FINAL DETERMINATION OF THE
U.S. ENVIRONMENTAL PROTECTION AGENCY'S
ASSISTANT ADMINISTRATOR FOR WATER
PURSUANT TO SECTION 404(C) OF THE CLEAN WATER ACT
CONCERNING THE PROPOSED YAZOO BACKWATER AREA PUMPS PROJECT,
ISSAQUENA COUNTY, MISSISSIPPI

AUGUST 31, 2008

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EXECUTIVE SUMMARY

Section 404(c) of the Clean Water Act (CWA)(33 U.S.C. 1251 *et seq*) authorizes the U.S. Environmental Protection Agency (EPA) to prohibit, restrict, or deny the specification of any defined area in waters of the United States (including wetlands) as a disposal site for the discharge of dredged or fill material whenever it determines, after notice and opportunity for public hearing, that such discharge into waters of the United States will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas.

Pursuant to section 404(c), EPA initiated a CWA section 404(c) review of the proposed Yazoo Backwater Area Pumps Project on February 1, 2008. The Yazoo Backwater Area Pumps Project is a U.S. Army Corps of Engineers (the Corps) Civil Works project designed to address flooding concerns in a 630,000 acre area situated between the Mississippi and Yazoo Rivers in west-central Mississippi (Yazoo Backwater Area). The project is represented as Plan 5 in the Corps' Final Supplemental Environmental Impact Statement (FSEIS)(published in November 2007). The primary component of this project is a 14,000 cubic feet per second (cfs) pumping station that would pump surface water out of the Yazoo Backwater Area during high water events on the Mississippi River. The project also includes 10,662 acres of reforestation of agricultural land to compensate for the adverse environmental impacts associated with the project, and up to 40,571 acres of reforestation of agricultural land to provide potential environmental benefits.

According to the Corps, the Yazoo Backwater Area contains between 150,000 to 229,000 acres of wetlands, as well as an extensive network of streams, creeks, and other aquatic resources. Extensive information collected on the Yazoo Backwater Area demonstrates that it includes some of the richest wetland and aquatic resources in the Nation. These include a highly productive floodplain fishery, substantial tracts of highly productive bottomland hardwood forests that once dominated the Lower Mississippi River Alluvial Valley (LMRAV), and important migratory bird foraging grounds. These wetlands provide important habitat for an extensive variety of wetland dependent animal and plant species, including the federally protected Louisiana black bear and pondberry plant. In addition to serving as critical fish and wildlife habitat, project area wetlands also provide a suite of other important ecological functions. These wetlands protect and improve water quality by removing and retaining pollutants, temporarily store surface water, maintain stream flows, and support aquatic food webs by processing and exporting significant amounts of organic carbon. As stated in the FSEIS, "The lands in the lower Mississippi Delta are noted for high value fish and wildlife resources. The area serves as an integral part of the economic and social life of local residents and sportsmen from around the Nation" (FSEIS, Main Report, Appendix 1 Mitigation, page 1-29).

The construction and operation of the proposed pumps would dramatically alter the timing, and reduce the spatial extent, depth, frequency, and duration of time that wetlands within the project area are inundated. After extensive evaluation of the record for this project, EPA has determined that these large-scale hydrologic alterations would significantly degrade the critical ecological functions provided by approximately 67,000 acres of wetlands in the Yazoo Backwater Area, including those functions that support wildlife and fisheries resources.

During the initial consultation period with the Corps and the Mississippi Board of Levee Commissioners (the project sponsor), the Corps offered two alternatives to the proposed project to reduce wetland impacts. One of these alternatives is Plan 6 from the FSEIS, and the other is a modified version of Plan 6. Both of these alternatives retain the 14,000 cfs pump station, but include modifications to the pump-on elevation and the amount of compensatory mitigation and reforestation as compared to Plan 5. After discussions with the Corps and following careful consideration of the two alternatives, EPA is concerned that neither proposal would reduce impacts to an acceptable level.

In March 2008, EPA Region IV published a proposal (i.e., Proposed Determination) to prohibit or restrict the use of certain waters of the United States as disposal sites for the discharge of dredged or fill material in connection with the construction of the proposed Yazoo Backwater Area Pumps Project (73 Federal Register 14806, dated March 19, 2008). EPA Region IV solicited public comments on the Proposed Determination until May 5, 2008. EPA received approximately 47,600 written comment letters, including approximately 1,500 individual comment letters and 46,100 mass mailers. Nearly all of the comment letters (99.9 percent) urged EPA to prohibit discharges to waters of the United States associated with the proposed pumps project. A public hearing was held in Vicksburg, Mississippi, on April 17, 2008, in which approximately 500 people participated. A total of 67 people provided oral statements, including one representative from the Corps' Vicksburg District and four individuals representing the project sponsor. Of the remaining 62 people who provided oral statements, 32 people spoke in opposition to the proposed pumps project, 29 spoke in favor of the pumps project and one person did not specify a position. In total, approximately 463 residents of the state of Mississippi submitted written comments to EPA or spoke at the public hearing. Of these, 417 expressed support for EPA’s proposal and 45 favored construction of the pumps. Within the Yazoo Backwater Area, a total of 31 residents expressed an opinion on the project either at the public hearing, in written comments, or both. Of these 31, four expressed support for EPA's position, 26 expressed support for construction of the pumps, and one did not express an opinion.

On July 2, 2008, EPA Region IV submitted to EPA Headquarters its Recommended Determination to prohibit the specification of certain wetlands and other waters of the United States within Humphreys, Issaquena, Sharkey, Warren, Washington, or Yazoo County, in the state of Mississippi as a disposal site for the discharge of dredged or fill material for the purpose of construction of the proposed Yazoo Backwater Area Project, or any similar pump project in the Yazoo Backwater Area that would result in unacceptable adverse effects on fishery areas and wildlife.

EPA Region IV based its recommendation upon a conclusion that the proposed discharge of fill material into 43.6 acres of wetlands and other waters of the United States in connection with the construction of the pumping station and the subsequent secondary impacts, would result in unacceptable adverse effects on at least 67,000 acres of wetlands and other waters of the United States and their associated wildlife and fisheries resources. Additionally, EPA Region IV expressed concern that the proposed mitigation would not fully compensate for the potential impacts of the project, as identified in the FSEIS, and that the suggested environmental benefits

associated with the project's reforestation component have not been substantiated. EPA Region IV also stated that the Corps did not evaluate the proposed project's adverse impacts on up to 24,000 acres of wetlands outside the FSEIS's wetland assessment area. EPA Region IV also expressed its belief that there are likely to be less environmentally damaging practicable alternatives available to achieve the improved flood protection goals of the proposed Yazoo Backwater Area Project.

The U.S. Fish and Wildlife Service (FWS), in its comments on the Proposed and Recommended Determinations, concurred with EPA Region IV's conclusion that the proposed project would result in extensive and unacceptable adverse effects on wildlife and fishery areas. FWS also highlighted its concerns that the proposed project would significantly degrade the wildlife habitat provided by its four National Wildlife Refuges located within the Yazoo Backwater Area – reducing the capability of these refuges to achieve the purpose and intent for which they were Congressionally established.

This Final Determination represents the last step of EPA's section 404(c) review of the Yazoo Backwater Area Pumps Project. EPA has prepared this Final Determination based on an evaluation of EPA Region IV's Recommended Determination, and review and consideration of the administrative record, including information in the Corps' 2007 FSEIS, public comments received in writing and at the public hearing, and submissions by other federal and state agencies. In addition, this Final Determination reflects the careful review and full consideration of written information that was subsequently submitted and made part of the record, as well as information conveyed to EPA by the Department of the Army and the project sponsor during the EPA Headquarters section 404(c) consultation process.

EPA's Final Determination concludes that the discharge of dredged or fill material in connection with the construction of the proposed Yazoo Backwater Area Pumps Project (i.e., Plan 5 from the FSEIS), as well as the two alternative proposals offered by the Corps in February 2008 (i.e., Plan 6 from the FSEIS and Modified Plan 6) and subsequent operation of the 14,000 cfs pumping station would result in unacceptable adverse effects on fishery areas and wildlife. The administrative record developed in this case fully supports the conclusion that, as a result of alterations to the spatial extent, depth, frequency, and duration of inundation of wetlands within the project area, the proposed projects would significantly degrade the critical ecological functions provided by approximately 28,400 to 67,000 acres of wetlands (i.e., the range of wetland impacts as a result of Plan 5, Plan 6, and Modified Plan 6) in the Yazoo Backwater Area, including those functions that support wildlife and fisheries resources. Although not proposed to go forward, FSEIS Plans 3, 4, and 7, which also include a 14,000 cfs pumping station are expected to result in wetland impacts between approximately 28,400 and 118,400 acres (see FSEIS Main Report, Table 17, page 1-20). EPA has determined that each of these alternatives would also result in unacceptable adverse effects on fishery areas and wildlife. EPA does not believe that these adverse impacts can be adequately compensated for by the proposed mitigation, and are inconsistent with the requirements of the CWA. Further, these impacts should be viewed in the context of the significant cumulative losses across the Lower Mississippi River Alluvial Valley (LMRAV), which has already lost over 80 percent of its bottomland forested wetlands, and specifically in the Mississippi Delta where the proposed project would significantly degrade important bottomland forested wetlands.

Based on these findings, this Final Determination prohibits, pursuant to section 404(c) of the CWA, the specification of the subject wetlands and other waters of the United States as described in the FSEIS as a disposal site for the discharge of dredged or fill material for the purpose of construction of FSEIS Plans 3 through 7, and Modified Plan 6.[1] The adverse effects associated with the prohibited projects are the result of a combination of operational factors including the capacity of the pumping station and its associated pump-on elevations. While this Final Determination prohibits the construction of FSEIS Plans 3 through 7, and Modified Plan 6, the data supporting this Final Determination indicates that derivatives of the prohibited projects that involve only small modifications to the operational features or location of these proposals would also likely result in unacceptable adverse effects and would generate a similar level of concern and review by EPA.

The staff at the Corps Vicksburg District deserves recognition for the years of commitment and effort that have been necessary to evaluate the Yazoo Backwater Area Pumps Project. EPA also wants to emphasize our respect and appreciation for the Corps' cooperation with us on our review of this project. EPA recognizes that pumps are often an important and appropriate component of flood control projects. However, in this instance, EPA has concluded the adverse impacts on wetlands and their associated fisheries and wildlife resources are unacceptable.

EPA continues to support the goal of providing improved flood protection for the residents of the Mississippi Delta; however, it believes that this vital objective can be accomplished consistent with ensuring effective protection for the area's valuable natural resources. EPA is committed to participating in discussions with other federal and state agencies, and the public, concerning the best way to provide flood protection while protecting wetlands and other natural resources.

[1] FSEIS Plan 2B (one of the nonstructural alternatives considered in the FSEIS) does not include a pumping station, however, it does include the construction of fourteen ring levees, which would result in adverse impacts to approximately 92,100 acres of wetlands. Although Plan 2B would result in significant adverse environmental impacts comparable to those whose effects we have determined to be unacceptable, EPA has not included it in the prohibition since the FSEIS concluded it was not a practicable alternative because it is "locally unacceptable" and "not economically justified."

I. INTRODUCTION

Section 404(c) of the Clean Water Act (CWA)(33 U.S.C. 1344(c)) provides that, where the Administrator of the U.S. Environmental Protection Agency (EPA) determines, after notice and opportunity for public hearing, that unacceptable adverse effects on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas will result from the discharge of dredged or fill material into waters of the United States, the Agency may exercise its authority to prohibit the specification (including the withdrawal of specification) of any defined area as a disposal site, or restrict or deny the use of any defined area for specification (including the withdrawal of specification) as a disposal site for the discharge of dredged or fill material.

EPA's regulations for implementing section 404(c) are set forth in 40 CFR part 231. Four major steps in the process are: 1) the Regional Administrator's[2] notice to the U.S. Army Corps of Engineers (the Corps), the property owner, and the applicant (and/or project proponent) of the intention to initiate the section 404(c) process; 2) the Regional Administrator's publication of a Proposed Determination to withdraw, deny, restrict, or prohibit the use of the site, soliciting public comment and offering an opportunity for a public hearing; 3) the Regional Administrator's recommendation to the Assistant Administrator for Water at EPA Headquarters to withdraw, deny, restrict, or prohibit the use of the site (Recommended Determination); and, 4) the Assistant Administrator for Water's Final Determination to affirm, modify, or rescind the Regional recommendation.[3]

This Final Determination assesses the nature and extent of adverse environmental impacts to waters of the United States associated with the proposed discharge of dredged or fill material for the purpose of constructing a pumping station to address flooding concerns in a six county area situated between the Mississippi and Yazoo Rivers in west-central Mississippi (Yazoo Backwater Area). Figure 1 shows the general location of the Yazoo Backwater Area. The Yazoo Backwater Area Pumps Project is a Corps Civil Works project sponsored by the Mississippi Board of Levee Commissioners (the project sponsor). The project is represented as Plan 5 in the Corps' Final Supplemental Environmental Impact Statement (FSEIS)(published in November 2007). The primary component of this project is a 14,000 cubic feet per second (cfs) pumping station, near the Steele Bayou flood control gates, designed to pump surface water out of the Yazoo Backwater Area during high water events on the Mississippi River when the gates are closed. The construction and operation of the proposed pumps would dramatically alter the timing, and reduce the spatial extent, depth, frequency, and duration of time that wetlands within the project area are inundated by the 2- through 100-year flood events. For example, according

[2] At the request of the EPA Region IV Regional Administrator to recuse himself, EPA Administrator Stephen L. Johnson designated Mr. Lawrence E. Starfield, Deputy Regional Administrator for EPA Region VI, to implement the regional responsibilities of the Regional Administrator under the section 404(c) regulations (40 CFR Part 231) associated with the review of the Yazoo Backwater Area Project. Since Mr. Starfield has been designated to exercise all such authority for the Regional Administrator for the Yazoo Backwater Area Project, any reference to the authority of the Regional Administrator in this Final Determination is the responsibility of Mr. Starfield for the purposes of this action.

[3] In 1984, the EPA Administrator delegated the authority to make final decisions under section 404(c) to EPA's national Clean Water Act Section 404 program manager, who is the Assistant Administrator for Water. That delegation remains in effect.

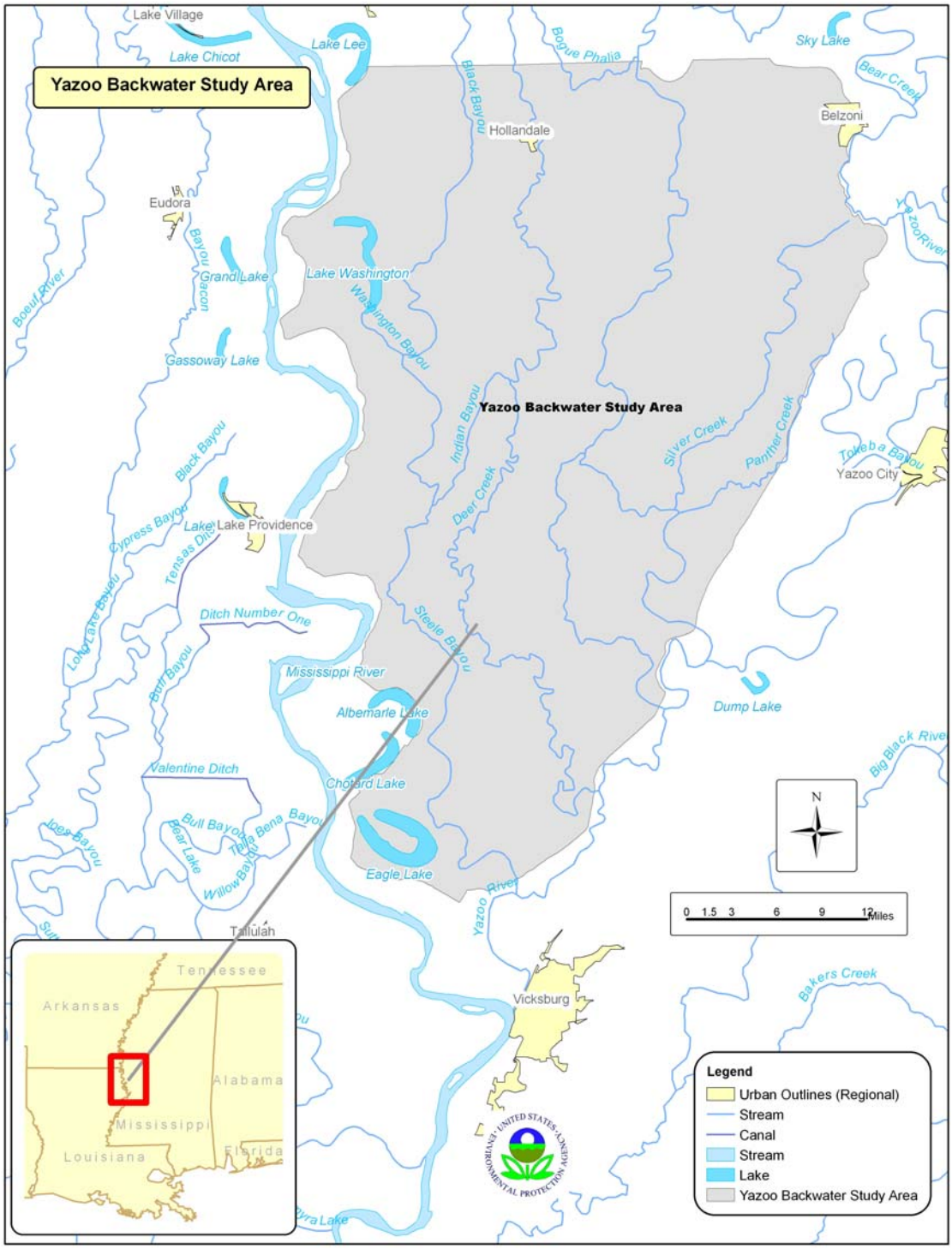


Figure 1. The Yazoo Backwater Study Area is located in west-central Mississippi, just north of Vicksburg, Mississippi. Of particular focus are the approximately 630,000 acres inundated by the 100-year flood event which lie in parts of Humphreys, Issaquena, Sharkey, Warren, Washington, and Yazoo Counties in Mississippi

to the FSEIS for the Yazoo Backwater Area Project, the proposed project would reduce the spatial extent of the 100-year flood event by approximately 25 percent, or 158,000 acres (i.e., a 4 to 4.5 foot reduction in flood stage).

Additional project components include the proposed reforestation of up to 40,571 acres of cleared agricultural land and operation of the Steele Bayou flood control gates to maintain minimum water elevations in the Yazoo Backwater Area waterways during low-water periods, when practicable. A compensatory mitigation plan that includes reforestation of 10,662 acres is also proposed to offset the project's adverse environmental impacts.

EPA Region IV's Regional Administrator for this section 404(c) action has recommended that EPA prohibit the specification of the subject wetlands and other waters of the United States within Humphreys, Issaquena, Sharkey, Warren, Washington, or Yazoo County, in the state of Mississippi, as a disposal site for the discharge of dredged or fill material for the purpose of constructing the proposed project or any similar pump project in the Yazoo Backwater Area that would result in unacceptable adverse effects on fishery areas and wildlife. Region IV's Regional Administrator based this recommendation upon a conclusion that the construction of the pumping station and the subsequent secondary impacts would eliminate or significantly degrade the critical ecological functions provided by 67,000 acres of wetlands, thereby resulting in unacceptable adverse effects on wildlife and fisheries resources. In addition, the Regional Administrator concluded that the proposed mitigation would not adequately compensate for the project's impacts. He also concluded that the anticipated environmental benefits associated with the project's reforestation component had not been substantiated. The Regional Administrator also expressed his concern that an additional 24,000 acres of wetlands, located outside the FSEIS wetland assessment area, would be adversely impacted by the project, and that these impacts were not evaluated in the FSEIS. Finally, the Regional Administrator expressed his belief there are likely to be less environmentally damaging practicable alternatives available to achieve the improved flood protection goals of the Yazoo Backwater Area Project.

This Final Determination is based on an evaluation of the Regional Administrator's Recommended Determination and review and consideration of the administrative record developed in this case, including public comments submitted in response to the Region IV Proposed Determination, comments received during the public hearing held in Vicksburg, Mississippi, and submissions from other federal and state agencies. In addition, this Final Determination reflects the careful review and full consideration of all written information that was submitted and made part of the record subsequent to the close of the public comment period, as well as information conveyed to EPA by the Assistant Secretary of the Army for Civil Works, and the project sponsor during the EPA Headquarters section 404(c) consultation process, consistent with the requirements of 40 CFR 231.6.[4] EPA Headquarters consultation is described in Section II of this document. EPA's responses to the major issues raised by the Assistant Secretary of the Army for Civil Works, the Corps, the project sponsor, and the public, including those issues that are not addressed in the body of this document, are provided in Appendix 1.

[4] EPA requested a complete copy of the Corps' administrative record for the proposed project in a letter dated June 4, 2008. In its response, dated June 16, 2008, the Corps indicated that "to date we have not assembled an administrative record of the Yazoo Backwater project. Undertaking the preparation of the administrative record for the project would be very time consuming and is not undertaken until some type of litigation is filed."

According to the Corps, the Yazoo Backwater Area contains between 150,000 to 229,000 acres of wetlands, as well as an extensive network of streams, creeks, and other aquatic resources. Extensive information collected on the Yazoo Backwater Area demonstrates that it includes some of the richest wetland and aquatic resources in the Nation. These include highly productive floodplain fisheries and an extensive variety of wetland-dependent animal and plant species, including the federally protected Louisiana black bear and pondberry.[5] In addition to serving as critical fish and wildlife habitat, the project area wetlands provide a suite of other important ecological functions. For example, these wetlands protect and improve water quality by removing and retaining pollutants, temporarily store surface water, maintain stream flows, and support aquatic food webs by processing and exporting significant amounts of organic carbon. As stated in the FSEIS, "The lands in the lower Mississippi Delta are noted for high value fish and wildlife resources. The area serves as an integral part of the economic and social life of local residents and sportsmen from around the Nation" (FSEIS, Main Report, Appendix 1 Mitigation, page 1-29).

The Assistant Administrator for Water has determined that the administrative record supports the conclusion that the construction and operation of the proposed project (i.e., Plan 5 of the FSEIS), as well as the two alternative proposals offered by the Corps in February 2008 (i.e., Plan 6 and Modified Plan 6), would result in a dramatic alteration of the hydrologic regime in the Yazoo Backwater Area, thereby significantly degrading the critical ecological functions provided by at least 28,400 to 67,000 acres of wetlands. Although not proposed to go forward, FSEIS Plans 3, 4, and 7, would also result in a dramatic alteration of the hydrologic regime in the Yazoo Backwater Area, significantly degrading the critical ecological functions provided by between approximately 28,400 and 118,400 acres of wetlands (see FSEIS Main Report, Table 17, page 1-20). EPA does not believe that the adverse impacts associated with the proposed projects are consistent with the requirements of the CWA. Further, these impacts should be viewed in the context of the significant cumulative losses across the Lower Mississippi River Alluvial Valley (LMRAV), which has already lost over 80 percent of its bottomland forested wetlands, and specifically in the Mississippi Delta where the proposed project would significantly degrade important bottomland forested wetlands.

EPA has determined that the discharge of dredged or fill material in connection with the construction of FSEIS Plans 3 through 7, and Modified Plan 6, together with the anticipated indirect impacts associated with the subsequent operation of the pumping station would have an unacceptable adverse effect on fishery areas and wildlife.[6] Based on these findings, the Final Determination prohibits, pursuant to section 404(c) of the CWA, the specification of the subject wetlands and other waters of the United States as described in the FSEIS as a disposal site for the

[5] In a letter dated August 10, 2006, the FWS concurred with the Corps' determination that the proposed project was not likely to adversely affect the Louisiana black bear. The FWS's Biological Opinion for the proposed project, dated July 2, 2007, concludes that the project is likely to adversely affect the pondberry, but it would not jeopardize the continued existence of the endangered plant.

[6] For the purposes of this section 404(c) Final Determination, "effects on wildlife" includes impacts to ecosystem integrity, nutrient pathways, and all other life requisites of animal, including fish, species.

discharge of dredged or fill material for the purpose of construction of FSEIS Plans 3 through 7, and Modified Plan 6.[7]

The adverse effects associated with the prohibited projects are the result of a combination of operational factors including the capacity of the pumping station and its associated pump-on elevations. While this Final Determination prohibits discharges associated with the construction of FSEIS Plans 3 through 7 and Modified Plan 6, the data supporting this Final Determination indicates that derivatives of the prohibited projects that involve only small modifications to the operational features or location of these proposals would also likely result in unacceptable adverse effects and would generate a similar level of concern and review by EPA.

The staff at the Corps Vicksburg District deserves recognition for the years of commitment and effort that have been necessary to evaluate the Yazoo Backwater Area Pumps Project. EPA also wants to emphasize our respect and appreciation for the Corps' cooperation with us on our review of this project. EPA recognizes that pumps are often an important and appropriate component of flood control projects. However, in this instance, EPA has concluded the adverse impacts on wetlands and their associated fisheries and wildlife resources are unacceptable.

EPA continues to support the goal of providing improved flood protection for the residents of the Mississippi Delta. This Final Determination does not preclude the opportunity for discussions and coordination with state and federal interests to evaluate flood protection alternatives. EPA is also committed to participating in discussions with other federal and state agencies, and the public, concerning the best way to provide flood protection while protecting wetlands and other natural resources.

[7] FSEIS Plan 2B (one of the nonstructural alternatives considered in the FSEIS) does not include a pumping station, however, it does include the construction of fourteen ring levees, which would result in adverse impacts to approximately 92,100 acres of wetlands. Although Plan 2B would result in significant adverse environmental impacts comparable to those whose effects we have determined to be unacceptable, EPA has not included it in the prohibition since the FSEIS concluded it was not a practicable alternative because it is "locally unacceptable" and "not economically justified."

II. BACKGROUND

A. Project Description

The Yazoo Backwater Area is located in west-central Mississippi, just north of Vicksburg, Mississippi (Figure 1). The portion of this area relevant to the Yazoo Backwater Area Project is located between the east bank mainline Mississippi River levee and the west bank levees of the Will M. Whittington Auxiliary Channel, and comprises about 926,000 acres. Of particular focus are the approximately 630,000 acres inundated by the 100-year flood event which lie in parts of Humphreys, Issaquena, Sharkey, Warren, Washington, and Yazoo Counties in Mississippi and part of Madison Parish in Louisiana. The Big Sunflower River, Little Sunflower River, Deer Creek, and Steele Bayou flow through this area.

The Yazoo Backwater Area has historically been subject to extensive backwater flooding from the Mississippi and Yazoo Rivers. In the past, when the Mississippi River reached a certain stage, water would back up into the Yazoo River Basin, causing flooding, while preventing the Yazoo River Basin from draining. With the implementation of the Mississippi River and Tributaries (MR&T) Project, which began in 1928, levees were constructed and the Steele Bayou flood gate was installed by 1978, to prevent Mississippi River water from flowing into the Yazoo Backwater Area. The gate feature, combined with other levees, has greatly decreased backwater flooding in the Yazoo Backwater Area from the Mississippi and Yazoo Rivers. However, when the Steele Bayou flood gate is closed, precipitation from the Delta region becomes trapped and backs up behind the gate which may cause flooding in the Yazoo Backwater Area.

The primary purpose of the Yazoo Backwater Area Project is to reduce the flood damages in the Yazoo Backwater Area caused by flooding within the existing levee system. As stated in the FSEIS, a principal objective of the project is to reduce flood damages "to urban and rural structures, as well as agricultural properties." To achieve this objective, the Corps and the project sponsor have proposed a flood damage reduction project with "structural" and "nonstructural" components.

The structural component entails the construction of a 14,000 cfs pumping station at Steele Bayou with a pump-on operation elevation of 87.0 feet, National Geodetic Vertical Datum (NGVD). When surface water at the Steele Bayou structure reaches (or is anticipated to reach) an elevation of 87.0 feet, NGVD, the pumps will be turned on and will move water from behind the gate into the Mississippi River. The pumping is designed to reduce the exent of land within the Yazoo Backwater Area that floods, and to remove water faster from some areas and some structures that still experience flooding. The nonstructural component proposes reforestation of up to 40,571 acres of agricultural lands through the purchase of perpetual conservation easements from willing sellers and operation of the Steele Bayou control gates to maintain water elevations between 70.0 and 73.0 feet, NGVD, in the Yazoo Backwater Area waterways during low-water periods when practical.[8] Construction of the proposed pumps involves the discharge of dredged or fill material into approximately 43.6 acres of forested wetlands and other waters of the United States in Issaquena County, Mississippi. According to the FSEIS, the estimated

[8] Operation of the Steele Bayou control gates to maintain water elevations and generation of the environmental benefits associated with this operation is not dependent upon construction of any pumping station.

federal cost of the proposed action is $220.1 million, with an annual operation and maintenance cost of $2.12 million.[9]

B. Project History

This project was authorized by Congress in the Flood Control Act of 1941 (Flood Control Act of 1941; P.L. 77-228, August 18, 1941), [10] which envisioned a plan to reduce backwater flooding in the Yazoo River Basin through a combination of levees, drainage structures, and pumping stations fully funded by the federal government. This Act also designated Yazoo Backwater Area lands located below 90 feet, NGVD, in elevation to serve as a sump area for surface water storage.

According to the Corps' Yazoo Area Pump Project Post Authorization Change (PAC) Notification Report (dated July 1982; Revised November 1982), the relevant portion of the Flood Control Act of 1941 is Section 3, which states in part:

> *(b) The project for flood control of the Yazoo River shall be as authorized by the Flood Control Act approved June 15, 1936, as amended, by Section 2 of the Act approved June 28, 1938, except that the Chief of Engineers may, in his discretion, from time to time, substitute therefore combinations of reservoirs, levees, and channel improvements; and except that the extension of the authorized project and improvements contemplated in Plan C of the report of March 7, 1941, of the Mississippi River Commission is authorized.*

The March 7, 1941 report by the Mississippi River Commission that is printed in House Document (HD) 359, 77th Congress, reads in part as follows:

> *Plan C…protecting Yazoo Backwater…with headwater plan in operation, Sunflower River dammed by backwater levee, and all drainage pumped…This plan again assumes that pumps of about 14,000 cubic feet per second capacity would be provided to prevent the sump level from exceeding 90 feet, mean*

[9] According to the project sponsor in its May 2, 2008, comments submitted in response to the Proposed Determination, the annual operation and maintenance cost is $2.24 million.

[10] According to the FSEIS, after the devastating 1927 flood, Congress passed the 1928 Flood Control Act (FCA). This act included a cutoff and channel realignment program, which was initiated in 1932, for the middle section of the Mississippi River. By 1941 this program was beginning to show benefits which included an increased channel carrying capacity and lower river stages. Features for the Yazoo Backwater Area were authorized by the FCA of 1941 and represented a compromise between the states of Arkansas, Louisiana, and Mississippi. The Arkansas and Louisiana congressional delegations wanted the Boeuf and Eudora Floodways on the west bank of the Mississippi River closed. The Mississippi congressional delegation wanted the floodways to remain open and estimated that closing the floodways would put an additional 700,000 cfs of floodwater flow back into the Mississippi River during the Project Design Flood (PDF). This additional flood flow would raise stages of the Mississippi River at Vicksburg by an estimated 5 to 6 feet and induce more flooding in the Yazoo Backwater Area. As a compromise to the closing of the floodways, Congress authorized an increase in the height of the Mississippi River levees and provided for flood protection to the Yazoo Backwater Area through a combination of levees, associated drainage channels, floodgates, and pump stations. The FSEIS notes that, the observed benefits from the cutoff and channel realignment program may also have played a role in the changes authorized by the FCA of 1941.

Gulf level, at average intervals of less than 5 years. Due to the small amount of cleared land below contour 90 there does not seem to be much advantage in holding the sump to lower levels….

The PAC report goes on to say that although levees, channel work, and pumps were authorized by the Flood Control Act approved on August 18, 1941, both World War II and the Korean War occurred during the time work on these structures would have been accomplished. In 1954, Congress directed the Chief of Engineers to review all MR&T Projects to determine if modifications were needed. This review was completed in 1959 and the Chief of Engineers recommended modification of several projects, including the Yazoo Backwater Project. The major modifications to the Yazoo Backwater Project were deletion of the Big Sunflower and Deer Creek drainage structures, the inclusion of a 27-mile connecting channel between the Little Sunflower and Steele Bayou drainage structures, and "the deferral of construction of pumping plants until some future time, with the number, location, and size of the pumps to be determined if and when future conditions and economic justification warranted installation."

Regarding the proposed pumping stations, the Vicksburg District Corps, MR&T Comprehensive Review Report, Annex L, Yazoo Backwater Project Mississippi at 20 (November 1959) reads in part as follows:

Since the original authorization for Yazoo Backwater Protection, important hydraulic changes have taken place due to improvement of channel efficiency in the Mississippi River and to reservoirs and channel improvement in the Yazoo Basin headwater area. These have resulted in less frequent flooding, and shorter duration of flooding, which makes it feasible to develop a simplification of the authorized plan by eliminating pumping at a large saving in project cost. . . . It is apparent that a protection plan for the Yazoo Backwater Area involving levees and floodgates only, which was not feasible under earlier conditions, is now feasible, and will provide a high degree of protection for the foreseeable future without the necessity of pumping.

Consistent with the PAC report, according to the FSEIS, as a result of the Comprehensive Review of the MR&T Project Report dated April 6, 1962 (HD 308/88/2), the Chief of Engineers modified the authorized plan for the backwater area to include a connecting channel between the Sunflower River and Steele Bayou, with all interior drainage evacuated through the Little Sunflower and Steele Bayou structures. The Chief of Engineers Report reads in part as follows:

". . . I believe that, at some future time, protection of some areas in the Yazoo Backwater by pumping may be warranted. Since the new plan developed by the Mississippi River Commission is proposed for construction under existing project authorization, selection of this plan does not affect those authorizations, which I consider sufficiently broad to permit selection of location and capacities of pump stations, or a combination of gravity and pumped drainage, as future developments dictate."

Over the next 19 years, the Corps planned and executed key flood control projects in the Yazoo Backwater Area, including: construction of the Will M. Whittington Auxiliary Channel and Levees in 1962; construction of the Steele Bayou and Little Sunflower flood control gates, which were completed in 1969 and 1975, respectively; construction of the Yazoo Backwater Levee completed in 1978; and construction of the Sunflower River to Steele Bayou Connecting Channel also completed in 1978. The PAC report notes that these levee and drainage structures protect the Yazoo Backwater Area from Mississippi River backwater floods. However, ponding of runoff from the delta presents a flooding problem when the Steele Bayou and Little Sunflower drainage structures are closed due to prolonged high stages on the Mississippi River. A reevaluation of the proposed pumping plant plan was initiated in 1978 to determine if conditions had changed sufficient to justify moving forward with the pumping plant component of the project and if so the best plan for reducing damages in the Yazoo Backwater Area.

According to the PAC report, at the time of initial authorization in 1941, 20 percent of the project area was cleared but only 2 percent of those lands below the 90-foot contour were cleared. However, by 1978, approximately 74 percent of the 539,000-acre [1982] project area had been cleared, including 59,000 acres or 43 percent of the lands below the elevation 90 feet, NGVD.

The PAC report and the FSEIS describe the originally authorized project as a plan with three separate pumping plants at Big Sunflower River, Deer Creek, and Steele Bayou with a combined 14,000 cfs of pumping capacity and with pump-on elevations of 80 feet, NGVD. Based on the reevaluation of the proposed pumping plants, the PAC report recommended a revised plan with a pumping capacity of 17,500 cfs and a pump-on elevation of 80 feet, NGVD (pump-on elevation of 85 feet, NGVD from December 1 – March 1).[11] According to the report, the "increase in agricultural lands provides the basis for the increase in pumping capacity."

The PAC report also revises the originally authorized plan by consolidating the three separate pumping plants proposed in the authorized plan into a single pumping plant at Steele Bayou. The report notes that the construction of the connecting channel completed in 1977-8 between the Big Sunflower and Little Sunflower Rivers and Steele Bayou intercepts flow from all of the tributaries within the project area. The chronology of events described in the PAC report and the FSEIS indicate that the decision to build the connecting channel and its completion predate the Corps' decision to: 1) reinitiate the pumping station portion of the Yazoo Backwater Area Project which was suspended in 1959, and 2) the Corps' ultimate decision regarding the number, size and location of pumping plants which was not approved by Corps Headquarters until 1983.[12] However, the report does note that the previous investment in the connecting channel made the construction of a single pumping plant possible and apparently less costly than the construction of three separate plants as originally authorized.

[11] This revised project is commonly referred to as the "1982 plan" or "1982 project".

[12] The project sponsor has argued that the single pumping station currently proposed at the Steele Bayou location is the "culmination of early steps" and that the Sunflower River to Steele Bayou Connecting Channel completed in 1978 was built with the single pumping station at Steele Bayou in mind. This statement does not appear to be consistent with the chronology of events established by the Corps in its PAC report and FSEIS. See also February 3, 1983 memo from Corps Headquarters to the President of the Mississippi River Commission approving the PAC Report.

As noted in the PAC report, this 25 percent increase in the capacity of the pumping plant expanded the scope of environmental impacts associated with the project and raised concerns and opposition to the project. The revised plan was described in the Draft Environmental Impact Statement (DEIS) dated March 1982 that was released by the Corps for review and comment.

In April 1982, EPA Region IV provided comments on the DEIS for the 1982 version of the proposed project. EPA comments on the DEIS highlighted concerns regarding the proposed project's potentially extensive impacts on wetlands and associated fish and wildlife habitat and its belief that a less environmentally damaging design would meet the project's objectives. EPA Region IV stressed the importance of the flood water storage and water quality enhancement functions provided by area wetlands and expressed its concerns that the proposed project would degrade these critical functions. EPA Region IV also expressed concerns that the project would stimulate agricultural intensification in flood-prone areas, potentially increasing suspended solids, pesticides, and fertilizers in the water column, and exacerbate existing water quality problems.

The Final Environmental Impact Statement (FEIS) was filed with EPA in March 1983. The FEIS states that the 1982 project would adversely impact approximately 17,500 acres of wetlands.[13] It also states that although the District Engineer had originally adopted the FWS's recommended compensatory mitigation plan which entailed fee title acquisition of 32,800 acres or acquisition of 40,000 acres of easements (or a combination thereof) of bottomland hardwood forested wetlands, at the recommendation of the Mississippi River Commission this amount was reduced to 11,300 acres in the FEIS. In EPA Region IV's May 1983 comments on the FEIS we reasserted concerns similar to those raised by our comments on the DEIS. EPA Region IV's review of the FEIS concluded that the project would likely "decrease water quality in the area through increases in suspended solids, pesticides and fertilizers; reduce natural overbank flooding and decrease nutrient assimilation by wetland vegetation; transfer flood peaks downstream; serve as a precedent to similarly convert other bottomland hardwood remnants in the lower Mississippi River Valley; and greatly diminish a fish and wildlife resource, which, due to previous clearing elsewhere, has become nationally valuable." Additionally, EPA Region IV expressed concerns that the proposed mitigation would not adequately minimize and offset the extensive adverse environmental impacts associated with the proposed project and urged the Corps to reconsider its decision to reject the FWS's proposed mitigation plan.

The FWS also raised similar concerns regarding the proposed project. According to FWS, its first report on the Yazoo Backwater Area Project and related flood control projects in the Yazoo River Basin was issued in 1956. This report concluded that losses of fish and wildlife resources

[13] In February 2008, the Corps reevaluated the impacts associated with the 1982 project using its current impact assessment methodologies and determined "post-hoc" that the 1982 project would actually impact approximately 137,000 acres of wetlands, almost eight times more than was estimated in the 1983 FEIS. The Corps and project sponsor currently argue that because EPA did not initiate a section 404(c) review for the 1982 project it should not be doing so now for the 2007 proposal because, based on this "post-hoc" analysis, the 2007 project represents an 80% reduction in wetland functional losses over the 1982 project. We do not find this argument persuasive. EPA raised significant concerns regarding the level of impacts acknowledged by the Corps in the 1982 DEIS and 1983 FEIS at that time; and we stressed the need to reduce those impacts through use of less damaging alternatives and more commensurate mitigation.

as a result of the construction of the Yazoo Headwater Project and Yazoo Backwater Project would be large, and that the proposed pumps would promote large scale clearing of forests and intensification of agriculture in wetlands. In February 1978, FWS provided a Fish and Wildlife Coordination Act report to the Corps which concluded that the pumping plant was environmentally unsound, and that the Service was opposed to the project as planned. A subsequent Fish and Wildlife Coordination Act report submitted in June 1982 noted continued concerns with the proposed project and indicated that it may consider the project a candidate for referral to the Council on Environmental Quality (CEQ).

The Record of Decision (ROD) for the FEIS was signed on July 7, 1983. The Mississippi River Commission transmitted the signed ROD to EPA's Office of Federal Activities in a letter dated July 18, 1983. In July 1984, the U.S. Army Chief of Engineers responded to EPA Region IV's May 1983 comments regarding the inadequacy of the proposed mitigation. In his letter, the U.S. Army Chief of Engineers indicated that his "decision to recommend a reduced level of mitigation was based on recognition that over half of the woodlands in the project area are already in federal ownership, that a number of structural and operational measures have been approved to partially offset fish and wildlife losses, and that any additional mitigation measures recommended for authorization should be confined to those required to compensate for losses associated with the authorized pump plant."

Notwithstanding the concerns expressed by EPA and FWS, construction on the project was initiated; however, work subsequently halted in 1986 after the Water Resources Development Act (WRDA) of 1986 modified the funding for the project by requiring a local cost-share. Under this new provision, the local project sponsor would provide the lands, easements, rights-of-way, relocations, and disposal areas for the project, or 25 percent of the construction cost, whichever was greater. Work on the project effectively halted. The reauthorization of WRDA ten years later in 1996 reversed the cost-sharing provisions established in 1986 and restored the project to full federal funding and work on the project began once again.

In 1997, EPA initiated an ecosystem restoration prioritization analysis with the U.S. Geological Survey (USGS). This work evolved into ecological and economic model development for nonstructural floodplain management alternatives in the Yazoo Backwater Area. Between 1998 and 2000, EPA participated in a series of interagency and stakeholder meetings with the Corps, USGS, FWS, the Virginia Polytechnic Institute and State University, and representatives of the Board of Mississippi Levee Commissioners to present the finding of these studies and discuss concerns regarding the proposed project and potentially less environmentally damaging alternatives.

In 2000, EPA also participated in multiple meetings at the request of the project sponsor with a group composed of the Mississippi Department of Environmental Quality, Mississippi Department of Wildlife, Fisheries and Parks, the Corps, FWS, Board of Mississippi Levee Commissioners and Yazoo Backwater Area landowners in which we discussed our concerns with the proposed project. EPA also voiced its concerns with the proposed project in meetings with the Office of Management and Budget (OMB), CEQ and representatives from Corps Headquarters in February and March of 2000.

In September 2000, the Corps released the project's Draft Supplemental Environmental Impact Statement (DSEIS). One of the purposes of this reformulation of the project's 1982 FEIS was to respond to a 1991 directive from OMB to evaluate a broader suite of alternatives to the proposed project that would provide: 1) greater levels of flood protection for urban areas; 2) reduced levels of agricultural intensification; and 3) reduced adverse impacts to the environment. The OMB directive also stated that the revised evaluation should include "full consideration of predominantly nonstructural and nontraditional measures" to address flooding issues.

EPA recognizes the considerable work that was done by the Corps and project sponsor to reduce the scale of the project and the extent of associated environmental impacts between the 1983 FEIS and the 2000 DSEIS. For example, the pump capacity was reduced from 17,500 cfs back down to its pre-1982 level of 14,000 cfs and the pump-on elevation was increased from 80 to 87 feet. Significant efforts were also made to improve the mitigation and reforestation components of the project. Despite these improvements, EPA Region IV remained concerned with the proposed project's extensive impacts to wetlands and associated fish and wildlife resources, its potential to exacerbate existing water quality problems in the Yazoo Backwater Area, the inadequacy of the proposed compensatory mitigation, and the uncertainty associated with the proposed reforestation and expressed these significant concerns in a November 3, 2000, letter to the Corps on the DSEIS. EPA Region IV also identified, for further consideration, a number of potentially less environmentally damaging alternatives that emphasized nonstructural and nontraditional measures to address flooding issues. EPA Region IV concluded that the project was environmentally unsatisfactory and noted that it was a candidate for referral to CEQ under section 309(b) of the Clean Air Act and the CEQ regulations at 40 CFR part 1504 and for further action under CWA section 404(c).

Between 2002 and 2005, EPA Region IV worked with the Corps to improve the evaluation of the extent of wetlands in the Yazoo Backwater Area, the extent of wetlands potentially impacted by the project, and the nature and degree of these impacts. This work involved numerous site visits and extensive data collection in the Yazoo Backwater Area, meetings, and conference calls. In December 2005, EPA Region IV provided detailed technical comments on the revised draft Wetland and Mitigation appendices for the DSEIS outlining a number of concerns regarding the evaluation approaches used in these appendices. EPA noted that the Corps' approach resulted in an underestimation of the potential adverse impacts to wetlands and fish and wildlife resources associated with the construction and operation of the proposed pumps and an overestimation of the potential environmental benefits associated with the proposed reforestation.

In November 2007, the Corps released the Yazoo Backwater Area Reformulation Main Report and Final Supplemental Environmental Impact Statement (FSEIS)[14]. Although the Corps responded to many of EPA's November 2000 comments on the DSEIS, no substantive modifications had been made to the structural component of the proposed project since November 2000. In a January 22, 2008, letter to the Corps on the FSEIS, EPA Region IV concluded that the nature and extent of anticipated adverse environmental impacts continue to be significant and that EPA continued to have significant concerns with the proposed project including: 1) magnitude of anticipated impacts to wetlands and associated fish and wildlife

[14] U.S. Army Corps of Engineers' Yazoo Backwater Area Project Reformulation Main Report and FSEIS: http://www.mvk.usace.army.mil/offices/pp/projects/YBR_Report/index.html

resources; 2) compliance with the CWA's substantive environmental criteria (i.e., the Section 404(b)(1) Guidelines); 3) uncertainties with the proposed reforestation plan; 4) changes in land use; 5) environmental justice (EJ) considerations; 6) uncertainty with the economic analysis; and 7) the evaluation of potential project alternatives. EPA Region IV again identified the project as a candidate for referral to CEQ and for further action pursuant to our authorities under the CWA.

In its January 18, 2008, comment letter to the Corps regarding the FSEIS, the FWS shared similar concerns, particularly those associated with the proposed project's potentially unacceptable adverse effects on fish and wildlife resources. The FWS also reiterated its determination of the project as a candidate for referral to CEQ.

On February 1, 2008, EPA Region IV's Regional Administrator informed the Corps and the Board of Mississippi Levee Commissioners of his intent to initiate a CWA section 404(c) review of the proposed project, based on his belief that the project may have an unacceptable adverse effect on fish and wildlife resources. During the 15-day response period following the 404(c) initiation letter (which was extended to March 3, 2008) EPA Region IV met with representatives from the Corps and Board of Mississippi Levee Commissioners. In addition, EPA Region IV had a number of conference calls with the Corps during this consultation period to discuss specific technical concerns we had with the Corps' analysis (many of which are discussed in this Final Determination).

EPA Region IV held a meeting with the Corps, the project sponsor, and the FWS on February 29, 2008, during the initial consultation period. At this meeting, the Corps proposed two alternatives to the project (i.e., 2007 FSEIS Plan 5) in an attempt to reduce project impacts to an acceptable level. One of these alternatives was Plan 6 from the 2007 FSEIS and the second was described by the Corps as a modification of Plan 6. As described in Table 1, both new alternatives include the same 14,000 cfs pumping station as the proposed project. However, both of these alternatives include modifications to the pump-on elevation and amounts of proposed reforestation and compensatory mitigation as compared to Plan 5. Plan 6 also changes the Water Management feature while Modified Plan 6 changes the Mitigation Acquisition feature. As noted in the FSEIS, Plan 6 reduces impacts to wetlands from 67,000 to approximately 48,000 acres. While the Corps had not developed precise estimations of wetland impacts associated with its Modified Plan 6, it noted that this value would likely fall between 28,408 and 48,066 acres, the impact estimates for FSEIS Plans 7 and 6 respectively. EPA Region IV had fully evaluated all ten alternatives included in the FSEIS during its review pursuant to National Environmental Policy Act (NEPA) (42 U.S.C. 4321 *et seq*). EPA Region IV also fully considered Modified Plan 6 based on the information provided by the Corps subsequent to the release of the FSEIS. However, it found that both alternatives proposed by the Corps during the initial consultation generate similar concerns as Plan 5. These include the magnitude of the impacts to wetlands and their associated fisheries and wildlife resources, the inadequacy of the compensatory mitigation to reduce these impacts to an acceptable level and the uncertainty of the proposed reforestation to provide the level of environmental benefits contemplated by the Corps. The Regional Administrator was not satisfied that no unacceptable adverse effect would occur, or that adequate corrective action would be taken to prevent an unacceptable adverse effect. Thus, EPA Region IV took the next step in the section 404(c) process – publication of a Proposed Determination in the Federal Register.

Table 1. Comparison of alternatives proposed at February 2008 initial consultation meeting.

Feature	Plan 5	Plan 6	Modified Plan 6
Pump Station Capacity (cfs)	14,000	14,000	14,000
Pump Elevation (NGVD) March – November	87.0’	**88.5’***	**88.5’**
Pump Elevation (NGVD) December - February	87.0’	**88.5’**	**91.0’**
Reforestation (acres) [includes historic and current compensatory mitigation]	55,600	**81,400**	**81,400**
Compensatory Mitigation (acres) [includes historic and current compensatory mitigation]	15,029	**6,913**	**9,156**
Mitigation Acquisition	- Willing sellers - Easement	- Willing Sellers - Easement	- Willing Sellers - **Fee Title or Restrictive Easement**
Water Management	- Hold 70.0 to 73.0’	- Hold 70.0 to 73.0’ - **Reintroduce to 87.0**’	- Hold 70.0 to 73.0’
Wetland Impacts (acres)	66,945	**48,066**	**28,408 – 48,066****

*Items in bold represent a change from Plan 5.
**Corps indicated that it had not calculated this estimate but that its value would fall between the impact estimates for FSEIS Plans 6 and 7.

On March 19, 2008, the Regional Administrator published a Proposed Determination to prohibit, restrict, or deny the specification, or the use for specification, of certain waters of the United States in Issaquena County, Mississippi, as a disposal site for the discharge of dredged or fill material in connection with the construction of the proposed Yazoo Backwater Area Pump Project. In accordance with 40 CFR 231.3(a)(2), EPA Region IV published notice of the Proposed Determination in the Federal Register on March 19, 2008 (73 FR 14806). The notice established a public comment period from March 19 to May 5, 2008 and indicated a public hearing would be held. Notice of the Proposed Determination and of the public hearing was also published in the Delta Democrat-Times on March 19, 2008, the Clarion Ledger and Deer Creek Pilot on March 20, 2008, and the Vicksburg Post on March 22, 2008.

EPA Region IV conducted the public hearing at the Vicksburg Convention Center on April 17, 2008. Approximately 500 people were in attendance for the five-hour hearing. A total of 67 people provided oral statements, including one representative from the Corps' Vicksburg District and four individuals representing the project sponsor. Of the 62 people not directly affiliated with the project, 32 people spoke in opposition to the proposed pumps project, 29 spoke in favor of the pumps project and one person did not specify a position. Several of these speakers urged EPA to move promptly to prohibit the project. Representatives of U.S. Senator Thad Cochran

and Mississippi Governor Haley Barbour urged EPA to stop the 404(c) process pending further discussions on appropriate means of flood control for this area of the Mississippi Delta.

The public comment period ended on May 5, 2008. EPA received approximately 47,600 comment letters including approximately 1,500 individual comment letters and 46,100 mass mailers.[15] Looking at the 1,500 individual letters, 97.29 percent urged EPA to prohibit the proposed pumps project and 2.52 percent supported construction of the proposed pumps project. In addition, all of the mass mailers urged EPA to prohibit discharges to waters of the United States associated with the proposed project.

Within the state of Mississippi, approximately 461 residents submitted written comments during the public comment period or spoke at the public hearing. Of these, 417 expressed support for EPA's proposal and 43 favored construction of the pumps. EPA Headquarters received two additional comment letters from private citizens living within the project area on July 26, 2007; both letters expressed support for the proposed project. By analyzing zip codes and other address data, when available, we were able to determine that a total of 31 residents of the Yazoo Backwater Area expressed an opinion on the project either at the public hearing, in written comments, or both. Of these 31, four expressed support for EPA's position, 26 expressed support for construction of the pumps and one did not express an opinion.

Commenters in support of EPA Region IV's position echoed the Region's concerns regarding the extensive level of anticipated adverse environmental impacts associated with the proposed project. These impacts are described in more detail in the Recommended Determination and this Final Determination. Additionally, numerous commenters in support of EPA Region IV's position expressed concerns that the project would allow more intensive agricultural practices on marginal farmland that would in turn increase farm subsidy payments and that taxpayers would bear the burden of any economic gains from the project. Numerous commenters also questioned whether such a substantial amount of federal taxpayer money is needed to address the "limited" flooding that occurs within the "sparsely" populated project area, and whether the money allocated to construct and operate the pumps would be better spent addressing the more pressing needs of the region, such as economic development opportunities.

Those in support of the proposed project, including a number of local county officials and the project sponsor believe the project would alleviate flooding damages and is part of a long standing commitment to residents of the project area. These commenters stressed that the pumps are the final piece of a larger flood control plan for the Yazoo Backwater Area. Those in support of the proposed project also stated that periodic flooding contributes to the poor economy of the area because of public service interruption, road damage, people moving away from the area, and agriculture/crop damage. They noted that flooding does not yield to emergency services or school buses, and destroys many kinds of infrastructure. They believe that without the flood protection provided by the pumps, future economic development of the South Delta Region is seriously diminished. Some of these commenters cited the flooding that occurred this past spring in Mississippi and their belief that the pumps could have been used to diminish the damaging

[15] Public comments received in response to EPA Region IV's Proposed Determination may be viewed and downloaded at www.Regulations.gov, Docket Number EPA-R04-OW-2008-0179. See: http://www.regulations.gov/fdmspublic/component/main?main=DocketDetail&d=EPA-R04-OW-2008-0179

effects of these floods. Further, several commenters, including the project sponsor and the Corps, also suggested that the project would improve water quality and enhance wildlife habitat.

All of the comment letters received by EPA during this section 404(c) review were carefully considered in the preparation of the Recommended Determination and this Final Determination. The following section (C. EPA Headquarters Actions) elaborates on the significant issues raised by the project sponsor, the Corps, and the Department of the Army. Appendix 1 of this Final Determination contains EPA's detailed responses to the major issues raised by the public, the project sponsor, the Corps, and the Department of the Army.

EPA's regulations require that the Regional Administrator either withdraw the Proposed Determination or prepare a Recommended Determination within 30 days after the conclusion of the public hearing, in this case by May 17, 2008 (40 CFR 231.5(a)). However, in order to allow full consideration of the extensive record, including the 47,600 public comments EPA received, Region IV extended the time period provided in 40 CFR 231.5(a) for the preparation of this Recommended Determination until no later than July 11, 2008 (73 FR 27821). This time extension was made under authority of 40 CFR 231.8, which allows for such extensions upon a showing of good cause. EPA Region IV reviewed the information provided during the public comment period, and completed its review in advance of this date.

The Recommended Determination was signed by the Regional Administrator on June 23, 2008, and represents the culmination of EPA Region IV's section 404(c) review of the proposed Yazoo Backwater Area Project. Pursuant to the section 404(c) regulations (40 CFR part 231), the Recommended Determination and its administrative record were submitted to EPA Headquarters on July 2, 2008, initiating the time period for review and final action by EPA's Assistant Administrator for Water.

C. EPA Headquarters' Actions

The proposed Yazoo Backwater Area Project is a complex project with a long history. Recognizing the Headquarters role as decision maker on any final action to prohibit or restrict the project, EPA Headquarters has been engaged in the section 404(c) review since it was initiated on February 1, 2008. Staff from EPA Headquarters attended the public hearing in Vicksburg, Mississippi, and heard first-hand the testimony provided by those who live and work in the South Delta. EPA Headquarters staff also visited the project area on April 17, 2008, five days before the Mississippi River crested at the Steele Bayou flood control structure.[16]

On June 24, 2008, EPA Administrator Stephen L. Johnson and Assistant Administrator for Water Benjamin H. Grumbles met, at their request, with U.S. Senators Thad Cochran and Roger Wicker and Representative Bennie Thompson to discuss an alternative to EPA's ongoing section 404(c) review of the proposed Yazoo Backwater Area Project. At this meeting, Administrator Johnson discussed with the delegation the value of convening an intergovernmental working

[16] On April 23, 2008, water levels on the riverside of the Steele Bayou flood control structure crested at 100.1 feet, NGVD, 1.2 feet shy of the record high stage in 1973. Landward of the Steele Bayou flood control structure, inside the Yazoo Backwater project area, peak water elevations reached 92.2 feet, NGVD, roughly equivalent to the 2-year floodplain (http://www2.mvr.usace.army.mil/WaterControl/new/layout.cfm)

group to explore alternatives to the current project that appropriately balance flood control and environmental objectives. Administrator Johnson indicated that completion of the section 404(c) review would not preclude such initiatives; rather, the information and results from EPA's review could inform discussions on what are viable alternatives. Administrator Johnson also committed to providing the Mississippi Congressional delegation with copies of the Recommended Determination, which EPA staff hand-delivered to the U.S. House and Senate buildings the following day.

In accordance with the section 404(c) regulations at 40 CFR 231.6, the Assistant Administrator for Water offered the opportunity for final consultation to the Office of the Assistant Secretary of the Army for Civil Works and the Mississippi Board of Levee Commissioners, by letters dated July 2, 2008. The letters provided the Department of the Army and the project sponsor an opportunity to present additional relevant information for the record, including information about any corrective actions that could be taken to prevent unacceptable adverse effects from the proposed project. Further, the letters offered an opportunity to respond to the Recommended Determination to the extent that it raises issues not presented in the Proposed Determination or that it relies on information in the administrative record that was not available at the time the Corps and project sponsor provided comments on the Proposed Determination. As required under the regulations, the Department of the Army and the Mississippi Board of Levee Commissioners were requested to provide any comments within fifteen days of the date of the letter (i.e., July 17, 2008). Finally, the letters offered an opportunity to meet with EPA representatives and discuss any issues related to the section 404(c) review of the Yazoo Backwater Area Pump Project.

The Mississippi Board of Levee Commissioners responded to the consultation notification in a letter dated July 8, 2008, by requesting a 30-day time extension of the final consultation period as well as a meeting with EPA and the Corps. EPA replied in a letter dated July 10, 2008, granting the project sponsor a fifteen day extension, until August 1, 2008, to provide comments. This time extension acknowledged the need to balance the project sponsor's request with the schedule established in the section 404(c) regulations.

On July 22, 2008, the project sponsor submitted initial comments on the Recommended Determination. The major points raised in the letter were also discussed during a meeting held with the Mississippi Board of Levee Commissioners and their counsel on the morning of July 25, 2008, at the EPA's Headquarters Offices in Washington, D.C. The Assistant Administrator for Water presided over the meeting, which was also attended by the Assistant Secretary of the Army for Civil Works, EPA Region IV's Regional Administrator for the section 404(c) action,[17] as well as management, staff, and counsel from EPA and the Assistant Secretary of the Army for Civil Works/Corps of Engineers Headquarters Offices. During the meeting (and in the July 22, 2008 letter), the project sponsor raised six major points: 1) EPA lacks the legal authority to invoke section 404(c) in this case because the project is exempt from most CWA requirements, including section 404(c), due to section 404(r) of the CWA; 2) EPA has exceeded its authority under section 404(c) by recommending a prohibition that would affect the six counties encompassed by the project area; 3) the Recommended Determination does not respond to their previous comments or those provided by the Corps, including the issue of fairness to the people

[17] In this case, EPA's Deputy Regional Administrator for Region VI. See footnote #1.

living in the South Delta; 4) EPA has ignored the significant changes made to the project since 1982 to reduce adverse environmental impacts and enhance environmental benefits; 5) EPA has not identified a less environmentally damaging alternative; and, 6) the Recommended Determination improperly characterizes project impacts. In conclusion, the project sponsor specifically requested that the Recommended Determination be rescinded and remanded back to the Corps.

On August 1, 2008, the Mississippi Board of Levee Commissioners provided additional, detailed comments on the Recommended Determination. The project sponsor also reiterated its request for a time extension to complete its review. EPA responded by granting the project sponsor a second extension of fifteen days, until August 15, 2008, in a letter dated August 1, 2008. On August 15, 2008, the Mississippi Board of Levee Commissioners submitted a third set of comments on the Recommended Determination, including detailed comments on the June 2008 FWS report contained in Appendix 4 of the Recommended Determination, the Recommended Determination's discussion on Environmental Justice, and the information submitted by the Assistant Secretary of the Army for Civil Works in their August 1, 2008 letter (see below). The project sponsor also provided numerous news reports and articles on the effects of recent flooding events along the Mississippi River.

The substantive issues raised by the Mississippi Board of Levee Commissioners in their letters and at the July 25, 2008 meeting are addressed within the context of the discussion and analysis of the project throughout this Final Determination. EPA's detailed responses to the issues raised by the project sponsor during the July 25, 2008, meeting and in their comment letters to the Agency submitted during the public comment period on the Proposed Determination and during the final consultation period are supplied in Appendix 1. In addition, notes from the July 25, 2008, meeting were prepared by EPA staff and placed in the administrative record.

The Department of the Army also requested an unspecified time extension to the final consultation period in an email sent to EPA on July 15, 2008. EPA granted the Department of the Army the same fifteen day extension provided to the Mississippi Board of Levee Commissioners on July 10, 2008 (i.e., until August 1, 2008) in an email reply the same day. In addition, the Assistant Secretary of the Army for Civil Works met with the Assistant Administrator for Water in the afternoon on July 23, 2008. The discussion focused primarily on the Assistant Secretary of the Army for Civil Works' concern with the potential policy implications that EPA's determination could have on other water resources programs, projects and activities, and in particular the use of pumps as an acceptable method for flood damage reduction. The Assistant Secretary of the Army for Civil Works also stated his belief that EPA should commit to finding an alternative flood damage reduction solution for the area. A summary of the July 23, 2008, meeting was placed in the administrative record.

On August 1, 2008, the Assistant Secretary of the Army for Civil Works submitted two letters to EPA in response to the Recommended Determination. One letter provided the Department of the Army's comments on the Recommended Determination and summarized the main concerns raised by the Assistant Secretary of the Army for Civil Works during the July 23, 2008, meeting with the Assistant Administrator for Water. The second letter forwarded additional scientific and technical information developed by the Corps Vicksburg District for consideration as part of the

section 404(c) review. Eight attachments were provided that contain information on a number of topics including hydrology, larval fish sampling, environmental effects, compensatory mitigation, and species richness.

EPA reviewed the supplemental scientific and technical information provided by the Corps and, where necessary, clarified the relevant information in the Final Determination. The other substantive issues raised by the Department of the Army at the July 23, 2008, meeting and in their August 1, 2008, letter are addressed within the context of the discussion and analysis of this case throughout this Final Determination. EPA's detailed responses to the issues raised by the Assistant Secretary of the Army for Civil Works and the Corps are contained in Appendix 1.

Additional correspondence received by EPA during the final consultation period includes a letter from Representative James Oberstar, dated June 24, 2008, requesting a report on the status of the Proposed Determination. The letter highlighted the importance of EPA's section 404(c) review to the U.S. House of Representatives, Committee on Transportation and Infrastructure and the need for the Agency's Final Determination to be based on a rigorous and open assessment of all available information. Chairman Oberstar emphasized his concern for the project's significant potential adverse impacts to waters of the United States. In a letter dated July 9, 2008, EPA informed Chairman Oberstar that its Headquarters Office was in the process of completing a final review of the project before making a decision whether to affirm, rescind, or modify the Recommended Determination. EPA also acknowledged that section 404(c) is an effective tool available to EPA to ensure protection of our Nation's water resources, and as a result, EPA is judicious in using its section 404(c) authority. EPA agreed with Chairman Oberstar that the Yazoo Backwater Area Project warranted close scrutiny by EPA due to the potentially unacceptable adverse effects on fish and wildlife resources.

EPA also received a letter from U.S. Senators Cochran and Wicker, dated July 18, 2008, which raised the issue of EPA's legal authority to pursue section 404(c) in the context of the proposed project and provided a copy of a Congressional Research Service (CRS) memorandum on the limited exemption for certain federal projects included under section 404(r) of the CWA. EPA provided an initial response to the Senators on July 25, 2008, indicating that EPA had consulted with the Corps and carefully reviewed the requirements, preconditions, and legislative history of CWA section 404(r) prior to initiating section 404(c) review on February 1, 2008. Based on information available at the time, EPA determined that 404(r) was not applicable to the Yazoo Backwater Area Project because the statutory preconditions for qualification under section 404(r) had not been met. EPA also indicated that additional time was needed to evaluate information provided by the Mississippi Board of Levee Commissioners at the July 25, 2008, meeting relevant to this issue. EPA subsequently submitted a letter to the Senators on August 6, 2008, stating that while the CRS report provides an accurate description of the meaning of section 404(r), it does not reach a conclusion regarding the applicability of section 404(r) to the proposed project. After further consultation with the Corps, the Department of the Army, and review of all available information, EPA still has no evidence that an EIS for the proposed project was ever submitted to Congress, let alone before the actual discharge of dredged or fill material in connection with the construction of the project occurred, and prior to either authorization of the project or an appropriation of funds for construction. Thus, EPA continues to believe that the limited exemption established at section 404(r) does not apply to the proposed project.

On July 29, 2008, the Governor of Mississippi, Haley Barbour, sent a letter to EPA referencing the letter from Senators Cochran and Wicker regarding section 404(r), and similarly questioned EPA's legal authority to invoke section 404(c). The Governor also suggested that an intergovernmental working group be convened to explore alternatives to the current pump project that satisfy both flood control and environmental objectives. The Governor requested that EPA delay its final determination for at least 90 days to allow this process to work. EPA agreed with the Governor's suggestion regarding the value of an interagency work group by letter dated August 1, 2008. However, the letter also stated that EPA expects to proceed to complete its review of the Yazoo Backwater Area Project on a schedule that is consistent with the timeframes established in our regulations. Further, EPA expressed its belief that information and decisions that result from the section 404(c) review of the Yazoo Backwater Area Project will be valuable to the working group and help to inform their discussions and facilitate the preparation of timely recommendations.

A detailed response to comments regarding the applicability of section 404(r) raised by the project sponsor, U.S. Senators Cochran and Wicker, and Governor Barbour, is provided in Appendix 1. The project sponsor has also requested information from EPA regarding section 404(r) under the Freedom of Information Act (FOIA) on August 7, 2008. While EPA will respond to the project sponsor's request, the Agency does not feel it is necessary or appropriate to delay this Final Determination until EPA has responded to their request. Section 404(r), while having potential implications on the use of section 404(c) by EPA to review federal projects is not a part of the section 404(c) review process and in this case EPA has already determined that section 404(r) is not applicable to the proposed project.

Finally, on July 10, 2008, FWS Director, H. Dale Hall, sent a letter to EPA in support of the Recommended Determination. In the letter, the FWS concurred with EPA's conclusion that the Yazoo Backwater Area Project would result in significant degradation and unacceptable adverse effects on wildlife and fisheries resources. The FWS also expressed appreciation for the Recommended Determination's acknowledgment of the full breadth of the proposed project's anticipated adverse impacts to its four National Wildlife Refuges located within the project area.

III. SITE CHARACTERIZATION

A. Site Ecology

The Lower Mississippi River Alluvial Valley (LMRAV) was a 25 million acre area of forested wetlands that extended along both sides of the Mississippi River from Illinois south to Louisiana and the Gulf of Mexico. Saucier (1994) and Klimas et al. (2005) point out the effect the Mississippi River has had upon topographic diversity in the LMRAV and in the Yazoo River Basin. The effects of glaciation and the subsequent fluvial response of the Mississippi River, has created landforms which are the basis for the various wetland types in the Yazoo Backwater Area. Smith and Klimas (2002) indicate that the Yazoo Basin has 4 hydrogeomorphic (HGM) classes and 7 different wetland subclasses based on the geomorphology of the Yazoo Basin. These classes and subclasses are listed in Table 2 and illustrated in Figure 2.

Table 2. Hydrogeomorphic classes and subclasses of the Yazoo Basin (Smith and Klimas, 2002).

HGM Class	HGM Subclass	Class Characteristics
Riverine	Backwater	Wetland within 5-yr floodplain; floodwaters typically back-up into wetland due to high water
	Overbank	Wetland within 5-yr floodplain; Floodwaters typically flow parallel to channel
Fringe	Isolated	Wetland in topographic depression with water >2 m deep; Not within 5-yr floodplain
	Connected	Wetland in topographic depression with water >2 m deep within 5-yr floodplain
Depression	Isolated	Wetland in topographic depression with water <2 m deep; Not within 5-yr floodplain
	Connected	Wetland in topographic depression with water <2 m deep within 5-yr floodplain
Flat		Wetland not in topographic depression and not within 5-yr floodplain

Historically, the extent, hydrodynamics and duration of seasonal flooding from the Mississippi River fluctuated annually, shaped the topography, recharged the LMRAV systems and created a diversity of dynamic habitats that once supported a vast array of fish and wildlife resources. Although floodplains are characterized as being relatively flat in comparison to the surrounding landscape, it has been well documented that variations in the microtopography (i.e., spatial heterogeneity) along with variations in flooding frequency and duration (i.e., hydrologic heterogeneity) leads to an abundance of biodiversity (Schnitzler et al., 2005; Burnett et al., 1998; and Nichols et al., 1998).

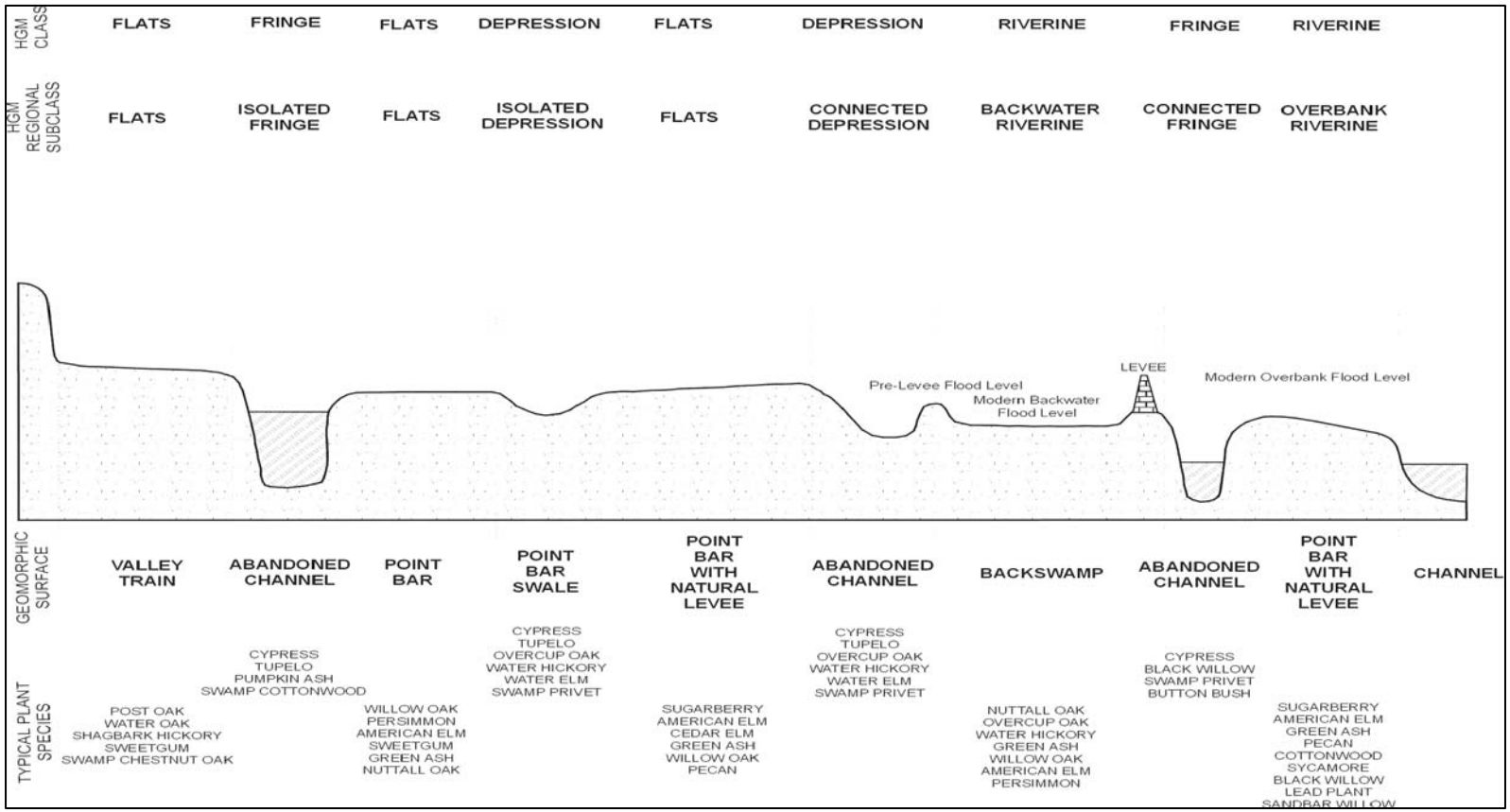


Figure 2. Floodplain cross section and the geomorphic position and dominant plant communities associated with the hydrogeomorphic classes in the Yazoo Basin (from Smith and Klimas, 2002)

Different wetland species require wet and dry conditions at different times in their life cycle. The various elevations of land in a floodplain combined with various hydrologic events create numerous habitat conditions which are available to animals and plants at different times. It was the spatial and temporal heterogeneity of these bottomland hardwood ecosystems which provided the components for the great biodiversity for which this region was once known (Schnitzler et al., 2005), vestiges of which remain today. The topographic and hydrologic complexity of floodplains is important to the distribution of plant communities, and it is these plant communities that create the primary production necessary to support the immensely diverse food web that make bottomland hardwood ecosystems unique.

Except during major floods, the dominant sources of water in the Yazoo Basin are precipitation and runoff from the hills along the eastern flank of the basin. The only surface outlet is through the Yazoo River, which enters the Mississippi River at the southern end of the basin near Vicksburg. Most stream flow in the Yazoo River originates in the uplands along the eastern flank of the basin and is carried to the Yazoo River via the Coldwater, Yokona, Tallahatchie, and Yalobusha Rivers, and several smaller streams. Interior drainage is provided by numerous small streams that discharge to Deer Creek, the Big Sunflower River, or Bogue Phalia - all of which flow to the lower Yazoo River. The direction of drainage within the basin is generally southward, but can be complicated by the topography left by the abandoned meander belts of the Mississippi River (Smith and Klimas, 2002; Saucier, 1994).

The hydrology of the Yazoo Basin has been modified extensively. Federal projects have largely protected the basin from the effects of major floods, allowing extensive land clearing and agricultural development. For example, the Yazoo and Big Sunflower/Steele Bayou basins are separated from the Yazoo River by a levee from Greenwood south. Water entering or underlying the modern basin is rerouted, stored, and exported from the system in complex patterns that can result in more or less water available to remaining wetlands. For example, heavy winter and spring rains make drainage necessary for agricultural operations while low rainfall periods in summer and fall warrant irrigation of crops. This drainage may involve land leveling as well as ditching, and can have various effects on wetlands. Area wetlands may serve as sumps to which adjacent fields drain or may themselves be drained to streams or larger ditches. During periods of backwater flooding, these same artificial drainage networks may function in reverse, delivering water to low areas far from the source stream channels (Smith and Klimas, 2002).

Hydrology is the single most important factor in the establishment and maintenance of wetlands (Mitsch and Gosselink, 2000; Frederickson, 2005). The hydroperiod is the seasonal pattern of water flow and fluctuations that characterizes each wetland type and provides stability to ecological patterns and processes. The hydroperiod, including flood duration, intensity or magnitude, frequency and timing ultimately limits species composition and influences ecosystem structure and function (Sharitz and Mitsch, 1993).

Three natural patterns of succession are recognized for floodplain sites of major river bottoms: 1) those occurring on permanently flooded sites; 2) those on low elevation wet sites; and 3) those on higher elevation, better drained sites. Floristic composition and successional patterns are strongly influenced by the hydrologic events on the sites and particularly by rates and types of deposition. Small differences in elevation can result in great differences in site quality primarily

because of differences in hydrology (Hodges, 1997). Historically, forests of the LMRAV, including the project area, were dominated by Sweetgum (*Liquidambar styraciflua*), sugarberry (*Celtis laviegata*), oaks (*Quercus spp.)*, ash (*Fraxinus spp*.), cypress (*Taxodium spp*.) and elm (*Ulmus spp*.) (Ouchley et al., 2000). These extensive forests and associated floodplains had an abundance of plant and animal biodiversity (Wharton, 1982; Frederickson, 2005).

Despite long-term man-made alternations and disturbances, comparison of the species richness (i.e., the number of species in a given area) in the Yazoo Backwater Area with that of larger southeastern United States and Lower Mississippi Valley bottomland hardwood ecosystems, demonstrate that the project area still includes some of the richest wetland and aquatic resources in the Nation. For instance:

- The Coastal Plain of the southeastern United States, which encompasses portions of 11 states, including Mississippi, is documented to contain an estimated 575 terrestrial and semi-aquatic vertebrate species that occur in lowland communities (Echternacht and Harris, 1993). Of these species, 130 are amphibians, 112 are reptiles, 231 are birds, and 102 are mammals. By comparison, the Yazoo Backwater Area which is a fraction of the size of the Coastal Plain of the southeastern United States is documented to contain an estimated 363 terrestrial and semi-aquatic vertebrate species (Figure 3).
- The Mississippi Lowland Forest ecoregion, which coincides with the LMRAV, is documented to contain an estimated 372 terrestrial and semi-aquatic vertebrate species, including 35 amphibians, 52 reptiles, 223 birds, and 62 mammals.[18] By comparison, the Yazoo Backwater Area which is a fraction of the size of the Mississippi Lowland Forest ecoregion is documented to contain an estimated 363 terrestrial and semi-aquatic vertebrate species (Figure 3).

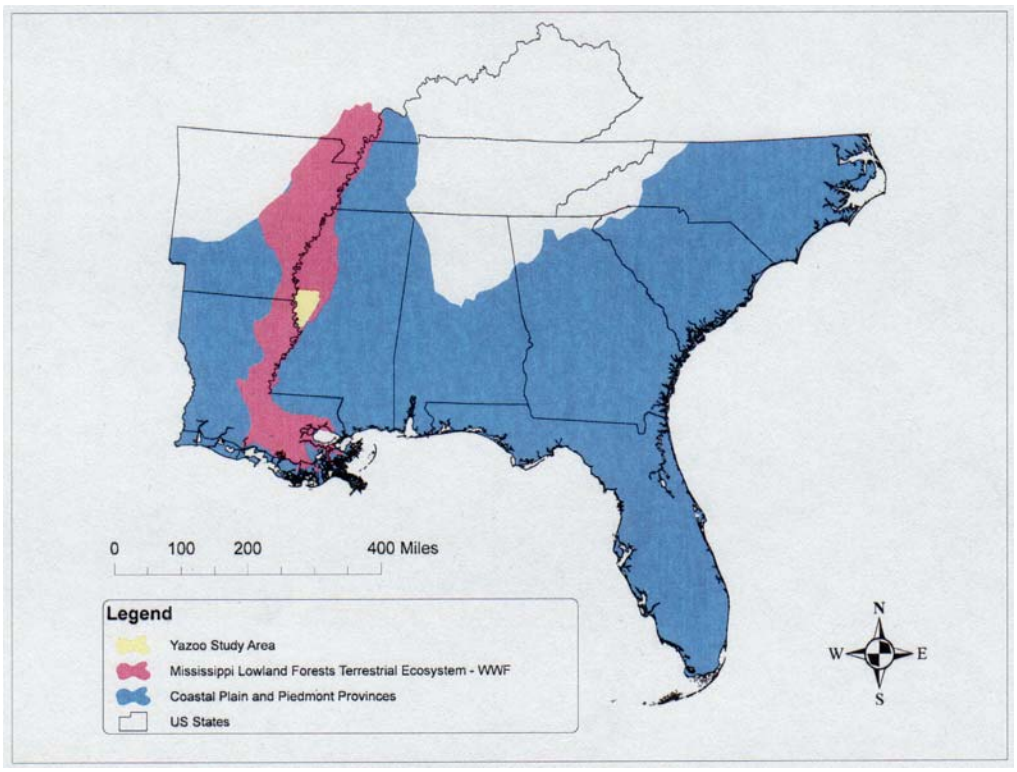
Records of faunal species collected or observed in the Yazoo Backwater Area by the Corps, FWS[19], Mississippi Museum of Natural Science[20], and Mississippi Natural Heritage Program document 21 species of amphibians, 37 species of reptiles, 257 species of birds, 95 species of fish, and 48 species of mammals as occurring within the Yazoo Backwater Area (Appendix 2).

The World Wildlife Fund includes the Lower Mississippi River, and its associated tributaries and floodplains in their Global 200 designation. This designation has been given to the 200 ecoregions in the world which are most critical for the preservation of biodiversity. Selection of the ecoregions was based on species richness, number of species unique to the region, unique higher taxa, unusual ecological or evolutionary phenomena, and global rarity of major habitat types. The Lower Mississippi River ecoregion, which encompasses the Yazoo Backwater Area, is included due to its diversity of fish species and their link to floodplain habitats. The Lower Mississippi River has the second richest assemblage of fish species in North America and is also noted for its diversity of aquatic invertebrates, amphibians, and reptiles. The Yazoo Backwater Area provides habitat for one species of fish found only in the Lower Mississippi River, a shiner

[18] World Wildlife Fund Mississippi Lowland Forest species list: http://worldwildlife.org/wildfinder/searchByPlace.cfm?ecoregion=NA0409

[19] FWS list of bird species utilizing wildlife refuges in the Yazoo backwater Area: http://www.npwrc.usgs.gov/resource/birds/chekbird/r4/yazoo.htm

[20] Personal Communication between William Ainslie, EPA Region 4, and Scott Peyton, Mississippi Museum of Natural Science, February 5, 2008.



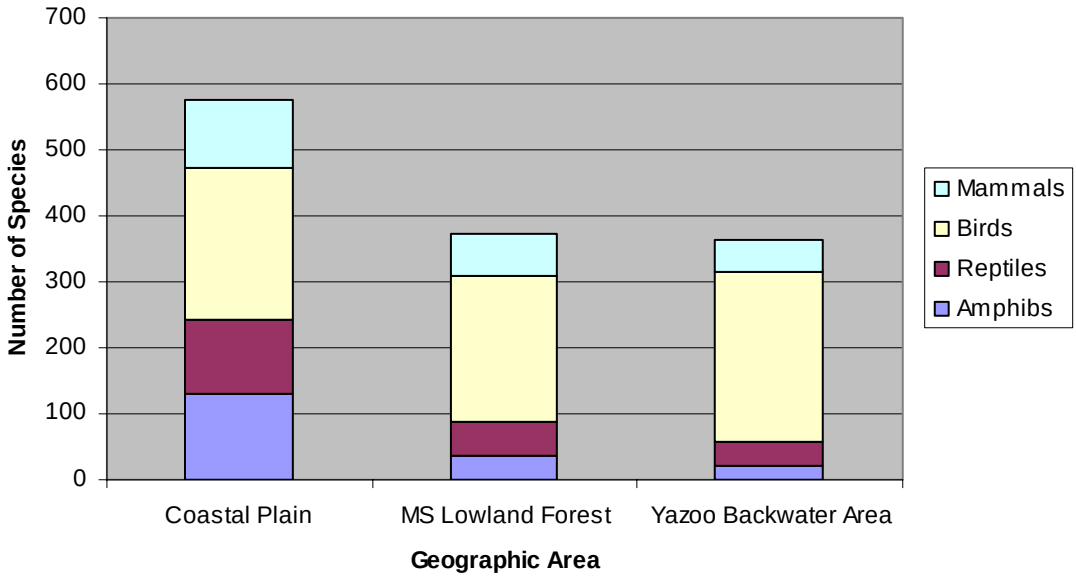


Figure 3. Faunal species number comparison by geographic region

(*Notropis rafinesquei*). In addition, 4 percent of North America's fish species are endemic to the Lower Mississippi River, and these are found in tributary drainages rather than in the Mississippi mainstem.

In its comments on the FSEIS, the FWS reports that the Yazoo Backwater Area is part of a major continental migration corridor for birds funneling through the midcontinent from as far north as the Arctic Circle and as far south as South America. The Yazoo Backwater Project Area comprises approximately 630,000 acres located in the LMRAV, through which 60 percent of all bird species in the U.S., including more than 40 percent of the Nation's waterfowl population and 500,000 to 1,000,000 shorebirds, migrate on a biannual basis. FWS also notes that natural springtime flooding in the area's riverine backwater wetlands coincides with two major events in the LMRAV: 1) native bird and waterfowl migration that requires suitable and productive stopover and foraging habitats to meet migratory energy needs; and 2) breeding bird and waterfowl nesting that requires adequate nesting and foraging habitats to meet reproductive and rearing needs.

On a regional scale, the importance of the project area is recognized by the state of Mississippi's 2005 Comprehensive Wildlife Conservation Strategy (MCWCS). Bottomland hardwood wetlands such as those in the Yazoo Backwater Area provide important habitat for 33 *species of greatest conservation need*[21] including 20 birds, 12 mammals, and 1 reptile. Also, all of the standing and running water systems of the Mississippi Alluvial Plain, including those in the Yazoo Backwater Area, have been classified by the state as critically imperiled because of their high conservation priority rank and the widespread degradation of stream habitats in this region. These waterbodies provide important habitat for 23 *species of greatest conservation need,* including 4 fish, 18 mussels, and 1 reptile. Finally, the stream habitat that remains in the Upper Coastal Plain Yazoo Drainage area, which receives significant hydrologic inputs from the Yazoo Backwater Area, is considered to be vulnerable because of extensive alteration caused by channelization, agricultural use of surrounding lands and impoundments. This portion of the Yazoo River Basin provides important habitat for 17 *species of greatest conservation need* including 1 amphibian, 12 fish, and 1 reptile (Mississippi Museum of Natural Science, 2005).

Over the past 100 years, the greatest changes to the LMRAV landscape have been land clearing for both agriculture and flood control projects. As a result of these and other land use changes, the historic geomorphologic and hydrologic diversity of the LMRAV has been reduced. The landscape level modification of geomorphic topography and reduced flooding, in turn have altered wildlife habitat, which has had an adverse effect on biological diversity and integrity. For example, breeding bird surveys show continuing declines in species richness and population numbers. In addition to the loss of approximately 80 percent of the bottomland forested wetlands within the LMRAV (DOI, 1988), there have been significant alterations in the region's hydrology due to river channel modification, construction of flood control levees and reservoirs,

[21] Species of Greatest Conservation Need (SGCN) are those animals, both aquatic and terrestrial, that are at risk or are declining in a State. They include threatened and endangered species, as well as other species of concern. The SGCN for Mississippi was developed through a rigorous analysis of the Mississippi Natural Heritage Program's list of "Animals of Special Concern" (ASC). An Expert Team of scientists evaluated the approximately 1,500 species from the ASC and narrowed this list down to only the species most at risk – resulting in approximately 300 Species of Greatest Conservation Need statewide (Mississippi Museum of Natural Science, 2005).

and deforestation. The cumulative effect of these hydrological alterations has reduced both the extent and duration of the annual seasonal flooding, adversely affecting the forested wetlands and their associated wetland-dependent species (Harris and Gosselink, 1990).

The significant cumulative aquatic resource losses across the LMRAV are mirrored in the Mississippi Delta and in the Yazoo Backwater Area. The Mississippi Comprehensive Wildlife Conservation Strategy reports that only 15 percent of the Mississippi Delta remains forested. The largest remaining segment is the complex of bottomland hardwood forests approximately 100,000 acres in size within and surrounding the Delta National Forest. Much of this important complex of remaining forests and forested wetlands is located in the Yazoo Backwater Area (Mississippi Museum of Natural Science, 2005).

B. Wetland Functions

The FSEIS estimates that the Yazoo Backwater Area contains between 150,000 to 229,000 acres of wetlands. In addition to serving as critical fish and wildlife habitat, project area wetlands also provide a suite of other important ecological functions. These wetlands protect and improve water quality by removing and retaining pollutants, temporarily store surface water[22], maintain stream flows, and support aquatic food webs by processing and exporting significant amounts of organic carbon. Wetlands in the Yazoo Backwater Area that will be impacted by the proposed project have been identified by the Corps as belonging to the HGM *riverine backwater* subclass. This classification indicates that these wetlands flood as a result of impeded drainage of small streams, channels, and drainage ditches due to high water in larger downstream reaches. As a result of this impeded drainage, low lying areas associated with these small streams fill with relatively still "backwater." The characteristics of the riverine backwater wetlands in this area are: a direct connection to a channel during flood stages equivalent to at least the 5-year frequency return period; the primary source of hydrology to the wetland is backwater; and surface water largely drains from the site back to the channel as flood stages fall (as opposed to being retained on the site in depressions) (Smith and Klimas, 2002).

Hydrology is considered by most to be the critical determinant of the establishment and maintenance of specific types of wetlands and wetland processes (Mitsch and Gosselink, 2000). The combination of the hydrologic, soil, and vegetative characteristics of this wetland subclass contribute to the wetland processes, or functions, which support the area's diverse and abundant flora and fauna. In 2002, the Corps and EPA, in partnership with FWS, the Natural Resources Conservation Service (NRCS), the National Marine Fisheries Service (NMFS) and the Federal Highway Administration (FHWA), published a comprehensive guidebook (Yazoo Basin HGM Guidebook) for applying the HGM approach to assessing wetland functions of selected regional wetland subclasses in the Yazoo Basin (Smith and Klimas, 2002). The HGM wetland assessment outlined in the Yazoo Basin HGM Guidebook uses indicators of flooding, plant community and soil structure to assess wetland functions given the assumption that these

[22] EPA acknowledges that the proposed pumping station is designed to significantly alter the floodwater detention function provided by project area wetlands. However, the floodwater detention function is important from an ecological perspective; it is a fundamental component of the hydrologic regime (i.e., timing, frequency, depth, and duration of water reaching area wetlands) of project area wetlands, necessary for these wetlands to perform critical ecological functions, such as providing fish and wildlife habitat.

structural indicators are representative of wetland function and, if altered, would adequately capture a change in wetland function. As thoroughly discussed in the Yazoo Basin HGM Guidebook and outlined below, maintenance of the hydrologic regime (i.e., timing, frequency, and duration of water reaching area wetlands) is the most important factor in ensuring that riverine backwater wetlands in the Yazoo Backwater Area perform important functions, such as temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat.

Functional Capacity Indices (FCI) are the result of combining the HGM assessment's hydrologic, plant, soil and landscape indicators to estimate a change in function as the result of change in indicators. The FCIs are scaled between zero and one, with one being the optimal score for a function. Table 3 shows the baseline FCIs for the 8 riverine backwater functions for 5 typical land uses in the Yazoo Backwater Area. Mature forested areas generally have the highest scores across all functions due to their mature plant community and well developed soils. The other cover types show that as plant community and soil indicators are degraded by various land uses (e.g., silviculture, agriculture) FCIs decrease indicating a reduction in function. Each of the functions included in Table 3 below is described in more detail below (with the exception of "detain precipitation" which is not expected to change significantly as a result of the proposed pumping station).[23] However, there is considerable overlap between the hydrologic, plant, and soil indicators and the role they play in wetland function. EPA views the "with-project" FCIs as indicators of the effect this project will have on the wetland ecosystems in the project area. In other words, these wetland functions will not be viewed as separate, interchangeable entities, but as integrated signals of ecosystem health.

Table 3. Baseline functional capacity indices for riverine backwater wetlands by land use type for the Yazoo Backwater Area (FSEIS HGM Assessment, 2007).

Function	Mature Forest	Middle Aged Forest	Pasture/ Planted/ Early Aged Forest	Recently Logged	Agricultural	Other
Detain Floodwater	0.98	0.78	0.75	0.73	0.25	na
Detain Precipitation	0.83	1.00	0.48	0.76	0.56	na
Cycle Nutrients	0.95	0.88	0.56	0.67	0.29	na
Export Organic Carbon	0.64	0.58	0.32	0.42	0.17	na
Physical Removal of E and C	0.53	0.69	0.21	0.49	0.43	na
Biologial Removal of E and C	0.64	0.58	0.32	0.42	0.17	na
Maintain Plant Communites	0.93	0.94	0.55	0.71	0.00	na
Provide Wildlife Habitat	0.92	0.88	0.48	0.74	0.00	na

1. Temporary Storage of Surface Water (i.e., Detain Floodwater)

When riverine backwater wetlands are allowed to temporarily detain and moderate surface water they provide a number of important benefits. Surface water interaction with wetlands tends to dampen and broaden the flood wave, which reduces peak discharge downstream. Wetlands can reduce the velocity of water currents and, as a result, reduce erosion. Some portion of the surface water volume detained within riverine backwater wetlands is likely to be evaporated or

[23] Physical and biological removal of elements ("E") and Compounds ("C") are considered together in this discussion under the heading "Pollutant Filtering and Removal."

transpired, thereby reducing the overall volume of water moving downstream. The portion of the detained flow that infiltrates into the alluvial aquifer, or which returns to the channel very slowly via low-gradient surface routes, may be sufficiently delayed that it contributes significantly to the maintenance of baseflow in some streams long after flooding has ceased. Retention of particulates is also an important component of this function because sediment deposition directly alters the physical characteristics of the wetland (including hydrologic attributes) and positively influences downstream water quality. Temporary storage of surface water is a fundamental component of the hydrologic regime (i.e., timing, frequency, and duration of water reaching area wetlands) of project area wetlands, necessary for these wetlands to perform critical ecological functions, such as providing fish and wildlife habitat, as discussed in greater detail in the following sections.

2. Nutrient Cycling

In riverine backwater wetlands, nutrients are stored within, and cycled among, four major compartments: (a) the soil; (b) primary producers such as vascular and nonvascular plants; (c) consumers such as animals, fungi, and bacteria; and (d) dead organic matter, such as leaf litter or woody debris, referred to as detritus. The transformation of nutrients within each compartment and the flow of nutrients between compartments are mediated by a complex variety of biogeochemical processes associated with primary production and decomposition. These biogeochemical processes and their ability to support the rich array of flora and fauna found in the Yazoo Backwater Area are directly linked to maintenance of the spatial extent, depth, frequency, and duration of time riverine backwater wetlands in the project area are inundated.

3. Organic carbon export

The high productivity and close proximity of riverine backwater wetlands to streams make them important sources of dissolved and particulate organic carbon for aquatic food webs and biogeochemical processes in downstream aquatic habitats. Dissolved and particulate organic carbon is a significant source of energy for the microbes that form the base of the detrital food web in aquatic ecosystems. The ability of riverine backwater wetlands to perform this critical function is directly linked to factors associated with their natural hydrologic cycle of backwater flooding, including: (a) the large amount of organic matter in the litter and soil layers that comes into contact with surface water during flooding; (b) relatively long periods of inundation and, consequently, contact between surface water and organic matter, thus allowing for significant leaching; (c) the ability of the labile carbon fraction to be rapidly leached from organic matter when exposed to water; and (d) the ability of surface water to transport dissolved and particulate organic carbon from the floodplain to the stream channel.

As the surface water rises during a hydrologic event, biological productivity is expected to be stimulated by release of nutrients from the newly flooded soil. In addition, surface water warms as it spreads out on the floodplain improving fish yields (Sparks, 1995). Organic matter wetted by the surface water and then dried decomposes faster and subsequent flood events then carry fine and dissolved organic matter to the adjacent streams in support of aquatic foodwebs. Not explicitly captured in the description of this function is the role that soil microbes and

invertebrates play in processing the organic material into forms which can be utilized by other organisms in the food chain, completing the nutrient cycle.

The role of invertebrates in decomposition and nutrient cycling in bottomland hardwood forests, such as those in the Yazoo Backwater Area, is very important, as is their subsequent role in the food chain. Loosely bound nutrients (e.g., potassium and magnesium) as well as simple sugars are leached from the organic material soon after inundation occurs. Sometimes this leaching can occur within 24-48 hours of flooding. The rapid release of nutrients by leaching along with any additional nutrient inputs from surface water promotes colonization of leaf litter surfaces by algae and microbes (i.e., fungi and bacteria). Microbes are important because they immobilize and concentrate nutrients from leaf litter and surface water inputs and provide invertebrates an available and primary source of nutrition. Microbes also make the particles of leaf litter more palatable and digestible to invertebrates due to the reduction of complex carbohydrates to simpler, and more digestible, sugars.

Shredders, like amphipods, isopods, crayfish and crane fly larvae, are the first invertebrates to begin the decomposition process by consuming coarse organic particles and processing the material into finer particles. The resultant fine particulate organic matter, with its increased surface area is subsequently colonized by microbes which are then utilized by grazers (particularly snails in the Planoridae and Physidae families). Midge larvae, freshwater worms and fingernail clams are common bottomland hardwood collectors that feed on fine particulate organic matter. The processed fine particulate organic matter and associated nutrients then become available for plant uptake as the nutrient cycle is completed. Natural flooding regimes are essential to maintaining the balance between litter decomposition and its accumulation, as well as sustaining the biotic component of detrital processing and wetland productivity (Batema et al., 2005).

4. Pollutant Filtering and Removal

The area's riverine backwater wetlands permanently remove or temporarily immobilize elements and compounds that are imported to the wetland from various sources, but primarily via the flood cycle. Elements include macronutrients essential to plant growth (e.g., nitrogen, phosphorus, and potassium) as well as heavy metals (zinc, chromium, etc.) that can be toxic at high concentrations. Compounds include pesticides and other imported materials. The primary benefit of this function is that the removal and sequestration of elements and compounds by wetlands reduces the load of nutrients, heavy metals, pesticides, and other pollutants in rivers and streams. This often translates into improved water quality and aquatic habitat in adjacent or down gradient rivers and streams.

Once nutrients and compounds arrive in riverine backwater wetlands, they may be removed and sequestered through a variety of biogeochemical processes including complexation, chemical precipitation, adsorption, denitrification, and decomposition to inactive forms, hydrolysis, uptake by plants, and other processes. The effective performance of many of the most critical biogeochemical processes depends on maintenance of the hydrologic cycle of flooding in riverine backwater wetlands and the anoxic/reducing environment created by periodic cycles of inundation and saturation. For example, denitrification will not occur unless the soil is anoxic

and the reduction-oxidation (redox) potential falls below a certain level. Flooding and soil inundation for approximately 14 days causes soils to become anoxic. When this occurs and other soil conditions are favorable (i.e., availability of soil carbon) the nitrogen in nitrate (NO_2) is removed by denitrification and released as nitrogen gas to the atmosphere. In addition, sulfate is reduced to sulfide, which then reacts with metal cations to form insoluble metal sulfides such as copper sulfide (CuS), iron sulfide (FeS), lead sulfide (PbS), and others which then fall out of the water column and are retained by the wetland sediments (Smith and Klimas 2002).

5. Plant Habitat

The ability of riverine backwater wetlands to maintain a characteristic plant community is important because of the intrinsic value of the plant community and the many attributes and processes of wetlands that are influenced by the plant community. For example, primary productivity, nutrient cycling, and the ability to provide a variety of habitats necessary to maintain local and regional diversity of animals are directly influenced by the plant community. Due to the inundation by nutrient rich surface water, diverse assemblages of plants grow in riverine backwater wetlands and contribute to the primary production of these ecosystems. The growth of different plant communities as a result of variable hydrologic regimes and topography contributes to the uptake and release of nutrients and provides many layers of potential habitat (i.e., litter layer to canopy) for the hundreds of wildlife species which utilize these wetlands. In addition, the plant community of river connected wetlands such as riverine backwater wetlands in the Yazoo River Basin influences the quality of the physical habitat, nutrient status, and biological diversity of downstream systems. As noted in the Yazoo Basin HGM Guidebook, maintaining the natural hydrologic regime of these wetlands is consistently cited as the principal factor controlling plant community attributes (Smith and Klimas 2002).

Riverine backwater wetlands in the Yazoo Backwater Area typically contain vegetative communities dominated by green ash (*Fraxinus pennsylvanica*) and Nuttall oak (*Quercus nuttallii*), as well as overcup oak (*Q. lyrata*) and water hickory (*Carya aquatica*) in more low lying areas. In addition to these dominant canopy species, willow oak (*Q. phellos*), Sugarberry (*Celtis laviegata*), American elm (*Ulmus americana*), cedar elm (*U. crassifolia*), Red maple (*Acer rubrum*), Cypress (*Taxodium distichum*), water elm (*Planera aquatica*), and Black willow (*Salix nigra*) were also found dominating many of the field sampled plots in the area. Appendix 3 contains a detailed wetland plant species list for the Yazoo Backwater Area.

6. Fish and Wildlife Habitat

A broad array of fish and wildlife species utilize the riverine backwater wetlands in the Yazoo Backwater Area during some part of their life cycles. Terrestrial, semi-aquatic, and aquatic animals use these wetlands extensively. These wetlands provide important habitat for a diversity of organisms, are sites of high levels of secondary production, and are essential in the maintenance of complex trophic interactions. Habitat functions span a range of temporal and spatial scales. For example, invertebrate communities utilize the organic matter generated in these wetlands as a food source and the vertical structure of the plant community as refugia from flooding. Amphibian and reptile species use the wetlands for breeding and foraging habitats and fish utilize floodplains for spawning, rearing, and foraging. Birds and mammals utilize the

wetlands for food, cover, and nesting. Most wildlife and fish species found in riverine backwater wetlands of the Yazoo River Basin depend on certain aspects of wetland structure and dynamics such as specific vegetation composition and proximity to other habitats, but of particular importance to the life cycles of these species is the periodic flooding or ponding of water associated with the hydrologic regime of riverine backwater wetlands (Smith and Klimas 2002).

In addition to the information provided in the FSEIS, EPA evaluated additional information regarding faunal assemblages and species in the project area, including information provided by the FWS at the request of EPA (Appendix 4). As noted above, the Yazoo Backwater Area is an area that is micro-topographically and geomorphologically diverse. It can be broadly classified as a river-floodplain ecosystem characterized by seasonal floods which exchange nutrients and organisms among a mosaic of habitat types. The movement of surface water onto the floodplain and the associated exchange of materials lead to the biological productivity of these bottomland hardwood ecosystems (Junk et al., 1989; Bunn and Arthington, 2002; and Sparks, 1995). A growing body of evidence indicates that the ecological diversity and integrity of large floodplain rivers are maintained by flood pulses, channel-forming floods, and by river-floodplain connectivity. The native biota has developed strategies to take advantage of these flood pulses.

a. Invertebrates

Invertebrates are at the base of the faunal food web as primary consumers playing an important role in the breakdown of organic carbon as discussed earlier in Section III.B.3. Many invertebrate species respond to various inundation regimes found throughout the floodplain. Common taxa collected from forested wetlands, include: isopods (*Asellus* sp.), fingernail clams (*Pisidium* sp), amphipods (*Cragonyx* sp), crayfish (*Procambarus* sp.), and oligochaetes (Wehrle, 1992). Isopods and amphipods (primary shredders); midge larvae, aquatic worms and fingernail clams (collectors); and orb snails (grazers) were encountered more frequently in naturally flooded forests within the Delta National Forest than in artificially flooded greentree reservoirs or clearcut areas indicating natural conditions promote productive invertebrate populations (Wehrle, 1992). These organisms are very abundant in flooded bottomland hardwood forests facilitating organic carbon and nutrient cycling as well as providing an abundant food source for amphibians, reptiles, birds, and mammals. Wehrle et al. (1995) found that invertebrate biomass and density in the Delta National Forest was greater in seasonally flooded forest than in greentree reservoirs which have more static flood levels, indicating that invertebrate populations have increased numbers of taxa and individuals when a variable flood regime is present.

b. Amphibians and Reptiles

There are 21 species of amphibians which have been documented as occurring in the project area. Frogs [e.g., Southern cricket frog (*Acris gryllus*) and green frog (*Rana clamitans*)] newts [(e.g., eastern newt (*Notophthalmus viridescens*)] and salamanders [e.g., marbled (*Ambystoma opacum*) and mole (*Ambystoma talpoideum*)], toads (*Bufo spp*), and treefrogs [e.g., Bird-voiced (*Hyla avivoca*), Cope's gray (*Hyla chrysoscelis*), and green (*Hyla cinerea*) treefrogs] comprise the predominant species (Appendix 2). The list of species from the project area includes 60 percent of the number of species listed as occurring in the larger Mississippi Lowland ecoregion. There are 37 species of reptiles listed as occurring in the project area, most of which are snakes [e.g., copperhead (*Agkistrodon contortrix*), water moccasin (*Agkistrodon piscivorous*), rat snake

(*Elaphe obsolete*)] skinks [e.g., Five-lined (*Eumeces fasciatus*), and Broadhead (*Eumeces laticeps*)], and turtles [e.g., false map (*Graptemys pseudogeographica*) and common musk (*Stenotherus odoratus*)] (Appendix 2). This represents 71 percent of the number of species found in the entire Mississippi Lowland ecoregion.

The backwater flooding that currently occurs in the project area benefits a myriad of aquatic and terrestrial species. All of the 21 amphibian species, and all but 5 of the 37 reptile species benefit from the flood pulse. Shallow areas at the periphery of the flooded zone hold water for the shortest period, from days to a couple of months, and provide breeding habitat for species such as the mole salamanders, which are winter breeders in Mississippi, and for winter-breeding frogs such as leopard frogs, pickerel frogs, spring peepers, and chorus frogs. Areas which are deeper and flooded for longer periods (i.e., places closer to the main channel of the river) are utilized by the summer-breeding frog species as water levels drop in late spring and summer.

Larval amphibians make significant contributions to the biomass of other vertebrates, including many of the wading birds. Aquatic turtles, such as the common red-ear slider, also support the diet of many species of fish, birds, and mammals, which eat their eggs and hatchling turtles. Turtles produce several clutches of eggs per season, over a reproductive lifetime of several decades, and thus can be a significant food source for numerous aquatic and terrestrial species (Appendix 4).

c. Fish

Riverine floodplain ecosystems support productive inland fisheries and a high degree of species richness for fish (Hoover and Kilgore, 1998). River floodplains and backwater ecosystems are crucial to numerous fish species. In a diverse floodplain, fish will seek out different flow regimes and temperatures among the floodplain habitats in order to fulfill certain life-history requirements (Turner et al., 1994). Riverine backwater wetlands provide abundant food, which promotes rapid growth along with providing complex habitat used as refugia by fish. Flooding of these areas, particularly in late winter and spring, provide backwater dependent fish with the necessary conditions, including water with little or no current, soft-sediment substrates, and aquatic or inundated terrestrial vegetation, for spawning, nursing, and juvenile and adult feeding. Forested wetlands along the Big Sunflower River provide excellent habitat for fish spawning and rearing (Hoover and Kilgore, 1998). Life history and production dynamics of fish in river floodplain ecosystems are linked primarily to hydrologic regimes and heterotrophic processes (e.g., microbes convert organic materials to forms utilized by invertebrates which in turn are food for fishes). The warmer waters found in flooded backwater locations stimulate biological activity of aquatic invertebrates and fishes in these systems (Jackson, 2005). As water gradually covers the forest floor, invertebrate eggs, such as water fleas, begin to hatch and feed upon bacteria and fungi colonizing detritus. Flooding also increases aquatic habitat for fish. For instance flooding will introduce snags which provide important in-stream habitat for fish and attachment substrates for invertebrates.

FWS reports that despite being leveed and gated, the Yazoo Backwater Area is a highly productive fishery for catfishes [flathead (*Pylodictis olivaris*), blue (*Ictalurus furcatus*) and channel (*Ictalurus punctatus*)] and catostomids [primarily buffalofishes (e.g., Smallmouth

(*Ictiobus bulbalus*) and Bigmouth buffalo (*Ictiobus cyprinellas*)]. These two groups in particular, are sought by subsistence and artisanal (i.e., small scale commercial) fishermen in the Yazoo Backwater Area. Blue sucker (*Cycleptus elongates*), which was once considered an important commercial fish but is now listed as a fish of special concern by the American Fisheries Society, is also found in the project area (Hand and Jackson, 2003). Blue sucker stocks are fairly strong and dynamic in the Yazoo River Basin and depend on the functional integrity (i.e., seasonal flooding, incorporation of organic material into streams, and maintenance of deep water by natural geomorphic processes) of river ecosystems like the upper Yazoo River (Hand and Jackson, 2003; Appendix 4). Many of these species utilize floodplains for either feeding or spawning. The catfishes use floodplains for foraging and cover while the buffaloes use the floodplains for spawning and foraging. Larger individuals and more abundant stocks of bigmouth buffalo, smallmouth buffalo and channel catfish, are produced as a result of the interaction between floodplain and stream during flooding (Jackson and Ye, 2000).

As noted in Table 4, fish collection records indicate at least 95 species of fish potentially occur in the Yazoo Backwater Area (see Appendix 2). Of these, FWS estimates that over 58 species depend on backwater flooding and access to the floodplain to fulfill numerous life history requirements. Wharton (1982) reported that at least 20 families and 53 species of fish use various portions of the floodplain for foraging and spawning. In Arkansas' Cache River, considered by many to represent a reference standard for HGM riverine backwater wetland ecosystems in the Lower Mississippi River Alluvial Valley, Kilgore and Baker (1996) reported similar results with most fish species utilizing floodplain habitats at some time during the year, many for spawning and rearing. Fish find different microhabitats to fulfill life history requirements in hydrologically and microtopographically diverse floodplains. Based on the increased availability of vegetation and associated food and habitat as the moving littoral zone traverses the floodplain, the pattern of annual flooding in the Cache River appears to be of paramount importance in structuring the wetland fish assemblage (Kilgore and Baker, 1996). Another Lower Mississippi River Alluvial Valley reference backwater ecosystem, the Atchafalaya River, also supports a diverse fish assemblage due to interactions between the flooding and the floodplain similar to the Yazoo Backwater Area (Bryan et al., 1974). Fish undertake longitudinal (i.e., along the river/stream channel) and lateral (i.e., across the floodplain) migrations to spawning and feeding areas because optimal conditions for both activities vary with the flood cycle and do not often occur simultaneously in the same areas (Sparks, 1995).

Table 4. List of potential fish species occurring in the Yazoo Backwater Area based on collections by the Corps and the Mississippi Museum of Natural Science from Sharkey, Issaquena, Yazoo and Humphreys counties. Backwater dependency based on literature or collection records in backwater areas.

Species Name	**Common name**	**Corps***	**Backwater Dependant^**
Alosa chrysochloris	Skipjack herring		
Ameiurus melas	Black bullhead	X	X
Ameiurus natalis	Yellow bullhead	X	X
Ameiurus nebulosus	Brown bullhead		X
Amia calva	Bowfin	X	X
Ammocrypta vivax	Scaly sand darter	X	
Anguilla rostrata	American eel	X	

Aphredoderus sayanus	Pirate perch	X	X
Aplodinotus grunniens	Freshwater drum	X	X
Campostoma anomalum	Central stoneroller		
Carpiodes carpio	River carpsucker	X	
Carpiodes cyprinus	Quillback		
Centrarchus macropterus	Flier	X	X
Cycleptus elongatus	Blue sucker	X	
Cyprinella camura	Bluntface shiner	X	
Cyprinella venusta venusta	Blacktail shiner	X	X
Cyprinus carpio	Common carp	X	
Dorosoma cepedianum	Gizzard shad	X	X
Dorosoma petenense	Threadfin shad	X	X
Elassoma zonatum	Banded pygmy sunfish	X	X
Erimyzon oblongus	Creek chubsucker		
Esox americanus	Redfin pickerel	X	X
Etheostoma asprigene	Mud darter	X	X
Etheostoma chlorosoma	Bluntnose darter	X	X
Etheostoma fusiforme	Swamp darter	X	X
Etheostoma gracile	Slough darter	X	X
Etheostoma whipplei artesiae	Redfin darter	X	
Fundulus chrysotus	Golden topminnow	X	X
Fundulus dispar	Starhead topminnow	X	
Fundulus notatus	Blackstripe topminnow	X	X
Fundulus olivaceus	Blackspotted topminnow	X	X
Gambusia affinis	Mosquitofish	X	X
Hiodon alosoides	Goldeye	X	
Hiodon tergisus	Mooneye	X	
Hybognathus hayi	Cypress minnow		X
Hybognathus nuchalis	Mississippi silvery minnow	X	X
Hypophthalmichthys nobilis	Bighead carp		
Ichthyomyzon castaneus	Chestnut lamprey	X	
Ictalurus furcatus	Blue catfish	X	X
Ictalurus punctatus	Channel catfish	X	X
Ictiobus bubalus	Smallmouth buffalo	X	X
Ictiobus cyprinellus	Bigmouth buffalo	X	X
Ictiobus niger.	Black buffalo		X
Labidesthes sicculus	Brook silverside	X	X
Lepisosteus oculatus	Spotted gar	X	X
Lepisosteus ossens	Longnose gar	X	X
Lepisosteus platostomus	Shortnose gar	X	X
Lepomis cyanellus	Green sunfish	X	X
Lepomis gulosus	Warmouth	X	X
Lepomis humilis	Orangespotted sunfish	X	X
Lepomis macrochirus	Bluegill	X	X
Lepomis marginatus	Dollar sunfish	X	X
Lepomis megalotis	Longear sunfish	X	X
Lepomis microlophus	Redear sunfish	X	X
Lepomis miniatus	Spotted sunfish	X	X
Lepomis symmetricus	Bantum sunfish	X	X
Luxilus chrysocephalus isolepis	Striped shiner	X	
Lythrurus umbratilis cyanocephalus	Redfin shiner	X	X
Macrhybopsis aestivalis	Speckled chub	X	
Macrhybopsis storeriana	Silver chub	X	X
Menidia beryllina	Inland silverside	X	
Micropterus punctulatus	Spotted bass	X	
Micropterus salmoides	Largemouth bass	X	X
Morone chrysops	White bass	X	X
Morone mississippiensis	Yellow bass		X
Morone saxatilis	Striped bass	X	

Moxostoma poecilurum	Blacktail redhorse	X	
Notemigonus crysoleucas	Golden shiner	X	X
Notropis atherinoides	Emerald shiner	X	X
Notropis blennius	River shiner		
Notropis buchanani	Ghost shiner	X	X
Notropis longirostris	Longnose shiner		
Notropis lutrensis	Red shiner	X	X
Notropis maculatus	Taillight shiner		
Notropis rafinesquei	Yazoo shiner	X	
Notropis sabinae	Sabine shiner	X	
Notropis shumardi	Silverband shiner	X	X
Notropis texanus	Weed shiner		
Notropis volucellus	Mimic shiner	X	X
Noturus gyrinus	Tadpole madtom	X	X
Noturus nocturnus	Freckled madtom	X	
Opsopoeodus emiliae	Pugnose minnow	X	X
Percina caprodes	Logperch		
Percina sciera	Dusky darter	X	
Percina shumardi	River darter		
Polyodon spathula	Paddlefish	X	X
Phoxinus erythrogaster	Southern redbelly dace		
Pimephales notatus	Bluntnose minnow	X	
Pimephales promelas	Fathead minnow	X	X
Pimephales vigilax	Bullhead minnow	X	X
Pomoxis annularis	White crappie	X	X
Pomoxis nigromaculatus	Black crappie	X	X
Pylodictis olivaris	Flathead catfish	X	
Semotilus atromaculatus	Creek chub		
Stizostedion canadense	Sauger	X	
Total: 95		78	58
*Collected by Corps in the YBA. ^Backwater dependency based on FWS literature or collection records in backwater areas.			

The longer the fish can remain on the floodplain the greater the recruitment potential for the rivers' fish stocks (Jackson, 2005). It is commonly accepted that temperature, day-length, and the rise in water level are important for spawning. Upon hatching, most freshwater fish possess a yolk sac, which supplies nutrients for the first 7-10 days. Once the sac is used up, the fry have reached a critical stage where they must encounter food quickly, or starve. Flooded hardwoods and the abundance of food they produce enable fish larvae to encounter the critical food supply necessary for survival and growth. As the amount of flooded hardwoods increase, the supply of spawning and nursery habitat and the associated invertebrate populations, also increase. The result is an acceleration in the productivity of the habitat and, therefore, greater survival and growth in the fish populations (McCabe, et al., 1982). Studies suggest that reproductive success of early spring spawners will be poorer when there is reduced spring flooding. "In both tropical and temperate rivers, fish yields per unit surface area are considerably greater in rivers with flood pulses and floodplains than in nearby impoundments where flood pulses are reduced or absent" (Jackson, 2005).

In shallow flooded areas, such as the Yazoo Backwater Area, larval fish feed on rotifers, copepods, and cladocerans. Juvenile bluegill as well as other species feed primarily on aquatic insects, particularly midge larvae and small crustaceans (Ross, 2001). Crawfish (primarily *Procambrus clarkii*) constitute a principle food source for many juvenile and adult fishes which utilize the Yazoo Backwater Area, including largemouth bass, warmouth, yellow bullhead, and

blue catfish (Bryan et al., 1975). During seasonal inundation of bottomland hardwood wetland systems such as the Yazoo Backwater Area, crayfish occupy open water on the floodplains and adult channel catfish aggregate in locations where the river channel and floodplain are coupled and forage heavily on crayfish (Flotemersch and Jackson, 2005).

d. Birds

There are 223 species of birds listed as occurring in the Mississippi Lowland ecoregion by the World Wildlife Fund. FWS has documented 184 of these species as well as an additional 73 (for a total of 257) utilizing the complex of National Wildlife Refuges located in the Yazoo Backwater Area (see Appendix 2). The FWS wildlife refuge list is a more comprehensive list, with greater species richness due to the length of the record (observations began in 1956) and the inclusion of "rare" migrants. Each season of the year, "rare" migrants will utilize the diverse assemblage of habitats present at area refuges but are not regular inhabitants. Hence, the species richness for birds at the refuges tends to be higher than ecoregional or physiographic area richness estimates. There are 41 bird species on the National Wildlife Refuge List for the Yazoo Complex which are listed as "rare." These rare species are often not included in other bird species lists. The Mississippi Lowland ecoregion list is comprised of regular residents/migrants in the region. A comparison of the Wildlife Refuge list without "rare" species and the Mississippi Lowland ecoregion list is 216 to 223 respectively.

FWS has reported that project area wetlands support an abundant and diverse bird community reflective of similar bottomland hardwood wetlands in the LMRAV (Appendix 4). Smith et al. (1993) listed 200 species of birds that occur in the LMRAV, largely in bottomland hardwood wetlands, which is 85 percent of the 236 species of birds listed in eastern North America. Table 5 identifies wetland dependent bird species found in the Yazoo Backwater Area.

Table 5. Birds of the Yazoo River Basin documented as requiring seasonal flooding during winter (W), spring migration (M), or breeding season (B), as determined by the FWS (Appendix 4)

Common Name	Scientific Name	Season Of Use	References
Spotted Sandpiper	*Actitis macularia*	M	Yazoo NWR list
Wood Duck	*Aix sponsa*	W, B	Heitmeyer et al. 1981, Reinecke et al. 1987, Drobney 1977
Roseate Spoonbill	*Ajaia ajaja*	M	Yazoo NWR list
Northern Pintail	*Anas acuta*	W, M	Fredrickson & Heitmeyer 1988, Heitmeyer 2001
American Wigeon	*Anas americana*	W, M	Fredrickson & Heitmeyer 1988, Heitmeyer 2001
Northern Shoveler	*Anas clypeata*	W, M	Fredrickson & Heitmeyer 1988, Heitmeyer 2001
Green-winged Teal	*Anas crecca*	W, M	Fredrickson & Heitmeyer 1988, Heitmeyer 2001
Blue-winged Teal	*Anas discors*	W, M	Fredrickson & Heitmeyer 1988, Heitmeyer 2001

Mallard	*Anas platyrhynchos*	W, M	Fredrickson & Heitmeyer 1988, Hietmeyer 1988, Heitmeyer 2001, Heitmeyer & Fredrickson 1981, Reinecke et al. 1987
American Black Duck	*Anas rubripes*	W, M	Fredrickson & Heitmeyer 1988, Heitmeyer 2001
Gadwall	*Anas strepera*	W, M	Fredrickson & Heitmeyer 1988, Heitmeyer 2001
Anhinga	*Anhinga anhinga*	B	Yazoo NWR list
Greater White-fronted Goose	*Anser albifrons*	W, M	Yazoo NWR list
Great Egret	*Ardea alba*	B	Unpub. report 2002, Yazoo NWR list
Great Blue Heron	*Ardea herodias*	B	Unpub. report 2002, Yazoo NWR list
Ring-necked Duck	*Aythya collaris*	W, M	Fredrickson & Heitmeyer 1988, Heitmeyer 2001
American Bittern	*Botaurus lentiginosus*	M, B	Unpub. report 2002, Yazoo NWR list
Canada Goose	*Branta canadensis*	W, M	Fredrickson & Heitmeyer 1988
Green Heron	*Butorides virescens*	B	Yazoo NWR list
Sanderling	*Calidris alba*	M	Yazoo NWR list
Dunlin	*Calidris alpina*	M	Yazoo NWR list
Baird's Sandpiper	*Calidris bairdii*	M	Yazoo NWR list
Western Sandpiper	*Calidris mauri*	M	Twedt et al. 1997
Pectoral Sandpiper	*Calidris melanotus*	M	Twedt et al. 1997
Least Sandpiper	*Calidris minutilla*	M	Twedt et al. 1997
Semipalmated Sandpiper	*Calidris pusilla*	M	Twedt et al. 1997
Killdeer	*Charadrius vociferus*	M, B	Twedt et al. 1997
Little Blue Heron	*Egretta caerulea*	B	Rodgers & Smith 1995, Unpub. report 2002
Reddish Egret	*Egretta rufescens*	B	Yazoo NWR list
Snowy Egret	*Egretta thula*	B	Yazoo NWR list
Tricolored Heron	*Egretta tricolor*	B	Unpub. report 2002, Yazoo NWR list
Acadian Flycatcher	*Empidonax virescens*	B	Heitmeyer et al. 2005, Yazoo NWR list
White Ibis	*Eudocimus albus*	B	Unpub. report 2002
Common Snipe	*Gallinago gallinago*	W, M	Twedt et al. 1997
Common Moorhen	*Gallinula chloropus*	B	Yazoo NWR list
Black-necked Stilt	*Himantopus mexicanus*	M, B	Yazoo NWR list
Least Bittern	*Ixobrychus exilis*	M, B	Unpub. report 2002, Yazoo NWR list
Short-billed Dowitcher	*Limnodromus griseus*	M	Twedt et al. 1997
Long-billed Dowitcher	*Limnodromus scolopaceus*	M	Twedt et al. 1997

Hooded Merganser	*Lophodytes cucullatus*	W, B	Fredrickson & Heitmeyer 1988, Yazoo NWR list
Wood Stork	*Mycteria americana*	M	Unpub. report 2002
Yellow-crowned Night-Heron	*Nyctanassa violacea*	B	Fredrickson 2005, Unpub. report 2002

Large numbers of 12 species of waterfowl commonly use bottomland hardwood habitats in the southeastern U.S., small numbers of 11 species regularly use bottomland hardwood areas, and 8 species less commonly use bottomland hardwood (Fredrickson and Heitmeyer, 1988; Heitmeyer, 2001). All of these species of waterfowl utilize habitats in the Yazoo Backwater Area. Waterfowl occupy many niches in bottomland hardwood wetlands of the LMRAV. The flooded forests of the LMRAV provide waterfowl with many of their needs. Acorns, as well as seeds from wetland plants growing in forest openings are important foods. Leaf litter furnishes a rich substrate for invertebrates, which can be a significant component of waterfowl diets (Heitmeyer, 1988). Nutrient reserves, such as invertebrates, fuel migration and help meet energetic requirements during periods of low, widely dispersed food availability (Heitmeyer et al., 2005). Population size and recruitment of most species of waterfowl are correlated with wetness of primary breeding habitats, and, at least for some species, also migration and wintering habitats. The amount and type of habitat flooded, annual food production, and availability of refuges within bottomland hardwood and associated wetland habitats in the LMRAV influences local and regional distribution of species (e.g., Nichols et al., 1983), and subsequent production and survival of mallards and wood ducks (Heitmeyer and Fredrickson, 1981; Reinecke et al., 1987). The wood duck is an important resident species in the Yazoo River Basin. Wood ducks require wetland areas that provide a high-quality plant and invertebrate food base. During the breeding season, female wood ducks may use stored lipid reserves to assist with egg production; however, they must consume essentially all of the protein needed for egg formation on a daily basis during the laying period (Drobney, 1977). The required source of most of these proteins is a variety of invertebrates produced in these wetland habitats.

In bottomland hardwood wetland ecosystems, one of the most important elements of their productivity is the invertebrate population (Griffith and Welker, 1987). In turn, hydrology is the most important factor that determines vegetative structure and function (Fredrickson, 1979; Klimas et al., 1981; Schoenholtz, 1996), and thus invertebrate communities (Moore, 1970; Reid, 1985; Fredrickson and Reid, 1990; Magee et al., 1999; Sharitz and Batzer, 1999). Wetland invertebrates, such as adult aquatic insects, insect larvae and nymphs, crustaceans and mollusks, provide an important food source for wetland bird species during critical physiological periods such as breeding and migration (Reid, 1985). Short-term flooding regimes may determine the occurrence and abundance of invertebrates (Fredrickson and Reid, 1988). The duration and timing of flooding in river basins, such as the Yazoo River Basin, directly influences availability of aquatic habitat and indirectly affects invertebrate populations. Densities of invertebrates change rapidly and dramatically as organisms break or enter dormant stages and otherwise respond to changing environmental conditions (Smock, 1999). Fragmentation and modification of the timing and duration of natural flooding in bottomland hardwood ultimately reduces long-term productivity of these wetlands, limiting habitat availability, and resulting in a decline of wetland bird use (Fredrickson and Reid, 1990). For example, when forests become fragmented and drier, small rodent populations increase, causing greatly reduced survival of tree seedlings and changes to detrital bases which have ripple effects throughout most food chains in the

system (Heitmeyer et al., 2005). "In Mississippi, invertebrate biomass was reduced by approximately one-half (80.05 vs. 40.64 kg/ha) in consecutive years in a naturally flooded bottomland hardwood forest with less frequent flooding during the second winter" (Wehrle et al., 1995). Wehrle (1992) also documented a positive correlation between water depth and invertebrate abundance in naturally flooded hardwood bottomlands at Noxubee National Wildlife Refuge in Mississippi, where lower sites which flooded deeper and longer had greater invertebrate biomass.

Fourteen of 18 species of wading birds found in North America use bottomland hardwood habitats, and 12 of these species breed regularly in this system (Heitmeyer et al., 2005). Diets of most wading birds vary with seasonal availability, and many species forage extensively on small fish, amphibians, reptiles, and crayfish. Waders generally depend on seasonally-fluctuating water levels in bottomland hardwood and associated wetlands to make prey more available. One species that nests in the Yazoo Backwater Area, the Little Blue Heron, has recently shown declines in its population. Although the overall causes for this population change cannot be directly determined, it is believed that altered hydrocycles and habitat conversion have caused and continue to cause the greatest threats to this species. Food limitation, caused by wetland destruction and degradation, appears to be a significant factor controlling its breeding success and, therefore, its population numbers (Rodgers and Smith, 1995). Among the wading birds listed as priority species for management in the LMRAV are the following: Little Blue Heron, Tricolored Heron, American Bittern, Least Bittern, Black-crowned Night Heron, Yellow-crowned Night Heron, Great Egret, White Ibis, and Wood Stork (Appendix 4).

For many shorebird species, migration "stop-over" habitats play a vital role in their ability to accumulate fat reserves. Shorebirds unsuccessful in obtaining necessary fat are thought to have very low survival rates (Brown, Hickey, and Harrington, 2000). If these fat deposits are crucial for breeding and if they are dependent on feeding conditions on migratory stopovers south of breeding area, then changes in quantity and quality of migratory habitat could influence breeding populations and fitness parameters (Appendix 4).

Several species of secretive marsh birds, such as rails and gallinules, commonly use bottomland hardwood habitats, primarily during migration. Some populations of this bird group, such as the King Rail, have declined alarmingly in the past 30 years, due mostly to loss of wetlands (Meanley, 1992). Reid (1989) discusses this issue: "The Mississippi River corridor has historically formed important breeding and migratory habitat for King Rails…[m]ajor degradations to this ecosystem have occurred in the last century and include constriction of banks that modify flow and flood capacity, dike construction that impacts channel direction, and addition of toxicants through point and non-point pollution. Perhaps the greatest direct threat to King Rail habitats has been the large reduction in herbaceous floodplain wetlands through agricultural, urban, and industrial developments…" The most important food items for King Rails are crayfish and aquatic insects. Crayfish formed 61 percent by volume of foods in spring in rice fields and associated wetlands in eastern Arkansas (Meanley, 1956). Seasonal flooding of wetlands in the Yazoo project area is required for the production of these important foods as well as nesting cover.

Other aquatic-associated migrants utilizing the deeper open water portions of the Yazoo Backwater Area include the pied-billed grebe, double-crested cormorant, and anhinga. Anhingas breed in the area, typically in low elevation sites where large bald cypress trees and permanent water occur.

About 130 species of songbirds regularly use bottomland hardwood habitats, most of which have been documented in the Yazoo Backwater Area (see Appendix 2). Most songbirds in this system are insectivorous during spring migration and the breeding season. These birds capitalize on pulses of certain foods, often linked with flood pulses, which produce insect hatches in spring and lepidopteran larvae in early summer (Heitmeyer et al., 2005).

e. Mammals

There are 62 species of mammals listed as occurring in the Mississippi Lowland ecoregion by the World Wildlife Fund. Of these, 45 occur in the Yazoo Backwater Area and an additional 3 species have been collected which were not listed by World Wildlife Fund (see Appendix 2). Thus 77 percent of the number of species which occur at the ecoregion scale also occur in the project area. The project area has representative species from the 7 mammalian orders: Insectivora [(e.g., southeastern shrews (*Sorex longirostris*), least shrews (*Cryptotis parva*), and eastern moles (*Scalopus aquaticus*)]; Chirpotera (e.g., bats); Lagomorpha [e.g., eastern cottontail (*Sylvilagus floridanus*) and swamp rabbits (*Sylvilagus aquaticus*)]; Rodentia [e.g., squirrels, mice, beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus)*]; Carnivora [e.g., Louisiana black bear (*Ursus americanus*), river otter (*Lutra canadensis*), long tailed weasel (*Mustela frenata*), raccoons (*Procyon lotor*)]; Marsupialia [opossum (*Didelphis virginiana*)]; and Artiodactyla [white-tail deer (*Odocoileus virginianus*)]. The species richness of mammals in bottomland hardwood wetlands is equal to or exceeds the richness in adjacent upland habitats. Many mammal species are omnivores and have diverse diets in order to take advantage of complex food chains and food availability after major events like floods. Food chains in bottomland hardwood wetlands are long and complex and ultimately detrital based (i.e., all begin at the bottom of the food chain with invertebrate shredders, grazers, and collectors which process plant material). As with the other wildlife groups discussed above, invertebrates form a major food resource for predators and are available in detrital-based and production-based food webs. Small mammals, such as shrews, will consume large volumes of insects (Wigley and Lancia, 1998).

f. Nationally Significant Public Lands

Significant, seasonally-inundated public lands are located in the Yazoo Backwater Area including: (a) the Delta National Forest (61,800 acres); (b) the Yazoo National Wildlife Refuge (NWR) Complex [including the Yazoo (13,000 acres), Holt Collier (1,400 acres), Theodore Roosevelt (4,000 acres), and part of Panther Swamp (14,000 acres) refuges]; (c) Twin Oaks Mitigation Area (5,675 acres); (d) Mahanna Mitigation Area (12,675 acres); and (e) Lake George Wildlife Management Area (8,383 acres). Figure 4 illustrates the locations of the FWS NWRs and the Delta National Forest in and near the Yazoo Backwater Area.

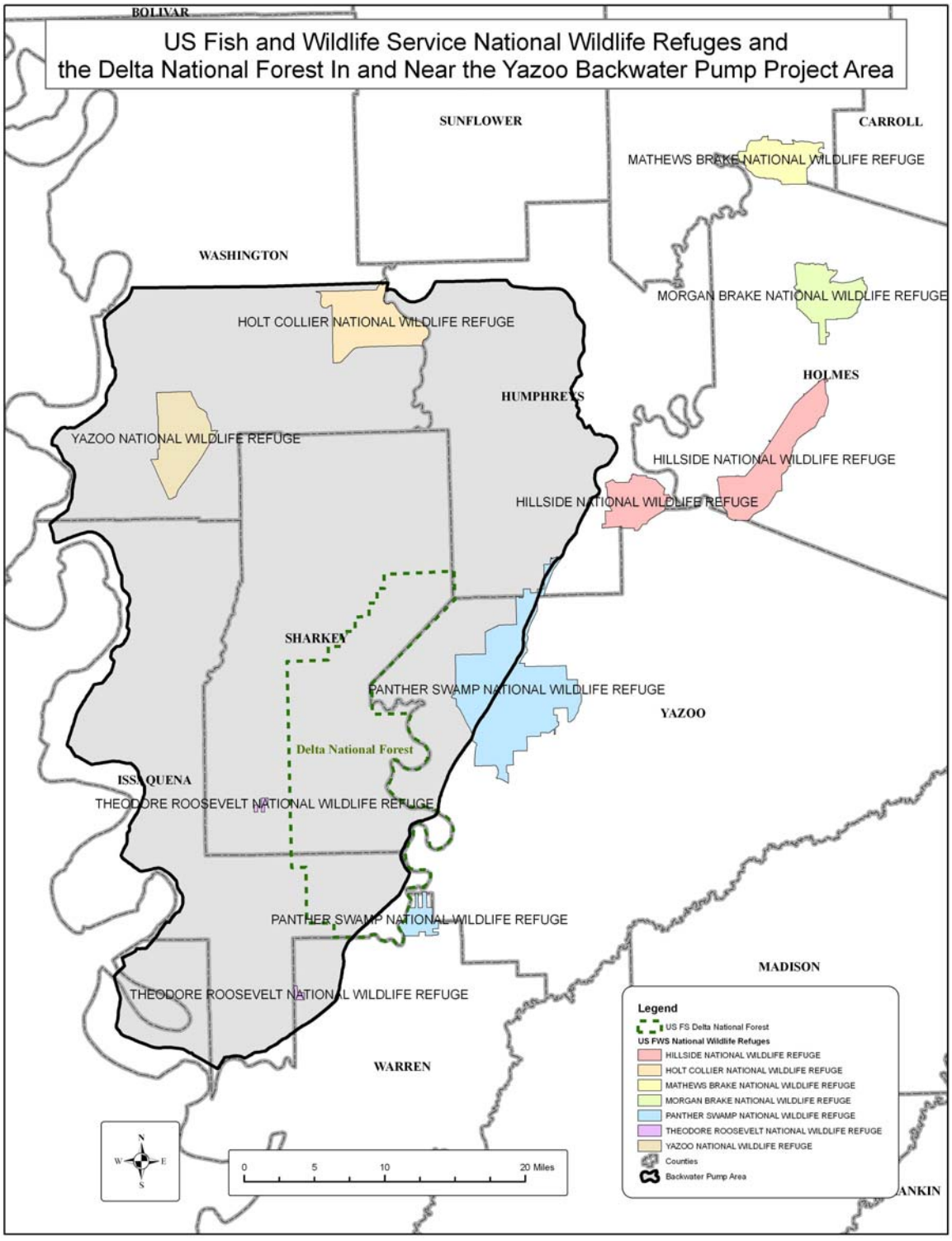


Figure 4. The locations of the U.S. Fish and Wildlife Service National Wildlife Refuges and the Delta National Forest in and near the Yazoo Backwater Area

According to the FWS, the four NWRs located in the Yazoo Backwater Area are managed, in part, to provide habitat for breeding and migratory birds with an emphasis on waterfowl. They are also managed to provide opportunities for compatible public use or recreational activities. The NWR System Improvement Act of 1997 states that the Secretary of the Interior shall "ensure that the biological integrity, diversity and environmental health of the NWR System are maintained for the benefit of present and future generations of Americans." The NWR System Improvement Act also established six priority public uses on refuge lands where they are compatible with the defined purpose(s) of each refuge. These priority public uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

According to the FWS, Mississippi has a 30,538,118 acre land base of which only 1,042,408 acres or 3 percent is publicly owned and not all of those acres are open to public recreation. Thus, these refuges provide important public recreational opportunities in an area where such opportunities are limited. In 2001, there were 357,000 licensed hunters and 586,000 anglers in the state of Mississippi. FWS reports that in 2002, an estimated $13.7 million in revenue was generated by hunting and angling activities and wildlife watchers spent $974 million, which supported 12,258 jobs in Mississippi.

There are an estimated 103,000 visits to Panther Swamp, Holt Collier, and Yazoo NWRs each year (only 320 acres is owned within the Theodore Roosevelt NWR acquisition boundary and these acres were only recently obtained; as such visitor use data is not yet available for this refuge). Historically, the refuges' visitor services programs focused on traditional recreational uses, primarily hunting and fishing. However, NWRs now fulfill a much broader need and offer more services than before. Of the 103,000 people per year that visit the refuges in the Yazoo Backwater Area, the majority (80-87 percent) are there to observe, hear, photograph, or learn about wildlife in a natural setting. According to the FWS, these refuges provide vast acreages of bottomland hardwood forested wetlands that are home for a diverse assemblage of fish and wildlife found nowhere else in Mississippi.

C. Summary

Based on the administrative record, EPA finds that the Yazoo Backwater Area contains ecologically significant fish and wildlife resources and habitat. EPA bases its conclusion on several factors including extensive species lists and collection records from the Corps; Mississippi Department of Wildlife, Fisheries, and Parks; the Mississippi Natural Heritage Program and Natural Science Museum; and the FWS National Wildlife Refuges. All of these sources as well as a great deal of published literature indicate that the Yazoo Backwater Area includes significant wetland and aquatic resources of national importance. The biodiversity of the Yazoo Backwater Area is a product of the topographic and hydrologic complexity which is a result of the fluvial geomorphology of the Mississippi River. This complexity has led to the development of numerous wetland and aquatic habitats which are connected via the backwater flood pulse and foster tremendous wetland plant and wildlife productivity. The wetlands in the Yazoo Backwater Area represent a remnant of the once vast bottomland hardwood wetlands of the LMRAV. The Yazoo Backwater Area is of major importance as a migratory corridor for many species of birds and mammals including the federally protected Louisiana Black Bear.

The productivity of the fishery and those species dependent on backwater areas indicates that river floodplain connectivity is still operating. The area provides not only habitat for a wide range of fish and wildlife but also provides wetland functions which promote improved surface water storage and water quality. These wetland functions contribute to the ecosystem health of the Yazoo Backwater Area. Despite historic and cumulative influences by human activities, the wetland, wildlife and fisheries resources of this area are significant.

IV. ADVERSE ENVIRONMENTAL IMPACTS

A. Section 404(c) Standard

The CWA requires that exercise of the final section 404(c) authority be based on a determination of an "unacceptable adverse effect" on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas. In making this determination EPA takes into account all information available to it, including any written determination of compliance with the Section 404(b)(1) Guidelines. EPA's regulations at 40 CFR 231.2(e) define "unacceptable adverse effect" as:

> *Impact on an aquatic or wetland ecosystem which is likely to result in significant degradation of municipal water supplies or significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas. In evaluating the unacceptability of such impacts, consideration should be given to the relevant portions of the Section 404(b)(1) Guidelines (40 CFR part 230).*

Those portions of the Guidelines relating to significant degradation of waters of the United States, water quality impacts, evaluation of secondary and cumulative impacts and impact minimization are particularly important to evaluating the unacceptability of environmental impacts. The Guidelines prohibit any discharge of dredged or fill material where: (1) there is a less environmentally damaging practicable alternative to meet the project purpose; (2) the proposed project would violate other environmental standards, including applicable water quality standards; (3) the proposed project would cause or contribute to significant degradation of the Nation's waters; or (4) the proposed project fails to adequately minimize and compensate for wetland and other aquatic resource losses (see 40 CFR 230.10(a)-(d) and 230.11(g) and (h)).

B. Extent and Location of Wetland Impacts

This Final Determination is based on the unacceptable adverse effects on fishery areas and wildlife associated with FSEIS Plans 3 through 7, and Modified Plan 6, which according to the FSEIS includes impacts to between approximately 28,400 – 118,400 acres of wetlands. According to the FSEIS, the construction and operation of the proposed project (i.e., FSEIS Plan 5) would degrade the critical functions and values of approximately 67,000 acres of wetland resources in the Corps' wetland assessment area (Table 6). EPA has determined that the range of impacts to wetlands and their associated fisheries and wildlife resources identified in the FSEIS are significant and unacceptable.

EPA's concerns regarding this proposed project are amplified because we believe the spatial extent of wetlands potentially impacted by the proposed project is much greater than that estimated in the FSEIS. As discussed in Appendix 5, EPA's Environmental Monitoring and Assessment Program (EMAP) analysis identified approximately 52,000 acres of wetlands which are located on the 2-year floodplain but outside of the wetland assessment area established in the FSEIS (Figure 5). EPA believes that as much as 24,000 acres of these 52,000 acres of wetlands are connected to backwater flooding and will be adversely impacted by the project to an even greater degree than the wetlands considered in the FSEIS. However, the FSEIS did not evaluate

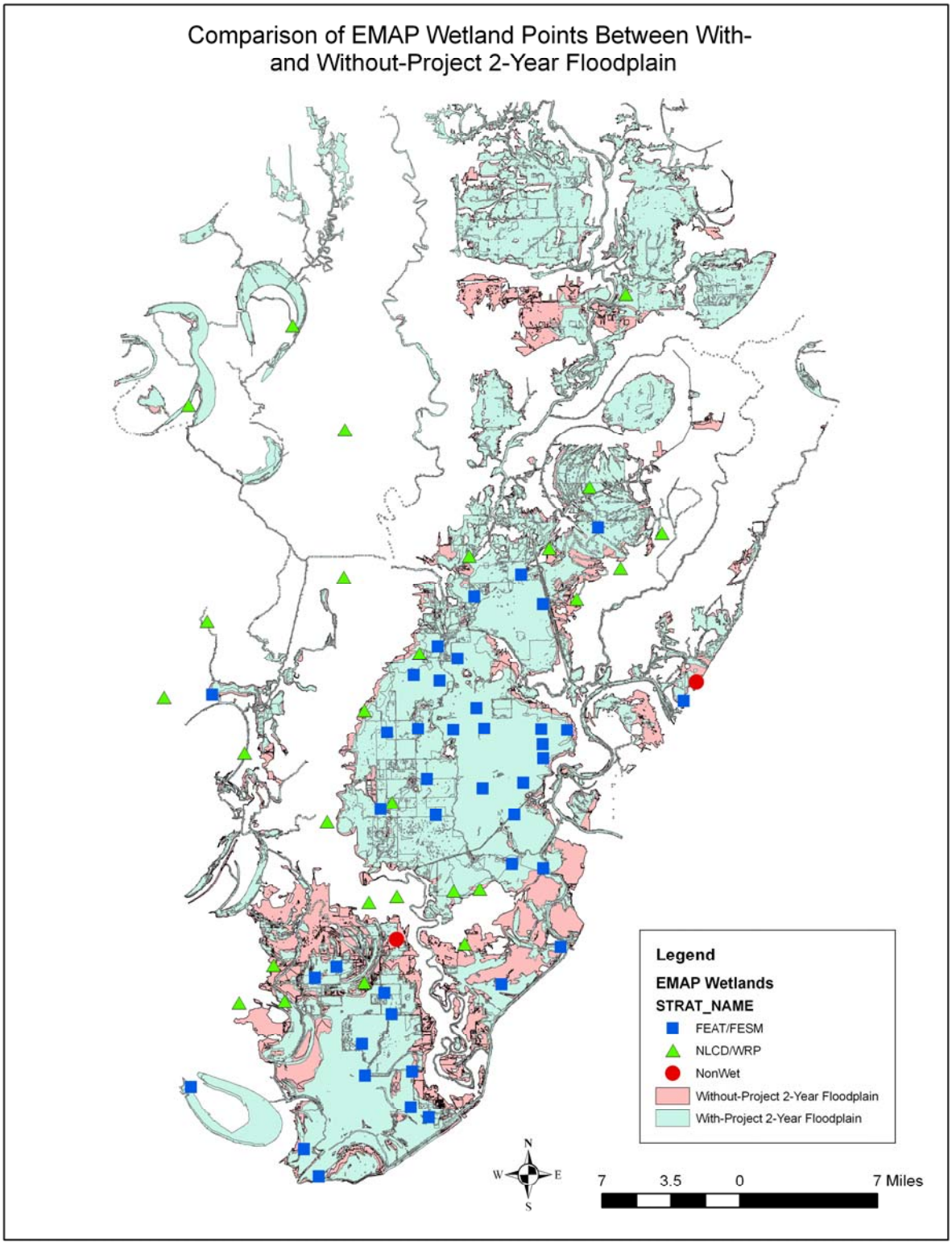


Figure 5. EMAP wetland points on 2-year floodplain with and without project

impacts to these wetlands. Therefore the following section also includes a discussion of the scope and nature of the adverse impacts to these 24,000 acres of wetlands.

Table 6. Change in flood duration, by cover type, in the FSEIS wetland assessment area (FSEIS HGM Assessment Report, 2007)

Land Cover Type	Acres Changed
Mature forest	29,822
Middle aged forest	341
Early aged forest	18,174
Recently logged	78
Agricultural	17,577
Other	949
Total	**66,941**

C. Adverse Impacts to Wetland Functions

EPA has concluded that the wetland, fish, and wildlife functional assessments in the FSEIS underestimate the scope and nature of adverse impacts to the 67,000 acres of wetlands that were evaluated in the FSEIS for the proposed project. EPA encouraged the use of the HGM assessment method and the Habitat Evaluation Procedure (HEP) as tools to help assess wetland functions for the FSEIS evaluations, and still supports the use of those tools. However, EPA believes that certain modeling assumptions and factors used by the Corps in the application of these assessment tools lead to a significant underestimation of the proposed pumping station's adverse impacts on the aquatic ecosystem, as well as a significant overestimation of the project's environmental benefits. These concerns are summarized in Appendix 6. In addition to underestimating the scope and nature of the adverse effects to the 67,000 acres of wetlands noted in the FSEIS for the proposed project, the Corps provided no evaluation of the adverse effects to the approximately 24,000 acres of wetlands on the 2-year floodplain that EPA's EMAP evaluation determined would be affected by the proposed project (Appendix 5). The following discussion of the adverse impacts of the proposed project is designed to provide a more complete evaluation of the proposed project's adverse impacts on wetlands and their associated fish and wildlife resources. In framing this discussion and providing our rationale for the Final Determination, EPA has carefully considered comments from the public as well as the Corps, the project sponsor, and the Department of the Army.

As discussed in Section III, the annual hydrologic cycle of water moving into and out of the project area defines the ecological attributes of the project area's wetland and aquatic resources, which in turn fuels the fundamental processes essential to fish and wildlife productivity. This annual water cycle, or the flood pulse (Junk et al., 1989; Odum et al., 1995; Sparks, 1995), not only makes the project area's diverse habitats accessible to fish and wildlife but also provides the primary linkages that transfer energy and organisms between the project area wetlands and streams, and the rest of the lower Mississippi River ecosystem.

The basic objective of the proposed project is to limit the spatial extent, frequency, and length of time the Yazoo Backwater Area floods. As illustrated by Figures 6 and 7, the hydrologic effect of this project, in addition to the effects of previous flood control projects in the area, will be to

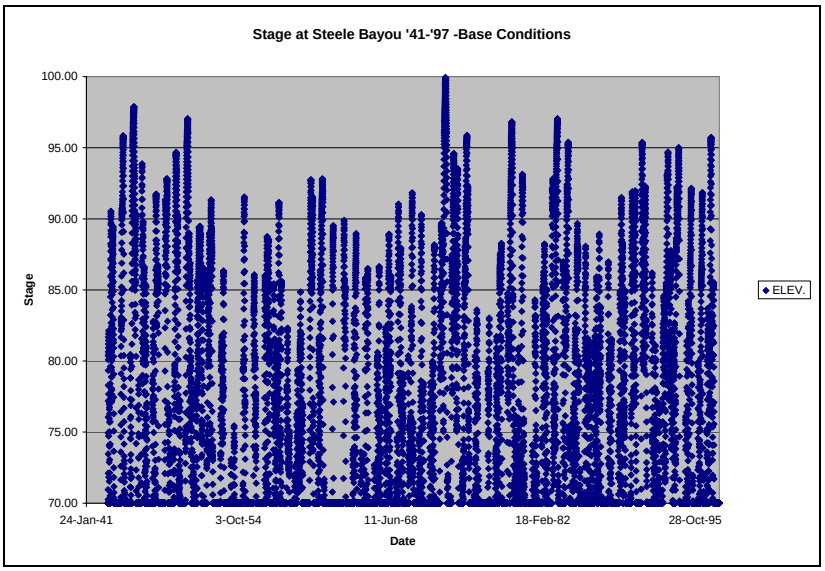


Figure 6. Annual peak water stages at Steele Bayou (1941-1997), without project

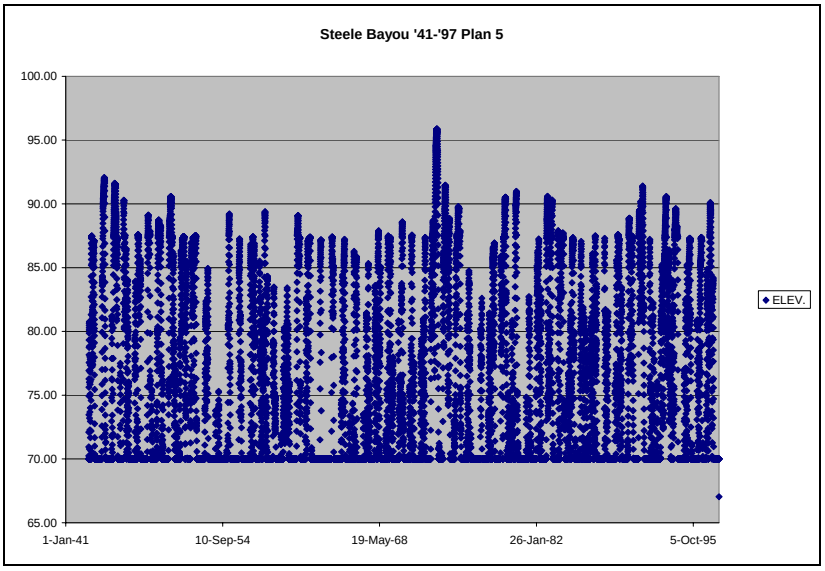


Figure 7. Annual peak water stages at Steele Bayou (1941-1997) with project

Figures 6 and 7 show the base flooding conditions at Steele Bayou without and with the Backwater Pumps project. They were generated using the Corps Period of Record stage data to display annual peak discharges. The number and magnitude of flood events above the 90' NGVD elevation without the project (Figure 6) is drastically reduced with the project (Figure 7). The with project condition shows how the flood peaks have been "shaved-off" leading to a more regular flood regime and less hydrologic diversity (i.e., the floods don't occur as often or for as long, and are not as severe).

further dampen and restrict the variability in flood regime (the flood pulse) which currently contributes to the biodiversity of the project area's wetlands. The ecological effect of altering the hydrologic cycle of this area will be to eliminate or significantly degrade many of the critical functions provided by the wetlands in the Yazoo Backwater Area, including temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. This in turn will adversely impact the diverse array of fish and wildlife species that live and depend on project area wetlands.

Table 7 shows the estimated with project FCIs for riverine backwater wetlands within the Yazoo Backwater Area. In calculating these FCIs, the Corps assumed that only one of the 19 indicators used in the HGM models (flood duration) would change as a result of the project.

All other indicators, including flood frequency, were assumed to remain constant. Despite the change in only one indicator, 4 functions (Export Organic Carbon, Physical and Biological Removal of Elements and Compounds, and Wildlife Habitat) showed impacts across all land use types (when compared to based conditions, shown in Table 3). As discussed below, when viewed in the context of effects on wetland biota and ecosystem integrity, these impacts become severe. Further, as discussed below and in Appendix 6, we believe that if particular shortcomings in the application of HGM had been addressed, the results of the FSEIS HGM analysis would have shown even greater impacts from the project. Both the Corps and the project sponsor take issue with EPA's assertion that the wetland impacts have been underestimated because the Corps' functional analysis indicates that project impacts to the wetlands are not significant. The project sponsor further asserts that the Recommended Determination suggests that all 67,000 acres of wetlands that would be impacted by the proposed project are high quality wetlands and impacts to these 67,000 acres represent "total wetland destruction." In the analysis conducted by EPA in the Proposed Determination and Recommended Determination, EPA fully recognizes that the baseline conditions of the 67,000 acres of impacted wetlands differ depending upon land cover type and the degree of the impacts to these 67,000 acres of wetlands will vary depending upon a number of factors, including their location and elevation. It is EPA's conclusion that the Corps underestimates the impacts to wetlands because of modeling assumptions and other factors used by the Corps in its analysis, as discussed in the following sections. These concerns were highlighted in the Proposed Determination and the Recommended Determination and have been extensively discussed with the Corps.

Table 7. With project functional capacity indices for riverine backwater wetlands by land use type for the Yazoo Backwater Area (FSEIS HGM Assessment, 2007)

Function	Mature Forest	Middle Aged Forest	Pasture/ Planted/ Early Aged Forest	Recently Logged	Agricultural	Other
Detain Floodwater	0.98	0.78	0.75	0.73	0.25	na
Detain Precipitation	0.83	1.00	0.48	0.76	0.56	na
Cycle Nutrients	0.95	0.88	0.56	0.67	0.29	na
Export Organic Carbon	0.47	0.58	0.32	0.42	0.17	na
Physical Removal of E and C	0.39	0.69	0.21	0.49	0.43	na
Biologial Removal of E and C	0.47	0.58	0.32	0.42	0.17	na
Maintain Plant Communites	0.93	0.94	0.55	0.71	0.00	na
Provide Wildlife Habitat	0.89	0.88	0.48	0.74	0.00	na

1. Temporary Storage of Surface Water (i.e., Detain Floodwater)

The FSEIS HGM assessment incorporates a flood duration variable in 4 of the 8 functions considered (i.e., Organic Carbon Export, Physical and Biological Removal of Elements and Compounds, and Wildlife Habitat). However, duration of surface water storage is not incorporated in the temporary storage of surface water function used by the Corps in their analysis; the specific function this project is designed to alter. With this omission, the HGM models do not show the project as having any effect on the temporary storage of surface water. In its discussion of the temporary storage of surface water function in the Yazoo Basin HGM Guidebook, the authors stress the importance of flood duration to the performance of this function.

Similarly, despite information in the FSEIS Engineering Appendix (Table 6-14) which notes that areas above the 1-year floodplain will be flooded less frequently because of the project, the frequency of flooding variable in the HGM assessment models reflects no change, for any function. This again seems incongruous, since the entire objective of the project is to reduce the extent, frequency and duration of flooding. Thus, although certain analyses in the FSEIS clearly acknowledge that the ability of project area wetlands to perform the temporary storage of surface water function will be reduced, the decision to exclude (in the case of duration) or hold constant (in the case of frequency) key variables prevents the FSEIS HGM assessment from adequately evaluating the change in this function.

The FSEIS HGM assessment also does not take into account those wetlands which occur outside the Corps' wetlands assessment boundary, which EPA believes would be affected by a change in duration and frequency (Figure 5). If these wetland areas had flooding reduced to a 5-year or greater return interval, which is indicated by the Corps' hydrologic data, then these wetlands could shift from the riverine backwater wetland subclass to the *flats* wetland subclass (see Table 2). This change in HGM subclass would result in the complete loss, by definition, of the functions performed by riverine backwater wetlands (i.e., temporary storage of surface water, organic carbon export and pollutant removal and sequestration functions). These functions are lost because the floodwaters no longer reach these areas with the regularity comparable to reference riverine backwater wetlands. Flat wetlands do not perform the functions associated with the regular inundation by floodwaters in riverine wetlands. The reduction in flood frequency and duration in the wetlands outside the FSEIS assessment area and the subsequent change in HGM subclass, results in a complete loss and/or change in key functions in approximately 24,000 acres of wetlands, none of which were evaluated by the FSEIS.

The reduction or elimination of the temporary storage of surface water function of wetlands in the Yazoo Backwater Area as a result of the proposed project could increase peak discharges and water currents in the Mississippi River. By maintaining water levels of regular flood events at approximately 87.0 feet, NGVD, at the Steele Bayou gauge, water would not be allowed to collect for significant periods of time in the backwater wetlands. Instead, water that would otherwise remain in the wetlands would be drawn off by the pump and discharged to the Mississippi River. Reducing or eliminating the temporary storage of surface water function of project area wetlands will also decrease the amount of water delivered to plants and allowed to infiltrate into the alluvial aquifer in the Yazoo Backwater Area. The effect of the project is to

increase the overall volume of water moving downstream. Not allowing adequate time for surface water infiltration in the Yazoo Backwater Area will also reduce the amount of water that returns to area streams as baseflow. This is particularly critical in the Yazoo Backwater Area as dewatering of the alluvial plain has already resulted in extremely low seasonal flows in area streams. For example, the Sunflower River flow rate often drops below the minimum low flow rate established by the USGS (i.e., the 7Q10 low flow rate) (Mississippi Museum of Natural Science, 2005).

2. Nutrient Cycling and Organic Carbon Export

These two functions are very tightly linked. Both involve the decomposition of organic material which is mediated by microbial and invertebrate communities supplied with moisture and nutrients from surface water. Nutrients are stored within, and cycled among: the soil; primary producers such as vascular and nonvascular plants; consumers such as bacteria, fungi, and animals; and dead organic matter (detritus) such as leaf litter or woody debris. The transformation of nutrients within and between these compartments is mediated by a complex variety of biogeochemical processes which, like organic carbon export, involve the breakdown of plant material to more readily used constituents. Certain nutrient transformations, namely denitrification, are mediated by microbes that occur in an anaerobic environment.

The moisture required for this and other biogeochemical processes represented by this function, can be delivered by the flood pulse. Nutrients can also be imported to the wetland via surface water. These nutrients can be used by the microbial and invertebrate communities to continue the nutrient cycling. Despite the recognition of the role of invertebrate biota in the processing of organic material and the subsequent cycling of this material to support internal wetland processes, and the role hydroperiod plays in supporting the invertebrate biota, no hydrologic indicator was explicitly incorporated by the Corps in its analysis of this function. This omission results in an underestimation of the effect of this project on nutrient cycling.

Reducing the spatial extent, depth, frequency, and duration of time wetlands in the project area are inundated will significantly reduce the amount of dissolved and particulate organic carbon available for wetland and aquatic food webs as well as biogeochemical processes in downstream aquatic habitats. The microbial and invertebrate communities, which are critical to the breakdown and recycling of organic matter in these wetlands and serve as the base of the food web for wildlife, are adapted to the periodic pulsing of floodwaters which currently occurs. Without these periodic flood pulses, microbial and invertebrate communities will diminish, and this will affect the capacity of the wetland to maintain the base of the food chain. The cycling and export of dissolved and particulate carbon requires prolonged contact between soil organic matter, surface water, and the invertebrate community and subsequent transport downstream – circumstances that would be dramatically altered by the proposed project.

In the 24,000 acres occurring in the 2-year floodplain and that were not evaluated in the FSEIS, the organic carbon export function would be lost completely since flooding would be reduced to a point (i.e., 10 year return) where floodwaters no longer access the wetland on a regular basis. Without regular input and export of nutrients and dissolved organic carbon by floods, these

normally riverine wetlands would convert to flat wetlands and would no longer perform this particular function.

3. Pollutant Filtering and Removal

Reducing the spatial extent, depth, frequency, and duration of time wetlands in the project area are inundated will reduce the capacity of area wetlands to remove water pollutants thus exacerbating existing water quality problems in the Yazoo Backwater Area. Many water pollutants are imported to wetlands via flood water. Hydrologic alterations associated with the proposed project (i.e., prevention of surface water from accessing wetlands) will reduce the level of sediment deposition as well as the levels of permanent removal and temporary immobilization of nutrients, metals, and other elements and compounds in project area wetlands. Loss or reduction of this important water quality enhancement function is of particular concern in light of existing water quality concerns in the Yazoo Backwater Area. The state reports that overall water quality is lower in this area than anywhere else in the state, as evidenced by a region-wide advisory regarding fish consumption, and numerous consumption bans in some area waters because of high pesticide levels (Mississippi Museum of Natural Science, 2005).

In the 24,000 acres of wetlands occurring in the 2-year floodplain that were not evaluated in the FSEIS, the pollutant removal functions would be lost completely since flooding would be reduced to a point (i.e., 10 year return) where floodwaters no longer access the wetlands on a regular basis. Without regular input of the elements and compounds by floods, these normally riverine wetlands would convert to flat wetlands and would no longer perform this particular function. Given that the Yazoo Backwater Area already contains CWA section 303(d)-listed impaired waterbodies (see Appendix 7), the extensive loss of pollutant filtering and removal functions by wetlands impacted by the proposed project could exacerbate the elevated concentrations of the pollutants of concern, potentially causing or contributing to violations of applicable state water quality standards (40 CFR 230.10(b)). Although reforestation within the Yazoo Backwater Area could, theoretically, result in water quality benefits, EPA has significant concerns with the ability of the proposed project's reforestation features to achieve these benefits (see Sections IV.E.).

4. Plant Habitat

The HGM assessment assumes that vegetative species composition remains approximately static over time, or that any species shift that does occur as a result of the project would be within the range of the reference standards. However, EPA maintains that if the hydrologic regime of the area is changed significantly, as is proposed by the project, the changes in the plant and animal communities would be much greater than was accounted for in the FSEIS. EPA has considered comments, from the Corps and the project sponsor, which question the availability of area specific data that would document the change in plant community structure due to hydrologic changes. Although precise predictions of forest changes occurring in the Yazoo Backwater Area with the project are not possible, the scientific literature strongly suggests that bottomland hardwood forests shift over time to more drought tolerant/less flood tolerant species composition when backwater flooding is significantly reduced or eliminated. This shift is important because a change in plant community not only signals a change in hydrology, but also in the habitat

resources available to wildlife. For example, a shift from hard mast trees (e.g., oaks) to soft mast trees (sweetgum and red maple) represent a loss of the food value of acorns. The plants also provide the structure for animal habitat. A diverse habitat is one with many layers of plants (i.e., herbs, shrubs, young trees, old trees, dead trees, etc.). If the hydrology is altered the forest structure could be altered, which in turn would alter wildlife habitat.

Reduction or elimination of hydrologic regimes has resulted in documented vegetative species composition changes over time in bottomland hardwood forests. For example, loblolly pine *(Pinus taeda)* and red maple *(Acer rubrum)* replaced swamp tupelo *(Nyssa sylvatica)* in the lower reaches of South Carolina's Santee River as a result of a water diversion project that caused the site to become significantly drier. The diversion of water from the Santee River took place during the 1930's and the change in species composition took nearly 60 years to become evident on the site (Kellison et al., 1998). Red maple (a constituent of project area wetlands) was found to rapidly takeover sites with reduced hydroperiod in riverine bottomland hardwoods of the Mississippi Embayment in west Tennessee (Wilder and Roberts, 2005). This invasion of former bottomland hardwoods by red maple took approximately 30 years to occur. Red maple's takeover is attributed to the loss of the flood pulse hydrology characteristic of these systems. Similar plant community conversion times could be expected in the Yazoo Backwater Area if the proposed project is implemented.

A study conducted in the Ouachita River basin in South Arkansas recorded that intolerance to soil saturation/flooding is an important factor in the development of various floodplain community types. It serves to exclude those species that might otherwise grow there if the soils were not saturated/flooded during part of the growing season. This became evident in those areas where flooding and/or soil saturation are no longer a factor, since these sites were commonly invaded by flood intolerant woody species such as shortleaf pine (*Pinus echinata*) and blackjack oak (*Quercus marilandica*) (Huffman, 1980). Although vegetative species may differ, a similar invasion of flood intolerant species could occur with the implementation of this project. These studies indicate that vegetative change is measured on the scale of decades and that over the life of this project, and beyond, the change in hydrologic regime in the project area will have an effect on the plant community.

EPA expects that large areas in the Yazoo Backwater Area currently dominated by Nuttall oak and green ash or overcup oak and water hickory will eventually become drier and be replaced by less flood tolerant species such as sweetgum, which produces mast that has a lower biological value to wildlife. This shift will result in a commensurate reduction in the habitat for other wetland dependent plant species found in the Yazoo Backwater Area such as pondberry, which is listed as federally *endangered* under the Endangered Species Act.[24]

The effect of this project will be more pronounced on the vegetative community in the 24,000 acres of wetlands that would be impacted in the 2-year floodplain but was not analyzed in the FSEIS. As indicated by the HGM classification of subclasses contained in the Yazoo Basin

[24] The FWS's Biological Opinion (BO) for the proposed project, dated July 2, 2007, concludes that the project is likely to adversely affect the pondberry, but it would not jeopardize the continued existence of the endangered plant. The BO includes a detailed discussion of the effects of this proposed project on extant colonies of pondberry in the project area, which is not repeated here.

HGM Guidebook, the change in subclass from a riverine backwater wetland to a flat wetland occurs if the wetland only floods at greater than a 5-year frequency flood. As a result of this hydrologic shift, a commensurate vegetative shift is indicated by the appearance of drier species such as Shellbark hickory (*Carya laciniosa),* Black hickory (*Carya texana*), Sycamore *(Platanus occidentalis),* Pumpkin ash (*Fraxinus tomentosa*), Water locust *(Gleditsia aquatica),* Eastern cottonwood (*Populus deltoids*), and Slippery elm (*Ulmus rubra).* All of these species occur in drier sites, typical of flats. This shift in plant community is the signal that the hydrology of the wetland has been altered from a backwater flood driven system to a rain water driven system. Flats do not receive floodwater the same as backwater wetlands, therefore they do not function the same as backwater wetlands and subsequently will not support the same habitat for wetland dependent fauna as riverine backwater wetlands.

5. Fish and Wildlife Habitat

The hydrologic regime of backwater riverine wetlands creates seasonal pulses of nutrient flow and food resources. The timing of these seasonal pulses of energy is important to many wetland faunal species inhabiting the Yazoo Backwater Area. The consequences of even modest changes in the timing of events can adversely affect these species. The proposed project would significantly degrade critical habitat for over 40 wetland dependent bird species (e.g., little blue herons, yellow-crowned night herons, wood storks, Acadian flycatcher wood ducks, mallards, blue and green-winged teal) (Table 5) and over 50 species of fish (e.g., catfish, sunfish and crappies) which have been documented as utilizing wetlands and other waterbodies in the Yazoo Backwater Area and Yazoo River (Table 4). The proposed project would also degrade important habitat for 33 *species of greatest conservation need* that depend on bottomland hardwood wetlands in the Yazoo Backwater Area; 23 *species of greatest conservation need* that depend on standing and running waterbodies in the Yazoo Backwater Area; and 17 *species of greatest conservation need* that depend on the Yazoo River and its major tributaries and their associated floodplains (Mississippi Museum of Natural Science, 2005; Appendix 4).

a. Invertebrates

Isopods (*Caecidotea spp.*), amphipods (*Crangonyx spp.*), midges (*Chironomidae*), freshwater worms (*Oligocheata*), crayfish (*Decapoda*), and fingernail clams (*Sphaeriidae*) make up a critical component of the macroinvertebrate communities that thrive in the area's riverine backwater wetlands due to the presence of saturated soils, organic material and periphyton (a layer of microbial organisms which colonize detrital material). These invertebrates not only contribute to the breakdown of organic material (shredders and grazers) but they are also critical sources of prey for fish, waterfowl, rodents, bats, and birds. The draining and drying of area wetlands associated with the proposed project would significantly reduce the species diversity, as well as the richness and productivity of the area's macroinvertebrate community, thus adversely impacting an extensive list of vertebrate species which depend upon the wetlands' rich macroinvertebrate community for nourishment. Project impacts on these wetland invertebrates would have a cascading adverse effect on wetland functions (e.g., organic carbon and nutrient cycling), and animals dependent on this food source. For example, delayed or reduced flood hydrology caused by the proposed project in late fall or early winter could delay and decrease detrital invertebrate populations in late winter and spring, which would affect, among other

factors and other species, the foraging resources for mallards, egg-laying of night herons and hooded mergansers, embryo development in raccoons and storage of nutrient reserves needed by hibernating black bears (Heitmeyer et al., 2005). While EPA agrees that reforestation can produce more organic material and provide more material for carbon cycling and consumption, it must occur on frequently flooded land to benefit trophic interactions between the plant material and the invertebrate community. As discussed in more detail in Sections IV. D. and E, and Appendix 8, EPA does not believe the reforestation component of the project adequately ensures re-establishment of appropriate wetland hydrology to fully mitigate for lost wetland functions.

b. Amphibians and Reptiles

Reducing the spatial extent, depth, frequency, and duration of time wetlands in the project area are inundated will also adversely impact all 21 amphibian as well as 32 of the reptile species in the Yazoo River Basin that depend upon wetlands for breeding and foraging habitat. The life cycles of amphibians and reptiles in alluvial floodplain ecosystems are linked to hydrology as well as soil conditions and climate (Jones and Taylor, 2005). Abiotic factors that influence habitat conditions within floodplains include hydrologic regime, flood pulse intensity and duration, topography, wetland permanence (hydroperiod), water quality, and connectivity to rivers or streams. For many amphibians, the hydrology associated with floodplain wetlands is necessary for breeding and egg laying (Appendix 4).

All the amphibian species listed as occurring in the Yazoo Backwater Area (Appendix 2) require wetlands and/or ephemeral pools for breeding (Jones and Taylor, 2005). The proposed project would reduce the amount of surface water that reaches these floodplain habitats making it difficult for portions of the amphibian population to survive (Semlitsch, 2005). For example, newts (*Notophthalmus viridescens*) require wetlands for breeding and egg deposition, while requiring vernal and ephemeral pools for adult life stages. The proposed project would also adversely affect reptile and amphibian species by reducing flood pulses and wetland water recharge, modifying river-wetland connectivity, and increasing habitat fragmentation. The reduction in flooding would also adversely affect the ability of amphibians to disperse to other suitable habitats (Jones and Taylor, 2005). Further, amphibians provide a valuable prey base for aquatic insects, fish, crayfish, birds, and mammals. Thus, a decline in amphibian and reptile populations will impact food resources for other animal groups.

c. Fish

The proposed project will reduce the spatial extent, depth, frequency, and duration of time wetlands in the project area are inundated, and therefore limit or eliminate access by fish to important habitat (Table 4). Reduction in access to the floodplain, as a result of the project, would result in decreased fishery production through loss of physical spawning habitat, loss of spawning opportunity (i.e., adequate period of time when habitat is available) or reduced fecundity and/or physiological condition resulting from poorer nutrition (Brunson, 1998). Some fish utilize the floodplains both to feed and to spawn (e.g., sunfish, buffalo fish). Other species move into the floodplain primarily to take advantage of the abundant food resources to improve vigor in preparation for spawning (e.g., catfish). Catfish will return to the channel to spawn, but do so in improved condition due to the foraging opportunities provided by access to the floodplain. Crayfish, an abundant floodplain invertebrate, is vital to the reproduction of catfish

by supplying essential fatty and amino acids for egg formation (Flotemersch and Jackson, 2005). However, catfish that cannot access the floodplain due to decreased flooding cannot take advantage of this significant food resource. Further, reductions in the interaction of floodplains with the river by flood control activities such as channelization, dredging, and levee construction can modify channel catfish interactions with terrestrially burrowing crayfish and reduce potential benefits from this foraging (Flotemersch and Jackson, 2003). The proposed pumping plant would produce similar effects by restricting the spatial extent of surface water on the floodplain with the commensurate effect of reducing foraging opportunities for fish by restricting their access to floodplain resources.

The FWS noted in its review of the FSEIS, the backwater floodplain in the project area supports a diverse fishery, and relative fish abundance is highly dependent upon seasonal overbank or backwater flooding. It also noted that reproduction by 55 of the 140 (39 percent) resident fish species in the Mississippi River is dependent on backwater flooded areas. In its January 18, 2008, detailed comments on the FSEIS, FWS concluded that the proposed action would reduce the areal extent of flooding in the Yazoo Backwater Area that is critical to fishery reproduction by approximately 46 percent, or 112,600 acres, during the critical spawning and rearing months. Spring flooding is the major factor responsible for fishery productivity within the Yazoo River Basin. It provides access to protective spawning and nursery habitat for the species which utilize backwater areas outside the stream channels where larger predatory fish species live. These shallowly flooded areas remain inundated for a duration that allows water temperatures to rise quickly, providing suitable spawning habitat, and allowing for optimum larval fish growth. Once the larval fish hatch and their yolk sack is absorbed (7 to 10 days), these seasonally flooded bottomland hardwood areas provide protective shallow water areas with an abundance of cover for protection from predators, as well as the organic matter, nutrients, and invertebrates needed for larval and juvenile fish growth (Appendix 4).

According to the Aquatics Appendix and reported again in the Main Report of the FSEIS, fish spawning habitat is the controlling resource for this project (i.e., the resource which suffers the greatest loss and requires the greatest amount of compensatory mitigation). The results of the HEP analysis indicate that the change in hydrologic regime will adversely affect fish populations. According to the HEP model used, fish spawning habitat requires 8 days of continuous inundation at least 1 foot in depth, from March to May. The Corps has also stated that most fish species reach sexual maturity in one or two years, so a flood that occurs once every two years is necessary to maintain reproductive populations. However, eight days is insufficient for any substrate spawning fish to spawn (Appendix 4). Eggs take 3 to 5 days to hatch. Larval fish fry are barely able to swim the first 7 to 10 days while the yolk sac is being absorbed. If surface water recedes in 8 days or less, fry would be forced to retreat to deeper channels and lake habitats where mortality rates are high. Extended periods of shallow inundation in hardwood and other vegetated areas provide critical nursery habitat for growth and escape from predators. Any reduction in extent or duration of inundation of flooded bottomland hardwood wetlands would reduce the fish productive capacity of the wetland (Wilkinson et al., 1987). The reduction in the extent and duration of the spring flood pulse would severely reduce the current fish productivity of the lower Yazoo Basin. Conversely, “managing the existing leveed floodplain to prolong inundation, increase water temperatures during spring flooding, and

maintain connectivity of floodplain habitats with the main river channel should benefit fish production in the LMR [Lower Mississippi River]" (Schramm et al., 1999).

The Corps has concluded that at least 3,300 acres of suitable fish habitat would be lost as a result of the project. However, this amount of lost habitat is inconsistent with information in the FSEIS (Table 10-10, FSEIS Wetland Appendix) which indicates that there are approximately 39,000 acres that currently flood for 14 days or less but greater than 7 days. Based on the criterion of 8 days of inundation from March to May for suitable spawning, it appears reasonable that some portion of these 39,000 acres would be suitable for fish spawning in addition to the 3,300 acres noted in the HEP analysis. According to the FSEIS, those acres currently flooded for 7-14 days will flood for less than 7 days after the project (i.e., shift to the <2.5 percent flood duration band). In other words, EPA's interpretation of the FSEIS (Table 10-10, FSEIS Wetlands Appendix) is that there is currently some portion of the 39,000 acres of suitable fish spawning habitat that meets the criterion of 8 days of inundation which will become unsuitable after project implementation. Therefore, these impacts appear underestimated in the FSEIS's Aquatics Appendix (FSEIS, Appendix 11).

d. Birds

Backwater riverine wetlands such as the ones that would be impacted by the proposed project are used by more bird species than most other ecosystems in North America (Heitmeyer et al., 2005). Project area wetlands provide significant migratory bird habitat, particularly for waterfowl, shorebirds, over-water nesting waterbirds and wading birds (Table 5). The loss of the productive shallowly flooded wetlands, especially in the spring months when the proposed pumps will typically be in operation, will impact migratory birds such as shorebirds and waterfowl as they stopover and forage in preparation for their seasonal migration. Fewer shallowly flooded wetlands will reduce foraging habitat, which will equate to reduced nutritional uptake and could result in higher mortality or reduced reproductive fitness as the birds travel the great distances between their southern wintering areas and their breeding areas in the northern U.S., Canada, and the Arctic. Breeding for many species could be adversely affected during the spring-time nesting season because foraging areas would be reduced. As a result of the reduction in flooding, adult birds will have to travel longer distances to find food, which equates to longer times away from the nest or foraging for food and may ultimately lead to higher nest mortality and lower recruitment (Appendix 4).

According to Twedt et al. (1997), shallowly flooded wetlands must be present in the Yazoo River Basin for shorebirds during northbound (spring) migration. These ephemeral shallow mud flats and sandbars provide critical food sources (primarily invertebrates) for adults during their long migration to breeding areas to the north. Shorebird species that have been documented using wetlands in the project area included the following:

> Common Snipe; Kildeer; Lesser Yellowlegs; Greater Yellowlegs; Semipalmated Sandpiper; Western Sandpiper; Least Sandpiper; Pectoral Sandpiper; White-rumped Sandpiper; Long-billed Dowitcher; Short-billed Dowitcher; Black-bellied Plover; and American Golden-plover.

For many shorebird species, migration "stop-over" habitats play a vital role in their ability to accumulate fat reserves, which in turn affects their survival. For example, studies of female pectoral sandpipers (*Calidris melanotus*) show that the body fat of migrating females increases as they fly north, which indicates the importance of feeding areas along migratory stopovers. Further, the length of stay in stopover sites is positively related to invertebrate abundances, indicating longer stays at stopover points that offer higher ingestion rates. Mean egg volume is positively related to female body fat, and clutches with higher egg volume hatched larger chicks suggesting a relationship between female condition and reproductive success. All of these findings indicate the importance of wetlands, such as those in the Yazoo Backwater Area, as spring migration stopover habitat for pectoral sandpipers (Appendix 4).

Recent studies of habitat use and energetics in spring migration stopover sites suggest the need to conserve complexes of small wetlands; such landscape connectivity is needed for maintenance of a variety of foraging sites within close proximity (Appendix 4). Management of wetland and agricultural units that maintain shallowly flooded fields (1–15 cm deep) during migratory periods provide good foraging sites (Helmers, 1993).

If the frequency of spring flooding in the Yazoo Backwater Area is significantly reduced, then the loss of this seasonal wetland habitat would result in lower survival rates, and therefore, reduced northward shorebird migrations. Other shorebird species impacted by this reduced flooding frequency, which have been documented in the project area, include the following:

> Spotted Sandpiper; Baird's Sandpiper; Sanderling; Dunlin; Black-necked Stilt and Solitary Sandpiper.

The proposed project could also affect resident breeding waterfowl, such as wood ducks (*Aix sponsa*) and hooded mergansers (*Lophodytes cucculatus*) (Kaminski, 1998). Both duck species breed in Mississippi and nest in natural tree cavities or artificial nest boxes. Reduced flood pulses in the spring could adversely impact nesting and brood rearing in these birds. These species depend heavily on food resources derived from shallowly flooded forested wetlands (Heitmeyer et al., 2005) and will move their broods to newly flooded bottomland hardwood areas flooded by spring and summer flood pulses, to take advantage of the available plant and animal foods (Kaminski, 1998). Reduction in flooding, due to the project, would adversely impact food resources for these breeding waterfowl (Appendix 4).

The proposed project would reduce the extent of flooding within wetlands in the 2- to 5- year floodplain potentially from January through June. The reductions to late winter and spring flooding would result in significant adverse impacts to those birds which not only utilize the Yazoo Basin, but are dependent upon backwater flooding during these periods (Table 5). As discussed above, species that require flooded habitat for foraging and/or nesting would obviously be the most severely affected. The reduction in the extent and duration of the spring flood pulse would accelerate the decline of many bird species that depend upon the wetland habitats of the lower Yazoo River (Appendix 4).

e. Mammals

EPA is aware of the public's concern regarding the effects of flooding on wildlife populations, particularly mammals, and the belief that flood control would benefit these wildlife species, particularly species that are important to hunters in the Mississippi Delta. Despite selective pressures from regular and sometimes extensive flooding, bottomland hardwoods provide a greater amount of habitat diversity than other habitats. Many mammals typical of bottomland hardwood habitats are mobile and can usually move away from rising waters. However, small ground dwelling species (e.g., mice, voles, shrews) cannot as easily escape from flooding and thus do not have high populations in these bottomlands. Flood waters can have disruptive effects on mammal populations by temporarily altering feeding and shelter habitats. For example, deer and bear will move out of bottomland hardwood areas during high water during which time food resources may be limited. However, as surface water recedes, mammalian species typical of these areas will return to take advantage of the diverse feeding, breeding and shelter opportunities provided by bottomland hardwood wetlands.

The cumulative impacts of this project would result in shortened food chains and more simplified trophic structures. Long-term land use and hydrologic perturbations, similar to those occurring in the project area, lead to loss of organisms of lower trophic levels that are more site specific (i.e., unable to move away from disturbances) than those of higher trophic levels. Animals of higher trophic levels (i.e., frogs and toads, fish, and shorebirds) seem to acquire their energy and nutrients from a diversity of food sources (i.e., energy flow pathways). A diverse food energy source is the seasonally migratory ecotone which results from fluctuating water levels in the bottomlands (i.e., the aquatic terrestrial transition zone of Junk et al. (1989), or the moving littoral zone of Kilgore and Baker (1996)). Under normal conditions, an aerobic, primary-production based food chain occurs side by side with a detritivore-based food chain. At approximately the tertiary level of the food chain vertebrates such as frogs, fish, and wading birds, as well as some furbearing mammals, begin to rely on both primary production and detritus pathways and thus integrate variance within and between pathways. Many North American fur-bearing species are found in the project area including red fox (*Vulpes vulpes*), black bear (*Ursus americanus*), mink (*Mustela vison*), and river otter (*Lutra canadensis*). Most of these species have amphibious life habits, exist at the interface of the aquatic and terrestrial subsystems, utilize both aquatic and terrestrial energy sources and are adversely affected by stresses on either energy pathway.

6. Summary

In summary, the proposed project would degrade and eliminate critical ecological functions provided by wetlands in the Yazoo Backwater Area including temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. The proposed project would alter the timing, and reduce the spatial extent, depth, frequency, and duration of time project area wetlands flood. These alterations would adversely impact the spawning, rearing and foraging habitat of approximately 58 species of backwater dependent fish identified by the FWS. The proposed hydrologic alterations would also adversely impact approximately 42 species of birds that FWS reports are dependent on bottomland hardwood wetlands and their associated flood regime for

fulfillment of specific life requisites. These species utilize the flooded wetlands of the project area for feeding and nesting, as well as providing essential nutrition during migratory flights. Further, the proposed hydrologic alterations will adversely impact approximately 21 species of amphibians and 32 species of reptiles by disrupting their reproductive cycles and feeding opportunities and thereby reducing overall productivity. Whereas many mammals are not as dependent on the flood pulse as other species, reduction of flooding is likely to impact food resources for these animals (e.g., insects, crayfish, amphibians, acorns and fruits). In light of the cumulative impacts on bottomland hardwood wetlands in the project area, further degradation of resources for these animals is detrimental. EPA believes that impacts to these functions and species at the scale associated with this project will result in significant degradation (40 CFR 230.10(c)) of the Nation's waters, particularly in light of the extensive historic wetland losses in the lower Mississippi Valley and specifically the Yazoo Backwater Area. Further, as discussed below, we do not believe the proposed compensatory mitigation would reduce these adverse impacts to an acceptable level.

D. Compensatory Mitigation

The Section 404(b)(1) Guidelines require that adverse environmental impacts associated with the proposed discharge of fill material to waters of the United States first be avoided to the maximum extent practicable and then minimized to the extent appropriate and practicable. For unavoidable impacts which remain, compensatory mitigation is required to offset wetland and other aquatic resource losses. If, as discussed in Section V.C., the Corps had selected a less damaging alternative, the opportunity to identify an effective compensatory mitigation plan would have been improved. EPA has determined that the anticipated level of adverse impacts associated with the Yazoo Backwater Area Project will not be adequately offset by the proposed compensatory mitigation.

To offset the project's extensive adverse environmental impacts, the Corps proposes 10,662 acres of compensatory mitigation. Compensation would consist of reforestation and conservation of areas located in previously cleared wetlands to restore those areas to bottomland hardwood forests. However, compensation sites have not been specifically identified for the proposed mitigation. Rather, the FSEIS states that conservation easements will be purchased from "willing sellers" to conduct the proposed compensatory mitigation.

EPA has significant concerns regarding the adequacy of the proposed compensatory mitigation. Based on our review of the HGM analysis, we maintain that compensation requirements for impacts of this type and on this scale are much greater than that estimated in the FSEIS (see Appendix 8). In addition, there do not appear to be enough acres of cleared wetlands with the proper hydrology and soils in the target area to satisfy more accurate projections of the mitigation needs of the proposed project. Moreover, the significant hydrologic alterations associated with the proposed pumps would further reduce the amount of cleared wetlands with the proper hydrology in the target area to enable wetland restoration. Even if sufficient compensation acreage were available, we do not believe that impacts of this scale and concentration could be effectively compensated for to avoid causing or contributing to significant degradation (40 CFR 230.10(c)), given that reliance on willing sellers would likely result in a noncontiguous patchwork of fragmented compensation sites that cannot deliver the

ecological benefits predicted by the FSEIS. For example, "reforestation" that ends up being located in a patchwork of areas which are no longer connected to the floodplain will not offset the extensive impacts to fisheries identified in the FSEIS (Appendix 8). Given the level of proposed hydrologic impacts to flooding, lack of detailed mitigation plans, and dependence on willing sellers, it is unlikely that mitigation sites could be successfully located in the 1-to 2-year post-project floodplain. In light of our mitigation analysis, we do not believe that enough adequate land is available to mitigate the proposed project's extensive impacts to the area's riverine backwater wetland ecosystem.

We also maintain that the project fails to include all appropriate and practicable steps to minimize and compensate for the project's adverse impacts on the aquatic ecosystem as required by 40 CFR 230.10(d). The Section 404(b)(1) Guidelines prohibit discharges that would cause or contribute to significant degradation. As previously discussed, we have shown that this project would cause or contribute to significant degradation. If the project is going to rely on compensatory mitigation to reduce impacts to an acceptable level, there must be a comprehensive and detailed mitigation plan which would inform whether in fact the impacts could reliably be offset to avoid significantly degrading the Nation's waters. These plans should include a number of critical details regarding the mitigation project(s) including: clearly articulated project goals and objectives; project site selection criteria; site protection instruments (e.g., conservation easements); detailed quantitative and qualitative baseline information describing both the impact and compensation sites; a detailed discussion of the mitigation project's credit determination methodology and results; a maintenance plan; ecological performance standards used to evaluate the degree to which the compensation projects are replacing lost functions and area; detailed monitoring requirements; a long-term management plan describing necessary long-term stewardship of the compensation sites and who is responsible for performing this stewardship; an adaptive management plan; and financial assurances to ensure project construction, implementation, and long-term management.

Another critical element of these plans is the site specific mitigation work plans. These plans include detailed written specifications and work descriptions for the compensatory mitigation project, including, but not limited to: geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water, including connections to existing waters and uplands; methods for establishing the desired plant community; plans to control invasive plant species; the proposed grading plan, including elevations and slopes of the substrate; soil management; and erosion control measures.

Despite the extensive anticipated environmental impacts associated with the proposed project, no specific compensation project sites have been identified or secured. Thus, the mitigation plan included in the FSEIS lacks most of the aforementioned details. In particular, it lacks accurate information regarding baseline conditions at compensation sites, as well as substantiated information regarding potential environmental benefits likely to accrue at these sites if reforestation activities are successfully implemented. Without these details it is not possible to determine that the potential adverse environmental impacts of a project would be successfully minimized and compensated for to avoid significantly degrading the Nation's waters.

What information is included in the FSEIS describing compensatory mitigation raises more concerns. The Corps only promises that 10,662 acres of compensatory mitigation will take place prior to initiating operation of the pumps and notes that this minimum may not be located in the target area or even the greater Yazoo – Mississippi Delta, raising significant concerns that important wetland functions will not be replaced in the watershed. The FSEIS indicates that no requirements will be included to implement hydrological modifications, to monitor hydrology, or to otherwise ensure that the compensation projects will result in fully functioning wetland systems. This is of particular concern since the Corps envisions mitigation projects being located in areas whose hydrology will be impacted by the proposed pumping station. The conservation easements used to provide long-term site protection described in the FSEIS (if such sites can be found) will not require landowners to ensure that sites are or will retain wetland characteristics and will allow potentially ecologically disruptive silvicultural practices in these areas. Additionally, the monitoring provisions described in the FSEIS entail only initial visual inspections in the early years of project implementation followed by remote sensing techniques in later years. These are inadequate and are one of many weaknesses in the mitigation plan, which make it impossible to conclude that impacts will be reduced permanently below the threshold of significant degradation.

E. Uncertainty of the Proposed Reforestation

Consistent with our comments regarding the proposed compensatory mitigation, EPA believes the Corps does not provide effective assurances regarding the project's primary nonstructural component – the proposed reforestation of up to 40,571 acres of cleared wetlands (i.e., up to 55,600 acres less the 10,662 acres the Corps proposes to use as compensation for this project and the 4,367 acres it proposes to use as compensation for impacts associated with already implemented aspects of related projects) through the purchase of conservation easements from willing sellers. Reforestation sites have not been specifically identified in the FSEIS and, as with the compensatory mitigation, there do not appear to be enough acres of cleared wetlands with the appropriate hydrology and soils in the target area to meet this goal. Even if there were enough potential wetland reforestation acres, reliance on willing sellers does not provide effective assurance that the acreage proposed (up to 40,571 acres) will ultimately be made available for the reforestation effort.

The reforestation component also suffers from the same technical problems associated with the compensatory mitigation plan in that it would likely result in a fragmented patchwork of reforestation sites with limited benefits. In addition to logistical and technical issues, the management of the reforestation lands (e.g., ensuring the implementation and success of planting efforts, providing long-term stewardship), the restoration of wetland hydrology, the replacement of temporal losses incurred before replanted trees become fully functional bottomland hardwood forested wetlands (hardwoods typically require a minimum of 60-70 years before they are mature), and the continuation of silvicultural practices in the reforestation areas are also major uncertainties. In light of these uncertainties, the environmental benefits suggested by the FSEIS to accrue from the proposed reforestation have not been substantiated.

F. Summary

The proposed project would degrade critical ecological functions provided by wetlands in the Yazoo Backwater Area including temporary storage of surface water, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. EPA maintains that impacts to these functions at the scale associated with this project will result in significant degradation (40 CFR 230.10(c)) of the Nation's waters, particularly in light of the extensive historic wetland losses in the lower Mississippi Valley and specifically the Yazoo Backwater Area. EPA does not believe the potential impacts of the Yazoo Backwater Area Project can be adequately mitigated to reduce the impacts to an acceptable level. Additionally, EPA does not agree that the environmental benefits suggested by the FSEIS to accrue from the project's nonstructural component (e.g., the reforestation of up to 40,571 acres) have been substantiated.

V. ADDITIONAL CONSIDERATIONS

A. Recreation

As previously noted, a 404(c) determination can be based on an unacceptable adverse effect on recreational areas. As noted in Section III.B.6.f, significant, seasonally-inundated public lands are located in the Yazoo Backwater Area including the Delta National Forest, four NWRs (Yazoo, Holt Collier, Theodore Roosevelt, and Panther Swamp), as well as three state wildlife management areas. The FSEIS acknowledges these lands as significant resources (FSEIS, page 90). As stated in the FSEIS, "The lands in the lower Mississippi Delta are noted for high value fish and wildlife resources. The area serves as an integral part of the economic and social life of local residents and sportsmen from around the Nation" (FSEIS, Main Report, Appendix 1 Mitigation, page 1-29). However, it does not evaluate how these resources and particularly their recreational values will be affected by the proposed project. In its January 18, 2008, detailed comments on the FSEIS as well as its April 29, 2008, detailed comments on EPA's Proposed Determination, the FWS indicated that the proposed project will have an unacceptable adverse effect on recreational areas in the Yazoo Backwater Area, particularly the area's four NWRs.

According to the FWS, all four NWRs in the project area would be adversely impacted by the proposed project. These refuges are managed, in part, to provide habitat for breeding and migratory birds with an emphasis on waterfowl. As FWS noted in its comments on the FSEIS and the Proposed Determination, the proposed project would reduce flooding on all four NWRs by 59 percent (6,695 acres) within the 2- to 5-year floodplain – significantly reducing the extent of habitat for migratory birds and the capability of these NWRs to achieve the purpose for which they were Congressionally established.

The NWRs are also managed to provide opportunities for compatible public use, or recreational activities. FWS believes that the anticipated adverse impacts to wildlife and fisheries associated with the proposed project (discussed above) will adversely affect related recreational values associated with these refuges – resulting in degradation or loss of their public benefit.

FWS estimates that approximately 10 percent of the visits to these refuges are from big game, upland game, and waterfowl hunters and 3 percent are from anglers. In 2007, there were an estimated 7,100 big game, 2,300 upland game, and 1,000 waterfowl hunter visitations. These visitations are based on use cards that are submitted by the user. However, this is a conservative estimate since it has been documented that only approximately 60 percent of the use cards are returned.

Managing wildlife populations and their habitats is a primary responsibility of FWS's "wildlife first" mission. If appropriately managed, hunting provides a biologically sound form of outdoor recreation that is used extensively throughout the Refuge System to manage wildlife populations. Hunting programs on the refuges within the Yazoo Backwater Area are coordinated annually with the Mississippi Department of Wildlife, Fisheries, and Parks, and hunting activities are managed in a manner that does not cause disturbance to migratory waterfowl in sanctuary areas within the refuges. According to the FWS:

- Deer hunting is the most popular hunting and fishing-related public use on the refuges. Hunting programs also offer opportunities to take dove, waterfowl, rabbits, squirrels, raccoons, other fur bearers, turkey, and feral swine. Large portions of the refuges are accessible by all-terrain vehicles on designated trails, which are only available for hunting and fishing purposes.
- Waterfowl hunting is the second most popular hunting and fishing-related public use on the refuges. Records obtained through hunter use card returns on Panther Swamp NWR indicate that approximately 1,000 people hunt waterfowl each year depending on waterfowl abundance which is dependent on available rainfall, backwater flooding and riverine sources for food and rest areas. The proposed pump project will result in reductions in spring flooding, which will reduce the quality and quantity of waterfowl habitat during the remainder of the year. This would cause waterfowl to disperse to other locations on and off the affected area of the refuge. Hunters will then seek alternate areas causing a negative impact to waterfowl hunting on the NWR and the local economy.
- Fishing is the third most popular hunting and fishing-related public use on the refuges. There are numerous lakes and streams suitable for fishing on the refuges, and boat ramps are available on Panther Swamp NWR. In 2007, 3,000 visits were associated with fishing within the affected area of Panther Swamp NWR. Most of this is subsistence angling by economically disadvantaged people in the local area. Further degradation of the fishery anticipated as a result of the proposed project would reduce quality fishing opportunities on Panther Swamp NWR dramatically impacting local anglers.

The FWS fully anticipates that the proposed project's adverse impacts to fish and wildlife habitat values on the four NWR's in the Yazoo Backwater Area would adversely impact visitation and recreational opportunities, as well as environmental education and interpretation opportunities at these refuges – particularly as examples of remaining intact Lower Mississippi Alluvial Valley bottomland hardwood ecosystems. Although EPA does not cite impacts to recreation as a basis for this Final Determination, it is likely that these impacts would be significant.

B. Environmental Justice

In recognizing that minority and/or low-income communities frequently may be exposed disproportionately to environmental harms and risks, EPA is committed to protecting these burdened communities from adverse human health and environmental effects, consistent with Executive Order 12898 (EO), "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Feb. 11, 1994)." The main provision of EO 12898 states that "To the greatest extent practicable and permitted by law,…each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (EO 12898, Section 1-101).

During its NEPA review of the Yazoo Backwater Area Project, the Corps included an environmental justice (EJ) analysis, conducted pursuant to EO 12898, in the FSEIS (FSEIS, Appendix 8 – Problem Identification/Socio-Econ Profile/Environmental Justice). Because EO 12898 directs agencies to implement its provisions "consistent with, and to the extent permitted

by, existing law" (EO 12898, Section 6-608), the scope of an EJ analysis is directly tied to the statutory and regulatory authority for the federal agency action. When the Corps reviews a project to determine whether to grant authorization under CWA section 404, it conducts a broad "public interest review" based on an evaluation of the "probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest" (33 CFR 320.4). In addition, under NEPA, the Corps examines the environmental effects, including human health, economic and social effects, of the project (33 CFR 230.1 and 230.4; 40 CFR 1508.8 and 1508.14).[25] Thus, in conducting its EJ analysis for the Yazoo Backwater Area Project the scope of the Corps' authority was broad and it considered a wide range of environmental, social and economic factors.

The Corps' EJ analysis discusses the general demographics of the project area, potential flood protection and potential economic development that could accrue from the project within communities with potential EJ concerns. EPA commends the Corps for including the EJ analysis in the FSEIS. However, the Corps EJ analysis may convey a message to members of communities with potential EJ concerns that specific flood control and economic development benefits will follow the completion of the project. Given the communities' expectations of the benefits of the project, EPA believes that it is appropriate to discuss the proposed benefits of the project that EPA believes may not be realized.

The Corps has not demonstrated which surrounding communities will be protected and which will remain subject to flooding after the project is completed. Since publication of the FSEIS, the Corps has provided EPA with Corps flood maps and GIS data indicating the location of structures within the 10-, 50-, and 100-year floodplains of the project area. According to the Corps' maps, most structures within the sparsely populated project area will not be protected from future flooding while a portion of the structures will benefit from the project. However, the maps do not include elevation information, structure type (i.e., residence, business, farm building, garage, etc.), whether the structures are habitable, and if so occupied or vacant, or what proportion of these structures are owned/occupied by residents with potential EJ concerns. Without the inclusion of the relative proximity of susceptible minority and/or low-income populations to the floodplains, it is impossible to know whether any such communities will be protected against 1-year, 2-year, or 100-year floods.

The Corps has not fully analyzed the impact of this project on potential economic development in communities with potential EJ concerns. According to the FSEIS, the primary economic benefits that may accrue from this project are from increased agricultural production. However, the primary agricultural beneficiaries have declined over 50 years from 2,913 farmers who owned 140 acres each to 192 farmers who own 2,036 acres each. While farm land use has increased in the area, earnings and overall contribution to the local economy have declined from 42 percent in 1969 to 17.4 percent by 2000 (FSEIS, Appendix 8, Table 8-23). The substantial decrease in small farms and farmers and the increased mechanization and industrialization within the project area may impact farm ownership and farm employment opportunities for members of communities with potential EJ concerns. Moreover, instead of resulting in additional farming jobs, post-project farm employment may continue to decrease due to greater opportunities for

[25] The requirements of NEPA do not apply to EPA when taking an action under 404(c). See CWA section 511(c)(1).

intensified farming and increased access to drier land, which may further promote the use of greater mechanization.

In the Proposed Determination, EPA Region IV raised concerns that the FSEIS did not address potential adverse impacts to populations that depend on subsistence fishing and/or hunting. EO 12898 states that "[i]n order to assist in identifying the need for ensuring protection of populations with differential patterns of subsistence consumption of fish and wildlife, Federal agencies, whenever practicable and appropriate, shall collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence" (EO 12898, Section 4-4).

The project sponsor's comments on EPA's Proposed Determination and Recommended Determination stated that the Yazoo Backwater Area is sparsely populated and very few people rely on subsistence hunting or fishing. The Corps stated that it does not believe that the proposed project would adversely impact subsistence fishing and/or hunting as it relates to communities with potential EJ concerns. Recent studies conclude that subsistence fishing and hunting in the Mississippi Delta is conducted by members of communities with potential EJ concerns (Brown, Xu and Toth 1998). EPA notes that those practices could be affected by the proposed project's adverse impacts on the areas' fisheries and wildlife resources. Brown and Toth (2001) state that "[t]he rich natural resource base of the [MS] Delta is accessed extensively and in some cases intensively by local residents." Brown and Toth also state that white subsistence fishers in the Mississippi Delta eat over 100 pounds of fish a year, while African American subsidence fishers may consume fish at even greater numbers. As evidence of current subsistence fishing and/or hunting, EPA received comments from FWS; conservation organizations (e.g., American Rivers, Gulf Restoration Network, National Wildlife Federation, National Audubon Society, etc.); and private citizens, stating that low-income and minority residents in the Yazoo Backwater Area rely on fish and other wildlife, taken from the project area, to supplement their food sources and income and can be classified as subsistence fishers and/or hunters. FWS stated "[i]n 2007, 3,000 visits were associated with fishing within the affected area of Panther Swamp NWR [in the Yazoo Backwater Area]. Most of this is subsistence angling by economically disadvantaged people in the local area. Further degradation of the fishery anticipated as a result of the project is expected to reduce quality fishing opportunities on Panther Swamp NWR and this will have a dramatic impact to the local anglers." Given EPA's conclusion above that the proposed project would significantly degrade critical habitat for over 50 species of fish and other wildlife in the Yazoo Backwater Area and the impacts to the wetlands, fish and wildlife resources cannot adequately be mitigated, it is likely the project could adversely impact minority and/or low-income populations that depend on the Yazoo Backwater Area's natural resources for subsistence.

The project sponsor contends that, because the studies cited above were based on surveys made prior to the issuance of a fish advisory by the Mississippi Department of Environmental Quality in June of 2001, none of the data can be applied to the use of subsistence fishing by minorities today. The 1998 and 2001 studies on subsistence fishing and hunting in the Mississippi Delta provide evidence that subsistence fishing by minorities has historically occurred and support EPA's conclusion, based on comments received from the FWS and several conservation

organizations and individuals that subsistence fishing does in fact occur presently in the Yazoo Backwater Area.

Again, EPA commends the Corps for including the EJ analysis in the FSEIS for the proposed project; however, EPA believes the Corps has not demonstrated the project would provide the proposed benefits of flood protection and economic development, specifically to members of communities with potential EJ concerns in the Yazoo Backwater Area. Additionally, when determining the project would benefit members of communities with potential EJ concerns, the Corps did not examine whether the proposed project would adversely impact minority and/or low-income populations that depend on the Yazoo Backwater Area's natural resources for subsistence.

Like the Corps, EPA has met with the members of local communities with potential EJ concerns and listened to their concerns and expectations regarding the Yazoo Backwater Area Project. The members of communities with potential EJ concerns with whom EPA met expressed a strong belief, based on the proposed benefits touted by the project sponsor, that the project would protect their homes and property against flooding and bring economic development, jobs, and a return of residents to the area. However, as noted above, these project benefits have not been demonstrated. EPA is very sensitive to the importance of providing improved flood protection for the people living and working in the project area, which includes minority and low-income populations. Although EPA's section 404(c) determination would effectively prohibit the construction of the pumps as proposed, the Agency continues to believe there are alternatives that can provide improved flood protection or mitigation of flood damage to the communities within the Yazoo Backwater Area and EPA remains fully committed to participating in discussions with other federal and state agencies, and the public, to identify a solution for reducing flood damages in the Yazoo Backwater Area.

An EPA action pursuant to CWA section 404(c) should also consider the EJ impacts of the Agency's action under EO 12898. Given the Agency's commitment to environmental justice, during the section 404(c) process it examined, to the greatest extent practicable and permitted by law, any "disproportionately high and adverse human health or environmental effects" that may result from undertaking a 404(c) action in the context of the Yazoo Backwater Area Pumps Project.

The federal agency action that EPA is reviewing in the context of EO 12898 in this case is EPA's utilization of section 404(c) to preserve the fish and wildlife resources of the Yazoo Backwater Area by protecting important habitat. In the context of section 404(c), review of the Agency's action under EO 12898 is unique since EPA is not the permitting authority.

As stated above, the scope of an EJ analysis is directly tied to the statutory and regulatory authority for the federal agency action. Under CWA section 404(c), EPA is authorized to prohibit, restrict, or deny the specification of a defined area as a disposal site for the discharge of dredged or fill material into waters of the United States only when it determines that the discharge would have an unacceptable adverse effect on "municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas." Thus, when EPA examines whether there are any "disproportionately high and adverse human

health or environmental effects," in the context of a section 404(c) action, EPA examines the potential effects prohibiting the discharge will have on the "municipal water supplies, shellfish beds and fishery areas, wildlife and recreational areas" ("404(c) resources") of the project site. EPA then examines whether those effects, if any, of the section 404(c) action on the 404(c) resources will have a "disproportionately high and adverse human health or environmental [effect]" on "minority populations and low-income populations" of the project area.

Applying the analysis above, EPA examined the potential effects of prohibiting the proposed project on the 404(c) resources that are located in the Yazoo Backwater Area and what effect that would have, if any, on members of communities with potential EJ concerns. EPA's section 404(c) action, by prohibiting the project, is preventing any impact to the 404(c) resources. With no project and no unacceptable adverse effect on the 404(c) resources, there are no disproportionately high and adverse human health or environmental effects on the minority or low-income populations of the project area.

As stated above, EPA has questions on whether there would be substantial economic development or flood control benefits that would specifically go to members of communities with potential EJ concerns in the Yazoo Backwater Area. However, even if there were, economic development and flood control are outside the scope of 404(c) and thus outside the scope of EPA's EJ review under EO 12898. EPA's authority under 404(c) is limited to prohibiting, restricting, or denying the specification of any defined area as a disposal site for the discharge of dredged or fill material into waters of the United States only when it determines that the discharge would have an unacceptable adverse effect on 404(c) resources. A section 404(c) review does not involve a balancing of environmental benefits against non-environmental costs, such as the benefits of the foregone project (see 44 FR 58078). EPA wants to make clear that while economic development and flood control are outside the scope of section 404(c), and thus an EJ review conducted in the context of section 404(c), the Agency acknowledges the importance of providing improved flood protection to all community members in the project area, including members of communities with potential EJ concerns. As previously stated, EPA remains fully committed to participating in discussions with other federal and state agencies, and the public, to identify a solution for reducing flood damages in the Yazoo Backwater Area.

For the reasons stated above, EPA concludes that its section 404(c) determination will not have a disproportionately high and adverse human health or environmental effects on minority or low-income populations of the project area.

C. Project Alternatives

The FSEIS evaluates ten alternatives, including four alternatives with combined structural and nonstructural features, one completely structural alternative, four primarily nonstructural alternatives, and the "no action" alternative. The completely structural alternative (Plan 3 in the FSEIS) and all of the combination alternatives (Plans 4 through 7) include a 14,000 cfs pump station. They vary with respect to pump-on elevation (i.e., between 80 and 91 feet, NGVD), nonstructural features (except for Plan 3), and operational plans for the Steele Bayou control

structure.[26] The nonstructural alternatives all propose reforestation of cleared agricultural lands (in varying amounts) and one or more the following features: conservation easements, income insurance, and relocation or flood-proofing of structures. One nonstructural alternative (Plan 2B) also includes the construction of 14 ring levees. We acknowledge that the Corps considered additional nonstructural alternatives in the FSEIS in response to EPA Region IV's November 2000, comments on the DSEIS. However, all of the non-structural alternatives carried forward in the FSEIS were determined to be economically unjustified (i.e., the benefit to cost ratio was less than one) based on the Corps' evaluation protocols. Plan 5, which represents the proposed project, was ultimately selected by the Corps as the Recommended Plan.

As mentioned previously, the Corps proposed two alternatives to the Recommended Plan during the first consultation period following EPA's initiation of the section 404(c) review. One of these alternatives was Plan 6 from the FSEIS and the second was a modification of Plan 6. Both of these alternatives include a 14,000 cfs pumping station with a pump-on elevation of 88.5 feet, NGVD (though Modified Plan 6 raises the pump-on elevation to 91 feet, NGVD from December through February). Both also include 81,400 acres of reforestation (including reforestation for compensatory mitigation). Refer to Table 1 for a comparison of these alternatives with Plan 5. As noted in the FSEIS, Plan 6 reduces impacts to wetlands from 67,000 to approximately 48,000 acres. While the Corps had not developed precise estimations of wetland impacts associated with its Modified Plan 6, it noted that this value would likely fall between 28,408 and 48,066 acres, the impact estimates for FSEIS Plans 7 and 6 respectively.

EPA's primary responsibility is to utilize its expertise with environmental matters to review the proposed project to ensure consistency with the requirements of the CWA, including, in the context of 404(c), determining whether there are unacceptable adverse effects on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas. EPA Headquarters has determined that the Recommended Determination and administrative record developed in this section 404(c) review support the conclusion that Plan 5, Plan 6 and Modified Plan 6 would result in unacceptable adverse effects on fishery areas and wildlife. EPA's Final Determination is based solely on environmental harms to fisheries and wildlife in the Yazoo Backwater Area and this determination is appropriate given the structure and language of the CWA and case law. As a result, this Final Determination prohibits the construction of Plan 5, Plan 6 and Modified Plan 6. EPA believes strongly that this final action does not preclude the opportunity to begin discussions and coordination with state and federal interests to evaluate alternative flood protection measures that are consistent with this Final Determination.

The devastating effects of flooding experienced in other parts of the country this summer highlight the importance of improved flood protection in the Yazoo Backwater Area. As we have stated throughout our section 404(c) review, EPA fully supports the goal of improved flood protection for residents living and working in the Mississippi Delta. Improving flood protection and conserving vital wetland, fish and wildlife resources are mutually achievable goals for a project in the Yazoo Backwater Area. EPA strongly believes that our section 404(c) review is consistent with both of these important goals because it provided for greater public involvement,

[26] As previously noted, however, operation of the Steele Bayou control gates is not dependant upon the construction and implementation of the proposed project.

greater transparency, and more complete information on which to make decisions. We also believe that the information and decisions resulting from this section 404(c) review will help to inform discussions and facilitate the preparation of timely recommendations for alternative flood control proposals.

EPA remains fully committed to participating in discussions with other federal and state agencies, and the public, to identify a solution for reducing flood damages in the Mississippi Delta. We support the Governor of Mississippi's recommendation to convene an intergovernmental working group to explore alternatives to the current Yazoo Backwater Area Pump Project that satisfy both flood control and environmental objectives. EPA recommends that the working group conduct a comprehensive evaluation of the flood management needs in the region and the full range of options to effectively address those needs. EPA recommends that such a study include facilitators and an independent peer-review process to ensure a balanced analysis. Based on the public input from the section 404(c) review, which reveals that there are many different perspectives on the area's flooding concerns (e.g., what is in most need of protection, and what the proposed project would accomplish) it will be necessary to clearly identify the goals and objectives for floodplain management in the area before constructive discussions on potential alternatives can occur.

VI. FINAL DETERMINATION

This Final Determination under section 404(c) of the CWA addresses unacceptable adverse effects on fishery areas and wildlife associated with construction and operation of the proposed Yazoo Backwater Area Pumps Project. The section 404(c) regulations define an unacceptable adverse effect as an impact on an aquatic ecosystem that is likely to result in significant degradation of municipal water supplies or significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas (40 CFR 231.2(e)). Section 231.2(e) of the section 404(c) regulations states that the evaluation of the unacceptability of such impacts should consider relevant portions of the Section 404(b)(1) Guidelines. The relevant portions of the Section 404(b)(1) Guidelines in this case are their prohibition of any discharge that 1) would cause or contribute to significant degradation of the Nation's waters (40 CFR 230.10(c)) and 2) fails to adequately minimize and compensate for wetland and other aquatic resource losses (40 CFR 230.10(d)).

Based upon an independent evaluation by EPA Headquarters of the Recommended Determination and the administrative record submitted by the Regional Administrator and in full consideration of materials submitted by the project sponsor, the Corps and the Assistant Secretary of the Army for Civil Works, I have determined that the aquatic environment, which would be adversely impacted by the proposed project, contains significant fisheries and wildlife resources. According to the Corps, the Yazoo Backwater Area contains between 150,000 to 229,000 acres of wetlands, as well as an extensive network of streams, creeks, and other aquatic resources. Extensive information collected on the Yazoo Backwater Area demonstrates that it includes some of the richest wetland and aquatic resources in the Nation. These include a highly productive floodplain fishery, substantial tracts of highly productive bottomland hardwood forests that once dominated the LMRAV, and important migratory bird foraging grounds. These wetlands provide important habitat for an extensive variety of wetland dependent animal and plant species, including the federally protected Louisiana black bear and pondberry plant. In addition to serving as critical fish and wildlife habitat, project area wetlands also provide a suite of other important ecological functions. These wetlands protect and improve water quality by removing and retaining pollutants, temporarily store surface waters, maintain stream flows, and support aquatic food webs by processing and exporting significant amounts of organic carbon.

The administrative record developed in this case fully supports the conclusion that the construction and operation of the proposed project (i.e., Plan 5 of the FSEIS) and the two alternative proposals offered by the Corps in February 2008 (i.e., Plan 6 and Modified Plan 6), would dramatically alter the timing, and reduce the spatial extent, depth, frequency, and duration of time project area wetlands flood. These large-scale hydrologic alterations would significantly degrade the critical ecological functions provided by at least 28,400 to 67,000 acres of wetlands in the Yazoo Backwater Area, including those functions that support wildlife and fisheries resources. Although not proposed to go forward, FSEIS Plans 3, 4, and 7, would also result in a dramatic alteration of the hydrologic regime in the Yazoo Backwater Area, significantly degrading the critical ecological functions provided by between approximately 28,400 and 118,400 acres of wetlands (see FSEIS Main Report, Table 17, page 1-20). In addition, EPA believes that the Corps has not adequately evaluated the degradation to critical ecological functions that the proposed project would have on 24,000 acres of wetlands outside the FSEIS

wetland assessment area. EPA does not believe that impacts of this magnitude are consistent with the CWA. Further, these impacts must be viewed in the context of the significant cumulative losses across the LMRAV, which has already lost over 80 percent of its bottomland forested wetlands, and specifically in the Mississippi Delta where the proposed project would significantly degrade important bottomland forested wetlands.

EPA also finds that the Corps has not demonstrated that potential impacts of the Yazoo Backwater Area Project can be adequately mitigated to reduce the impacts to an acceptable level. Additionally, EPA finds that the environmental benefits suggested by the FSEIS to accrue from the project's nonstructural component have not been substantiated.

EPA also notes that the FWS, in its comments on the Proposed and Recommended Determinations, concurred with EPA Region IV's conclusion that the proposed project would result in extensive and unacceptable adverse effects on wildlife and fisheries. FWS also highlighted its concerns that the proposed project would significantly degrade the wildlife habitat provided by its four National Wildlife Refuges located within the Yazoo Backwater Area – reducing the capability of these refuges to achieve the purpose and intent for which they were congressionally established.

After evaluation of the Recommended Determination and the full administrative record, including public comments and the written documents and information provided by the project sponsor, the Corps and the Assistant Secretary of the Army for Civil Works subsequent to the Recommended Determination, I have determined that the discharge of dredged or fill material in connection with the construction of FSEIS Plans 3 through 7, and Modified Plan 6 would have an unacceptable adverse effect on fishery areas and wildlife. Based on these findings, the Final Determination prohibits, pursuant to section 404(c) of the CWA, the specification of the subject wetlands and other waters of the United States as described in the FSEIS as a disposal site for the discharge of dredged or fill material for the purpose of construction of FSEIS Plans 3 through 7, and Modified Plan 6.[27]

The adverse effects associated with the prohibited projects are the result of a combination of operational factors including the capacity of the pumping station and its associated pump-on elevations. While this Final Determination prohibits the construction of FSEIS Plans 3 through 7, and Modified Plan 6, the data supporting this Final Determination indicates that derivatives of the prohibited projects that involve only small modifications to the operational features or location of these proposals would also likely result in unacceptable adverse effects and would generate a similar level of concern and review by EPA.

The staff at the Corps Vicksburg District deserves recognition for the years of commitment and effort that have been necessary to evaluate the Yazoo Backwater Area Pumps Project. EPA also

[27] FSEIS Plan 2B (one of the nonstructural alternatives considered in the FSEIS) does not include a pumping station, however, it does include the construction of fourteen ring levees, which would result in adverse impacts to approximately 92,100 acres of wetlands. Although Plan 2B would result in significant adverse environmental impacts comparable to those whose effects we have determined to be unacceptable, EPA has not included it in the prohibition since the FSEIS concluded it was not a practicable alternative because it is "locally unacceptable" and "not economically justified."

wants to emphasize our respect and appreciation for the Corps' cooperation with us on our review of this project. EPA recognizes that pumps are often an important and appropriate component of flood control projects. However, in this instance, I have concluded the adverse impacts on wetlands and their associated fisheries and wildlife resources are unacceptable.

EPA continues to support the goal of providing improved flood protection for the residents of the Mississippi Delta; however, the Agency believes that this vital objective can be accomplished consistent with ensuring effective protection for the area's valuable natural resources. EPA is committed to participating in discussions with other federal and state agencies, and the public, concerning the best way to provide flood protection while protecting wetlands and other natural resources.

Dated: AUG 3 1 2008

Benjamin H. Grumbles
Assistant Administrator for Water

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