Johns Bayou and would discharge ponded water from the interior over the levee during high Mississippi River stages. To maximize spring fish passage into the basin, gravity gate operations would be altered to remain open until the Mississippi River reaches 282.5 NGVD. Pumping would commence when water in the sump reached that elevation and would continue until water elevation in the sump dropped to 280.0 feet NGVD.

## **S.3.4 Recommended Plan**

This section will be completed for the Final RSEIS. Delaying selection of a Recommended Plan will facilitate full consideration and input from government agencies and the public on the alternatives.

## **S.3.5 Section 404(b)(1) Findings**

Project features of the proposed alternatives were evaluated in keeping with Section 404(b)(1) of the Clean Water Act, *Guidelines for Specifications of Disposal Sites for Dredged or Fill Material*, published by EPA. The potential for environmental impacts of disposal activities from channel enlargement was estimated on the basis of currently available engineering design data and available physical, chemical, and biological data. Efforts were made to identify the least environmentally damaging practical alternative for disposal sites.

It was found that the proposed material discharges would not cause or contribute to significant adverse effects on human health; the life stages of organisms within the aquatic ecosystem; or ecosystem diversity, productivity, and stability. Also, no significant impacts were identified with respect to recreational, aesthetic, or economic values. All the excavated material disposal sites are found to be in compliance with Section 404 Clean Water Act guidelines.

A final 404(b)(1) evaluation will be prepared for the recommended plan and submitted with the Final RSEIS. Comments received on this draft RSEIS will be forwarded to the Missouri Department of Natural Resources for their consideration relative to state water quality certification.

## **S.3.6 Executive Order 11988, Floodplain Management Findings**

Portions of the project would be constructed in floodplains. All alternatives were designed to minimize, to the extent practical, adverse impacts to floodplains. All non-structural alternatives were eliminated during screening due to economic infeasibility. *Section 5.0 Environmental Consequences* of this report describes the beneficial and adverse impacts for each of the alternatives studied in detail and describes any expected loss of natural floodplain benefit. Views of the general public and resource agencies have been obtained at numerous meetings. The proposed alternatives are

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responsive to the planning objectives and are consistent with the requirements of Executive Order 11988, and various operational measures for the proposed pumping facilities (such as increasing start/stop elevations) have been incorporated to minimize impacts to the floodplain. The recommended mitigation plan includes reforesting frequently flooded agricultural land as mitigation for floodplain habitat losses and purchasing of shorebird easements.

## **S.3.7 Executive Order 11990, Protection of Wetlands Findings**

The proposed alternatives are consistent with the requirements of Executive Order 11990. They minimize direct construction impacts along channel enlargement reaches by avoiding high-quality areas and by reducing channel width. Additionally, mitigation proposed pursuant to the project recommends reforesting up to 9,557 acres of frequently flooded agricultural land.

Wetlands will continue to exhibit wetland characteristics because existing topography, precipitation, soil characteristics, and water table will not change as a result of the project but will continue to produce a median continuous saturation for at least 5 percent of the growing season. The Mississippi River will continue to influence the water table, and saturation will continue to occur during the spring and early summer when the river is at high stage and rainfall is plentiful. This determination is based on evaluations, including field verifications, performed by Corps engineers and biologists. It is supported by the fact that there are jurisdictional wetlands above the limits of backwater inundation in both basins.

## **S.3.8 Wetland Impact Analysis Summary**

All wetland calculations are based on the impacts of backwater flooding. Some acreage subject to reductions in backwater flooding will still retain wetland characteristics due to headwater flooding and clay soil types present in both basins, which tend to retard vertical infiltration of water.

The St. John's Bayou Basin contains approximately 6,461 acres of wetlands below 300 feet NGVD, of which 3,514 acres are farmed. The remaining 2,947 acres are predominantly forested, herbaceous, or open water in nature. Under the Avoid and Minimize Alternative 3-1.A, approximately 1,296 acres of the agricultural land would receive reduced inundation from backwater. Of the non-agricultural 2,947 acres, about 720 acres would receive reduced inundation from backwater under Alternative 3-1.A.

The New Madrid Floodway contains approximately 11,659 acres of wetlands below 300 feet NGVD, of which 6,186 acres are farmed. The remaining 5,473 acres of wetlands are predominantly forested, herbaceous, or open water. Under Avoid and Minimize Alternative 3-1.A, approximately 6,122 acres of the agricultural lands would receive reduced inundation from backwater. Of the non-agricultural 5,473 acres, about 5,067 acres would receive reduced inundation from backwater under alternative 3-1a. The acres that are inundated due to backwater would increase with the greater connectivity to the Mississippi River from the gate operations under alternatives 3-1.B, 3-1.C, 3-2.B, 3-2.C, 3-3.B, and 3-3.C.

In both basins, most of the total 9,700 acres of wet cropland are primarily in soybean fields that require frequent summer irrigation every year.

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The 1987 Wetlands Delineation Manual requires that wetlands must have continuous inundation or saturation for 5 percent of the growing season. This level of inundation occurs at the 289.4 feet NGVD elevation in the St. Johns Bayou Basin and at the 290 feet NGVD elevation in the New Madrid Floodway. The Food Security Act (FSA) criteria for wetlands meeting the hydrologic criteria are lands inundated for 15 consecutive days or 10 percent of the growing season (whichever is less).

The jurisdictional status of non-cropland (forested, herbaceous, etc.) wetlands will not change in either basin. No existing forested wetlands will be converted to cropland or other uses as a result of the project, and all existing wetlands not required for direct construction will remain as wetlands. Thus, the existing jurisdictional status of all non-agricultural wetlands will remain unchanged with or without the project. Up to 6,122 acres of agricultural lands in the New Madrid Floodway and 1,296 acres in the St. John's Bayou Basin may no longer meet FSA criteria for farmed wetlands depending on the selected alternative. Although these lands would be saturated during much of the growing season and still provide some wetland functional value, because their inundation would in some cases be less than 15 consecutive days, their potential to be classified as farmed wetland would be impaired.

Mitigation of fishery rearing habitat impacts would compensate for impacts to other wetland functions. The proposed reforestation of frequently flooded croplands would compensate fishery habitat losses and other wildlife functions. In conjunction with the proposed mitigation, flood easements for shorebird mitigation would be purchased on herbaceous lands. With these lands, all proposed direct and indirect impacts related to fish and wildlife would be fully mitigated.

### **S.3.9 Cultural Resources Findings**

A cultural resources survey was conducted in the project ROW and was presented in the Technical Appendices, Revised December 1981, of the GDM. An additional survey documented a number of prehistoric and historic sites in the project area, including 21 previously unrecorded prehistoric and/or historic archaeological sites and seven cultural resources sites along St. Johns Bayou.

Twelve of the sites were determined not to be significant with respect to National Register of Historic Places (NRHP) criteria. Nine of the sites were determined to be significant and subjected to additional testing; two were eligible for inclusion on the NRHP. The proposed alternatives have been designed to avoid all significant and cultural resources sites. Any inadvertent discoveries during project implementation would be fully addressed in accordance with provisions of NHPA and other applicable laws

### **S.3.10 ER 1165-2-132; Hazardous, Toxic, and Radioactive Waste Findings**

A Phase I Environmental Site Assessment (ESA) was prepared for the project area in October 1996 in accordance with U.S. Army Corps of Engineers Regulation ER 1165-2-132, *Water Resources Policies and Authorities for Hazardous, Toxic, and Radioactive Waste (HTRW) for Civil Works Projects, June 26, 1992*. No sites of potential HTRW concern appear to be located within four miles of the project area.

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## S.4 AREAS OF CONTROVERSY

The following information is based on concerns that were earlier expressed and reported in the September 2000 FSEIS. It is hoped that many of these concerns have now been adequately addressed with the information in this revised document.

### S.4.1 Bottomland Hardwoods.

USFWS, MDC, and the Environmental Defense Fund (EDF) have questioned whether the reduction in inundation to BLH wetlands would induce clearing on privately owned tracts. The Corps has concluded that existing wetlands will remain jurisdictional wetlands due to the influence of the normally high ground water table in the sandy aquifer underlying both basins. Because most BLH in the project area lie in depressions that retain surface water due to low topography and underlying clay soils, BLH will continue to experience inundation from high river stages and interior rainfall after project implementation. Accordingly, such areas would remain subject to Section 404 of the Clean Water Act.

### S.4.2 Wet Cropland

USFWS, MDC, and EDF expressed concern that reducing backwater flooding on project area lands would change the hydrology and quality of wetlands and the agricultural practices for thousands of acres in the project area. The wet croplands at issue are almost entirely soybean fields that are periodically inundated in late winter and early spring when the land cover is soybean stubble. Economic analyses by the Corps and recent water quality analyses indicate there might be a 5 percent increase in corn planting and a slight change to a higher yield/longer season variety of soybeans. There should be no significant change in overall agricultural practices.

With any of the alternatives, there would be a reduction in the amount of farmlands that meet FSA hydrological criteria for wetlands. The amount of farmed wetland that could be reduced ranges from 6,122 acres for Alternative 3-1a to 5,824 acres for alternative 3-3a for the New Madrid Floodway. Any alternative that increases the elevation of the start/stop pump operation would lessen potential impacts on farmed wetlands.

Furthermore, the Corps reviewed groundwater levels and patterns relative to identified wetland areas. It was determined that internal rainfall events and the high water table resulting from Mississippi River stages would continue to produce saturated soil conditions. The lands will retain their wetland functions and hydrology. The review was coordinated with NRCS, which concurred with the findings.

EPA expressed concern about water quality, nutrient cycling, detrital import/export, and floodwater storage resulting from reduced Mississippi River inundation on wet cropland. Recent analyses revealed that water quality in the area reflects conditions typical for basins where agriculture is the dominant land use. Water quality should not change significantly as a result of the proposed alternatives. Material processing (detrital import/export) will not change significantly, either. Sediment retention during inundation was estimated to be low (10 percent) in the study area. This is supported by the observation that during the 1993 flood, nearly all sediment settled out upstream of St. Louis, Missouri. There is little evidence of sediment deposition following flooding in the study area. Also, with floodwater slowly moving through the levee gap and then ponding on the land, there appears to be little detrital movement over the bare earth and soybean fields. Reducing

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inundation is not expected to result in significant adverse impacts to nutrient cycling, detrital import/export, or floodwater storage. Hydrologic analyses revealed very minimal changes in high Mississippi River stages and durations with the Avoid and Minimize Alternative. Therefore, there would be little change over existing conditions with respect to water quality.

Additional avoid and minimize measures that have been developed for the floodway since the September 2000 FSEIS, i.e., buffering 64 miles of channel, will significantly improve water quality associated with agricultural runoff.

## **S.4.3 Fisheries**

USFWS, MDC, and EDF stated that impacts of closing the levee gap and the reduction in the duration and frequency of Mississippi River backwater flooding through the levee gap would result in a major loss of spawning and rearing habitat in local streams and to the Mississippi River fisheries. Summer, fall, and spring adult fish surveys were conducted and indicate the majority of the collected species were common and ubiquitous fish found throughout the entire Lower Mississippi River Valley. The survey data were used by the HEP team to identify and check the representative species in the study area. The HEP team chose species models based on the floodplain species that occur in the project area. WES conducted the aquatic HEP using these models and analyzed project impacts on fisheries. Reforesting frequently flooded agricultural lands would mitigate losses. However, based on agency concerns and uncertainties regarding acquisition of the most desirable mitigation lands, the Corps has proposed significant additional avoid and minimize measures for the floodway. These measures include improvements on 64 miles of floodway streams and channels. Also, this revised document investigates various scenarios for gate operation to minimize impact to the fishery.

## **S.4.4 Mussels**

USFWS and MDC stated that a diverse mussel community unique to southeast Missouri would be severely impacted. A mussel survey was conducted to locate colonized sites and determine species compositions. The Corps worked with USFWS and MDC to design measures that have less impact and has proposed mitigation to offset adverse mussel impacts. The resource agencies and the Corps agreed that prior to construction portions of mussel populations that are of State and Federal importance would be moved to adjacent areas. A 9-foot wide strip at the toe of the opposite work bank would be avoided to provide a seed source for recolonization. A 10-year monitoring plan will be implemented to study the speed and diversity of mussel recolonization of the enlarged channels. The Corps will follow the recommendations of USFWS regarding mussels in the project area that will partially mitigate project impacts.

## **S.4.5 Endangered Species**

USFWS and MDC have expressed concern about project impacts to two Federally endangered and one Federally threatened species in the project area. These species included the endangered pallid sturgeon and interior least tern and the threatened bald eagle. Concern about the pallid sturgeon pertained to potential loss of forage fish and possible spawning areas. Concern regarding the bald eagle pertained to loss of foraging, roosting, and nesting habitat, and increased disturbance due to earlier tillage during nesting, in addition to wintering, dispersing, and colonizing bald eagles. The concern over the interior least tern pertained to the loss of forage fish entering the river during spring migration and early nesting periods. Hydrologic, geotechnical, and fishery data were reviewed and used to prepare the Biological Assessment (BA) for these species.

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USFWS stated that the St. Johns Bayou and New Madrid Floodway Project, as proposed, is not likely to jeopardize the continued existence of the bald eagle or the interior least tern and that since no critical habitat has been designated for those species, none will be affected. The USFWS does believe, however, that an incidental take of bald eagles and least terns could occur as a result of the project. According to the USFWS, an incidental take of two bald eagles is expected through disturbance from harassment by earlier tillage and reduced foraging area for adult eagles because of reduced Mississippi River flooding in and around the nest during the breeding season.

USFWS also stated that incidental take in the form of harassment of interior least terns will be very difficult to determine because least terns are wide-ranging, may change nesting colonies from year to year, and may have reduced reproductive success masked by annual variability in tern numbers. However, an unquantifiable level of take of this species can be anticipated by loss of fisheries habitat in the New Madrid Floodway. The level of take is based on the permanent loss of a significant portion of the forage base for the tern colonies in and around the project area.

Under the terms and condition of Section 7(b)(4) and Section 7(o)(2) of the Endangered Species Act, taking that is incidental to and not intended as part of an agency's actions is not prohibited under the Act provided that such taking is in compliance with the terms and conditions of the incidental take statement in the Biological Opinion (BO). To ensure compliance, USFWS listed several nondiscretionary measures that must be undertaken by the Corps so that they become binding conditions of the project. The BA and BO will be updated from that shown in September 2000 FSEIS after a final plan is selected.

## **S.4.6 New Madrid Floodway Operation**

An operations team evaluated the proposed closure alignments and determined that all alignments were operationally feasible.

## **S.4.7 East Prairie Project Only**

USFWS and EDF recommended that some form of flood protection be provided around the town of East Prairie, Missouri, in lieu of any major basinwide improvements. USFWS maintains that this alternative is more consistent with executive orders 11988 and 11990 than are the proposed alternatives. Engineering design and hydraulic analyses of a ring levee around the town were conducted and indicate that in addition to a ring levee, channel work to resolve interior drainage problems would be required in the town and that, in turn, the costs to East Prairie outweigh the benefits. Moreover, limiting construction and benefits to East Prairie would not provide flood protection to the overall area nor remove a significant impediment to the agricultural economy of the community.

## **S.4.8 Limiting Improvements to St. Johns Bayou Basin**

USFWS and MDC recommended that the project be limited to St. Johns Bayou Basin, which would avoid most fish and wildlife impacts of the project, especially those to the New Madrid Floodway. Throughout the SEIS, impacts to both basins were evaluated separately. Limiting improvements to St. Johns Bayou Basin would preclude the most economically sound portion of the overall project and it would not completely address the economic development goals of the East Prairie Enterprise Community and the overall area.

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## S.4.9 Non-Structural Alternatives

USFWS and MDC recommended that non-structural measures, such as flooding easements, be evaluated to address agricultural flood damages in the New Madrid Floodway to minimize environmental impacts. An array of non-structural and smaller structural alternatives was investigated to address the stated project purpose of flood control. The non-structural and smaller structural alternatives were found to be infeasible from a benefit-to-cost standpoint, with the exception of Alternative 5 (St. Johns Bayou Basin Only). Alternatives found to be economically infeasible were not recommended for construction since they would have a net negative effect on the nation's economy. Although Alternative 5 is economically feasible, it does not maximize the net positive effect to the nation's economy and is not the best investment from a national perspective. Additionally, none of the non-structural or smaller structural alternatives address the goals and intentions of the East Prairie Enterprise Community.

## S.5 ACRONYMS

A&M	Avoid and Minimize
AAHUs	Average Annual Habitat Units
BA	Biological Assessment
BLH	Bottomland Hardwood
BO	Biological Opinion
CA	Conservation Area
CAR	Coordination Act Report (U.S. Fish and Wildlife Service)
CEQ	Council on Environmental Quality
cfs	cubic feet per second
cy	cubic yard
DSEIS	Draft Supplemental Environmental Impact Statement
DUDs	duck-use-days
EA	Environmental Assessment
EC	Enterprise Community
EDF	Environmental Defense Fund
EIS	Environmental Impact Statement
EL	Environmental Laboratory
EO	Executive Orders
EPA	Environmental Protection Agency
ERDC	Engineer Research and Development Center
ESEI	Environmental Science and Engineering, Inc.

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FSA	Food Security Act
FSEIS	Final Supplemental Environmental Impact Statement
FW	Farmed Wetlands
FY	Fiscal Year
GDM	General Design Memorandum
GEC	Gulf Engineers and Consultants, Inc.
GIS	Geographic Information System
HEP	Habitat Evaluation Procedures
HES	Habitat Evaluation System
HSI	Habitat Suitability Index
HTRW	Hazardous, Toxic, and Radioactive Waste
HU	Habitat Unit
LRR	Limited Reevaluation Report
MAV	Mississippi Alluvial Valley
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
MR&T	Mississippi River and Tributaries
MRL	Mississippi River Levee
NED	National Economic Development
NGVD	National Geodetic Vertical Datum
NRC	National Response Center
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
PC	Prior Converted
PCA	Project Cooperation Agreement
PDF	Project Design Flood
PED	Pre-construction, Engineering, and Design
ROW	Rights-of-Way
SEIS	Supplemental Environmental Statement
SHPO	State Historic Preservation Officer
TM	Thematic Mapper
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers

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USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAM	Waterfowl Assessment Methodology
WES	Waterways Experiment Station
WRDA	Water Resources Development Act
WRP	Wetland Reserve Program
YOY	young-of-the-year