



Yazoo Backwater Area Water Management Project



APPENDIX D-2 - U.S. Fish and Wildlife Service Coordination Act Report

December 2024

The U .S. Department of Defense is committed to making its electronic and information technologies accessible to individuals with disabilities in accordance with Section 508 of the Rehabilitation Act (29 U.S.C. 794d), as amended in 1998. For persons with disabilities experiencing difficulties accessing content, please use the form @ <https://dodcio.defense.gov/DoDSection508/Section-508-Form/>. In this form, please indicate the nature of your accessibility issue/problem and your contact information so we can address your issue or question. For more information about Section 508, please visit the DoD Section 508 website <https://dodcio.defense.gov/DoDSection508.aspx..>



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Mississippi Ecological Services Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213
Phone: (601)965-4900

December 10, 2024

IN REPLY REFER TO:
2024-0116749

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

Dear Colonel Gipson:

The U. S. Fish and Wildlife Service (Service) has prepared our final Fish and Wildlife Coordination Act (FWCA) Report for the Vicksburg District, U.S. Army Corps of Engineers (USACE), which addresses the proposed Yazoo Backwater Area Water Management Project's (Project) impacts to fish and wildlife resources. The Service submits this report in compliance with the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) in fulfillment of the requirements of Section 2(b) of that act. This letter replaces and supersedes our previous correspondence and FWCA report dated October 11, 2024 (see attached). The draft FWCA report was submitted to the Mississippi Department of Wildlife, Fisheries, and Parks; however, no formal written comments were provided.

In the draft FWCA report, the Service provided three conservation measures and eleven additional recommendations that would further enhance the Project's achievement of "equal consideration" of fish and wildlife resources along with the authorized project purpose of flood damage reduction, as mandated by the FWCA. The Service has reviewed the Final Environmental Impact Statement for the Project, dated November 29, 2024, and has determined the USACE has adequately addressed or adopted the Service's recommendations outlined in our draft FWCA report. Therefore, we find the Project, as proposed, represents an orderly, balanced, and environmentally sensitive approach to the water and related land resource problems and opportunities of the Yazoo Backwater Area.

The Service appreciates the collaborative efforts of the USACE to work with the Service, Environmental Protection Agency, and other federal agencies to develop a plan that balances flood risk reduction, natural floodplain values, and sustainable economic development for the Yazoo Backwater Area. We look forward to continued collaboration as a final plan is implemented.

If you have any questions or require additional information, please contact David Felder (769-487-6850) of this office.

Sincerely,
**JAMES
AUSTIN**

Digitally signed by
JAMES AUSTIN
Date: 2024.12.10
10:18:05 -06'00'

James A. Austin
Field Supervisor
Mississippi Field Office

cc: Mississippi Department of Wildlife, Fisheries and Parks
USFWS, Atlanta, GA
Environmental Protection Agency, Atlanta, GA



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Mississippi Ecological Services Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213
Phone: (601)965-4900 Fax: (601)965-4340

October 11, 2024

IN REPLY REFER TO:
2024-0116749

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

Dear Colonel Gipson:

The U. S. Fish and Wildlife Service (Service) has prepared the draft Fish and Wildlife Coordination Act (FWCA) Report for the Vicksburg District, U.S. Army Corps of Engineers (USACE), which addresses the proposed Yazoo Backwater Area Water Management Project's impacts to fish and wildlife resources. The Service submits the draft report in partial fulfillment with the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) which supersedes our previous reports dated June 11, 1982, October 23, 2006, and January 10, 2021. When finalized this report will represent the Secretary of the Interior's report in accordance with Section 2(b) of that act. The draft report has also been coordinated with the Mississippi Department of Wildlife, Fisheries, and Parks, and any written comments they provide to the Service will be forwarded to your agency.

The Service appreciates the collaborative efforts of the USACE to work with the Service, Environmental Protection Agency, and other federal agencies to develop a plan that balances flood risk reduction, natural floodplain values, and sustainable economic development for the Yazoo Backwater Area. We look forward to continued collaboration as a final plan is selected and implemented. If you have any questions or require additional information, please contact David Felder (769-487-6850) of this office.

Sincerely,
JAMES
AUSTIN

Digitally signed by JAMES
AUSTIN
Date: 2024.10.11 11:16:58
-05'00'

James A. Austin
Field Supervisor
Mississippi Field Office

cc: Mississippi Department of Wildlife, Fisheries and Parks
USFWS, Atlanta, GA
Environmental Protection Agency, Atlanta, GA

Fish and Wildlife Coordination Act Report Yazoo Backwater Area Water Management Project



U.S. Fish and Wildlife Service
Ecological Services
Jackson, Mississippi
October 2024

Table of Contents

Executive Summary	iii
Introduction	1
History	1
Description of the Study Area	2
Existing Fish and Wildlife Resources	2
Migratory Birds	4
Backwater Fisheries and Aquatic Habitats	4
Threatened and Endangered Species	5
At-Risk Species	5
Golden-Winged Warbler	6
Monarch Butterfly	6
Bumble Bees	6
Conservation Lands	7
Fish and Wildlife Resource Planning Goals and Objectives	8
Description of Alternatives	8
Alternative 2	9
Alternative 3	9
Comparison to the 2007 and 2020 Plans	9
Description of Impacts	11
Conservation Measures and Recommendations	14
Summary of Findings and Service Position	18
Literature Cited	20

Executive Summary

The Yazoo Backwater Area¹ contains some of the richest natural resources in the nation including a productive floodplain fishery, one of only a few remaining examples of the bottomland hardwood forest ecosystem which once dominated the Lower Mississippi Alluvial Valley, and is one of only four remaining backwater ecosystems with a hydrological connection with the Mississippi River. The area supports hemispherically significant populations of resident and migratory land birds and waterfowl. The public land base includes bottomland hardwood forest and open lands encompassing National Wildlife Refuges, State Wildlife Management Areas, and Delta National Forest, as well as thousands of acres of privately owned forest land, including lands reforested through the Wetland and Conservation Reserve Programs.

On June 28, 2024, the U.S. Army Corps of Engineers (USACE) released the Draft Environmental Impact Statement (DEIS) for the Yazoo Backwater Area Water Management Project (Project). This effort involved extensive interagency coordination between the USACE, the U.S. Fish and Wildlife Service (Service), the Environmental Protection Agency (EPA), and other federal agencies. This effort enabled each agency to leverage their respective knowledge, expertise, data, tools, and authorities to craft responsive solutions addressing the diverse challenges presented by the persistent flooding of the YBA.

The primary purpose of this Service report is to document our position and recommendations to achieve “equal consideration” of fish and wildlife resources with the authorized project purpose of flood damage reduction, as mandated by the Fish and Wildlife Coordination Act (FWCA). “Equal Consideration” under the FWCA requires that wildlife conservation be given equal consideration to other features of water-resource development programs through planning, development, maintenance and coordination of wildlife conservation and rehabilitation. Wildlife and wildlife resources are defined by the FWCA to include: birds, fish, mammals and all other classes of wild animals and all types of aquatic and land vegetation upon which wildlife is dependent. Our position and recommendations have been developed on the basis of previous biological, hydrological, and spatial surveys and analysis of the study area, the Service’s 1982, 2006 and 2021 FWCA reports, and information provided in the 2024 DEIS.

The Yazoo Backwater Area Water Management Project (aka Yazoo Pumps) has a long history dating back to its authorization under the Flood Control Act of 1941. The current DEIS includes four alternatives being considered to reduce flood risk in the YBA. Alternative 1 is the no action alternative and Alternative 4 is the nonstructural plan that would include voluntary acquisition of structures and croplands to the historical flood elevations (i.e., 98.2 feet National Geodetic Vertical Datum of 1929²). The two remaining alternatives (2 and 3) contain a combination of structural, operational and nonstructural components, as well as federal memorandums of agreement, environmental enhancement, and mitigation. Both Alternative 2 and 3 would include a 25,000 cubic feet (ft) per second (cfs) pump station, and both would manage water levels at 90.0 ft during the crop season and up to 93.0 ft during the noncrop season. The alternatives differ in the dates of the crop and noncrop season.

¹ 2024 USACE DEIS uses Yazoo Study Area (YSA) to describe this area

² Note: All future references to elevations in feet will be National Geodetic Vertical Datum of 1929

The Service has a long history of advocating for a plan that would balance flood risk management, natural floodplain values, and sustained economic development for the YBA. It is our opinion that previous planning efforts by the USACE emphasized agricultural drainage to the detriment of fish and wildlife resources and were inconsistent with national policies regarding the development and wise use of our floodplains (National Research Council, 1999). At the heart of our disagreement was the proposed “pump on” elevation, which in past plans had been set at 87.0 ft (i.e., one-year floodplain) or lower. The Service has always maintained that pumping down to the 87.0 ft elevation was not a sustainable balance between flood risk reduction, natural floodplain values, and sustainable economic development within the YBA, and that the land between 87.0 and 90.0 ft (i.e., the two-year floodplain) was at high risk for development, marginal for agriculture, and more naturally suited for fish, wildlife, and other wetland values.

Both Alternatives 2 and 3 propose a new “pump on” elevation of 90.0 ft during the crop season, thereby discouraging additional agricultural intensification to lands below 90.0 ft and promoting the transition of existing agriculture to forest within the two-year floodplain (i.e., between 87.0 and 90.0 ft). The Service believes this represents a new direction in floodplain management over previous plans proposed for the YBA, and therefore, the Service favors the current planning efforts by the USACE, versus previous planning efforts.

The Service believes these new alternatives better meet the FWCA planning goals and objectives that were established in previous Service reports. These goals and objectives included: continue the ongoing realignment of land use and land capability to address the imbalance between agricultural development and wetland conservation in the YBA; achieve “new directions” in floodplain management for the Mississippi Rivers and Tributaries (MR&T) project; and restore natural floodplain values and functions at and below the two-year floodplain.

Introduction

The Service has prepared this draft Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661-667e) report for the Yazoo Backwater Area Water Management Project (Project) in Humphreys, Issaquena, Sharkey, Warren, Washington, and Yazoo Counties, Mississippi and part of Madison Parish, Louisiana. This Act requires that the USACE coordinate with the Service to ensure that wildlife conservation be given equal consideration alongside other features of water-resource development programs through planning, development, maintenance and coordination of wildlife conservation and rehabilitation. This report is presented in partial fulfillment of FWCA and constitutes the draft report of the Secretary of the Interior as required by Section 2(b) of the FWCA and supersedes the position of the Department and the Service that was previously established in our June 11, 1982, October 23, 2006, and January 10, 2021, FWCA reports on the Project. As required by the FWCA, this report should be fully integrated and addressed in the USACE's final report to Congress. Because the FWCA also requires that the Service fully coordinate its findings and position with the Mississippi Department of Wildlife, Fisheries, and Parks, that agency was provided the opportunity to review this report and their comments will be included and addressed in our final report.

The primary purpose of the Project is to reduce flood risk in the lower Mississippi Delta. The lower Mississippi Delta, or YBA, continues to experience periodic, damaging floods creating a need to reduce flood impacts that are causing undue hardships and economic losses to residents of the area from the flooding of homes and disruptions of sanitation facilities, lines of communications, businesses and agriculture practices, and transportation. When high water stages occur on the Mississippi and Yazoo Rivers, the flood gates at the Little Sunflower and Steele Bayou water control structures in the Yazoo Backwater levee system are closed. Once these flood gates are closed, water from the Mississippi and Yazoo rivers are kept out of the area. However, excess water from precipitation events and runoff within the 4,093 square mile drainage area of Steele Bayou, Deer Creek, Little Sunflower River, and Big Sunflower River ponds behind the Yazoo Backwater levee system and is unable to drain out of the area, resulting in flooding events in the YBA. The USACE refers to this flooding as backwater flooding, even though it's not the Mississippi and Yazoo rivers backing up into the YBA, but rather water accumulating in the YBA behind the closed flood gates. For consistency purposes, we will use the term backwater flooding when describing the water accumulating behind the closed flood gates, and the term headwater flooding when describing floods that result from precipitation events within the YBA basin that cause rivers to rise and water begins to fill off-channel storage areas (i.e., floodplain).

History

For decades, controversy has surrounded water resource planning in the YBA, and no alternative yet recommended has gained sufficient public and federal support to be implemented. Previous federal flood control and drainage plans in the Mississippi Delta emphasized agricultural drainage to the detriment of fish and wildlife resources. Federal flood control and drainage projects built in the Mississippi Delta between 1935 and 1984 (i.e., MR&T Project) accounted for approximately 25 percent of total wetland depletion (DOI 1988). As a result, the Service has advocated for decades that water resource planning efforts balance natural floodplain values and

sustained economic development/flood reduction management.

In response to significant flood events in the YBA in 2019 and 2020, the Council on Environmental Quality (CEQ) established an interagency initiative to identify and implement workable solutions that address the health, safety, and economic needs of local communities, while conserving vital natural resources and ecosystem functions within the YBA. In support of this effort, the Service has provided information on the impacts of recent flooding events on fish and wildlife resources in the YBA, and the impact potential flood reduction projects would have on these resources.

Description of the Study Area

The YBA is located in west-central Mississippi, immediately north of Vicksburg, Mississippi, and has historically been subject to flooding from Mississippi River backwater and headwater flooding from the Yazoo River, Sunflower River, and Steele Bayou. The YBA extends northward about 65 miles to the latitude of Hollandale and Belzoni, Mississippi, and comprises about 1,446 square miles. The Big Sunflower and Little Sunflower Rivers, Deer Creek, and Steele Bayou flow through the YBA. These four streams drain 4,093 square miles of the Mississippi Alluvial Valley (MAV) and include a major portion of the Mississippi Delta. The drainage area extends from the confluence of Steele Bayou with the Yazoo River north to the vicinity of Clarksdale, Mississippi, and has an average width of approximately 30 miles. The Mississippi Delta alluvial plain is generally flat with slopes averaging 0.3 to 0.9 foot per mile. Interior drainage of the area is accomplished by structures at the mouth of the Little Sunflower River (upper ponding area) and the mouth of Steele Bayou (lower ponding area) (see Figure 1).

The YBA consists of approximately 926,000 acres, of which approximately 485,000 acres are lands within the 2019 flood extent (98.2-ft elevation). The YBA is bordered by the left descending bank of the mainline Mississippi River levee on the west, the west bank levees of the Whittington Auxiliary Channel and the Sunflower River and Steele Bayou connecting channel on the east, and the Yazoo River on the south. The study area includes all or portions of Humphreys, Issaquena, Sharkey, Warren, Washington, and Yazoo Counties, Mississippi and part of Madison Parish, Louisiana.

Existing Fish and Wildlife Resources

Lands within the YBA are regionally, nationally, and hemispherically important due to the habitat provided to a myriad of species (Nichols et al. 1983; Reinecke et al. 1989). The utility of these lands to wildlife is largely dependent on hydrology. Historically, connections between the floodplain and the Mississippi River were frequent due to an unmodified hydrologic regime (Biedenarn et al. 2000). Adaptation of the subsidy-stress model in forested wetlands suggests the highest rates of production and benefit occur with periodic floods of short duration, while longer duration floods in which water becomes stagnant cause stress and result in lower production (Odum et al. 1979).

Wetlands within the YBA support a variety of fish and wildlife, including white-tailed deer, Eastern wild turkey, mink, river otter, bobcat, rabbit, squirrel, and a multitude of reptiles and amphibians, most of which fall within the trust purview of the State. The following subsection is

intended to explicitly identify and substantiate the significance of the Federal-trust fish and wildlife resources within the YBA that will be affected by project implementation. In their broadest sense, Federal-trust fish and wildlife resources (i.e., those subject to Federal or international laws or treaties) of the YBA include publicly owned National Wildlife Refuges and Delta National Forest, migratory birds, interjurisdictional fishes, endangered, threatened, and at-risk species, and the backwater floodplain habitats on which they depend.

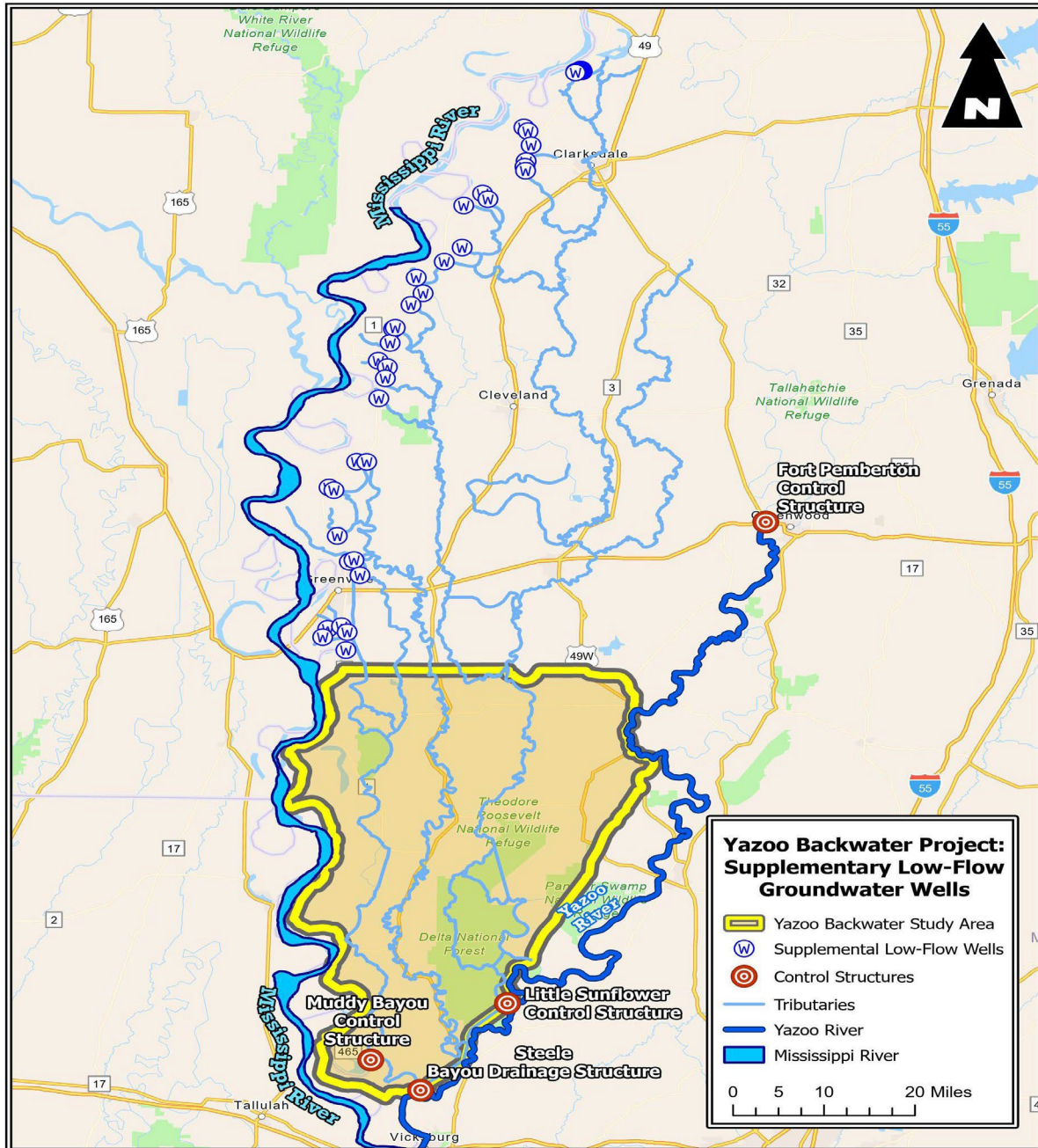


Figure 1. Yazoo Backwater Area including location of existing control structures and proposed supplemental low-flow wells. From USACE DEIS, 2024, Figure 3-1.

Migratory Birds

There is little question that the YBA floodplain wetlands provide migratory bird habitat of hemispheric significance, particularly for waterfowl, shorebirds, colonial-nesting waterbirds and wading birds, and neotropical species. The YBA lies within the MAV and is part of the Mississippi flyway, a migration route following the Mississippi, Missouri, and Lower Ohio from the south into Canada. The North American Waterfowl Management Plan, an international plan to conserve waterfowl and migratory birds in North America, signed in 1986 by the U.S. and Canada and in 1994 by Mexico, identifies the lower MAV ecosystem as internationally significant wintering habitat for mid-continental waterfowl populations.

The area also provides significant habitat to long-distance migrant shorebirds that require highly productive stopover sites where they can efficiently forage to replenish fat reserves. They typically require exposed mudflat habitats that are shallowly flooded (<10 cm) with an abundance of invertebrates. Within the YBA, such habitats are provided by impounded water on farmed wetlands and moist soil units, as well as the wetted edge in open lands as seasonal floodwaters recede.

In contrast to shorebirds, colonial-nesting waterbirds and wading birds are highly dependent upon forested and scrub-shrub wetlands for nesting and feeding habitat. Flooded forested wetlands contain abundant populations of forage fish and provide productive feeding habitats for wading birds and waterbirds. Nesting in the overstory of forested wetlands, particularly semi-permanently flooded wetlands and swamps, offers seclusion from predators, and minimal disturbance for raising young.

Like waterfowl, shorebirds, and wading birds, neotropical migrants also require stopover habitats along their migration routes in which to feed and rest for long flights, often over open water. The presence of suitable habitats along migration routes is therefore crucial to the survival and reproduction of these birds. Bottomland hardwood forests in the YBA are used extensively by these migrants during the nesting and migration seasons (Twedt et al. 2001; Wilson et al. 2000; Wilson and Twedt 2002).

Backwater Fisheries and Aquatic Habitats

The YBA supports a highly productive fishery for approximately 95 fish species, including 58 that depend on backwater flooding and access to the floodplain to fulfill life history requirements. It is one of only four remaining backwater ecosystems with a hydrological connection to the Mississippi River. Most species are considered indicative and tolerant of degraded water quality and habitat (Jester et al. 1992). Principal game and commercial fish species inhabiting the study area aquatic habitats include white crappie, bluegill, largemouth bass, channel catfish, blue catfish, flathead catfish, smallmouth buffalo, common carp, freshwater drum, and several gar species. Other fishes that are locally abundant in the YBA include mosquito fish, orange-spotted sunfish, gizzard shad, ghost shiner, blacktail shiner, threadfin shad, green sunfish, and warmouth. Permanent open-water habitats in the YBA include natural streams, oxbow lakes, sloughs, ponds, and ditches. Riparian vegetation along those habitats provides shade needed to sustain aquatic life by maintaining moderate water temperatures during the hot summer months. Aquatic habitats in the YBA are highly variable in

terms of size, current velocity, water clarity, depth, and amount of vegetative cover and woody debris. That diversity of habitat, in turn, supports diverse fish fauna. Ephemeral ponds are also an important aquatic habitat in the YBA because they support breeding reptiles, amphibians, and certain fish species.

In floodplain ecosystems such as the YBA, flooding not only enhances fish production, but also plays a key role in maintaining genetic and species diversity (Bayley 1995, Sparks 1995). Fishes use the floodplains for spawning, feeding, and refuge habitat (Welcomme 1979, 1985; Sparks et al. 1990). During flood periods, fishes gain access to inundated forests where they feed on terrestrial arthropods, fruits, seeds, flowers, and leaves (Ye 1996). Welcomme (1976, 1985, 1986), Goulding (1980), and Sparks et al. (1990) indicate that fish production in floodplain rivers is strongly influenced by the timing, height, and duration of flooding. In the lower Mississippi River and its tributaries, positive relationships between fish abundance and the acreage of bottomland hardwood forests susceptible to flooding have been documented (Risotto and Turner 1985). Bayley (1995) found that multi-species fish biomass was significantly greater in rivers with flood pulses and floodplains than in impoundments with stable water levels.

Threatened and Endangered Species

Several species that occur within or near the YBA are currently listed or proposed as threatened or endangered in accordance with the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). They include the pondberry (*Lindera melissifolia*) plant; the Northern long-eared (*Myotis septentrionalis*) and tricolored bats (*Perimyotis subflavus*), fat pocketbook mussel (*Potamilus capax*), pallid sturgeon (*Scaphirhynchus albus*), and the alligator snapping turtle (*Macrochelys temminckii*).

The USACE submitted a biological assessment in July of 2024, and the Service agreed to enter into consultation on the effects of the Project on listed and proposed species. This consultation is ongoing.

At-Risk Species

The Service's Southeast Region has defined "at-risk species" as those that are:

- 1) proposed for listing under the ESA by the Service;
- 2) candidates for listing under the ESA, which means the species has a "warranted but precluded 12-month finding"; or
- 3) petitioned for listing under the ESA, which means a citizen or group has requested that the Service add them to the list of protected species.

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

The Service's goal is to work with private and public entities on proactive conservation to conserve these species, thereby striving to preclude the need to federally list many at-risk

species. While not all species identified as at-risk will become ESA listed species, their potentially reduced populations warrant their identification and attention in project and mitigation planning.

Discussed below are species currently designated as “at-risk” that may occur within the YBA. The tricolored bat and alligator snapping turtle are species proposed for listing under the ESA and will be covered during the Section 7 ESA consultation.

Golden-Winged Warbler

The golden-winged warbler breeds in higher elevations of the Appalachian Mountains and northeastern and north-central U.S. with a disjunct population occurring from southeastern Ontario and adjacent Quebec northwest to Minnesota and Manitoba. Wintering populations occur in Central and South America. The loss of wintering habitat in Central and South America and migratory habitat may also contribute to its decline. The golden-winged warbler is also known to hybridize with the blue-winged warbler.

This species may be found in forested habitats throughout the YBA during spring and fall migrations. This imperiled songbird depends on forested habitats to provide food and water resources before and after trans-Gulf and circum-Gulf migration. Population declines correlate with both loss of early successional habitat owing to succession and reforestation and with expansion of the blue-winged warbler into the breeding range of the golden-winged warbler. Nonstructural features such as reforestation efforts and wetland mitigation would provide the opportunity to actively address this species habitat needs in the YBA.

Monarch Butterfly

With its iconic orange and black markings, the monarch butterfly (*Danaus plexippus*) is one of the most recognizable butterfly species in North America and is known for its impressive long-distance migration. Whether it's a field, roadside area, open area, wet area or urban garden, milkweed and flowering plants are needed for monarch habitat. Adult monarchs feed on the nectar of many flowers during breeding and migration, but they can only lay eggs on milkweed plants. For overwintering monarchs, habitat with a specific microclimate is needed for protection from the elements, as well as moderate temperatures to avoid freezing. For the eastern North American population, most monarchs overwinter in oyamel fir tree roosts located in mountainous regions in central Mexico at an elevation of 2,400 to 3,600 meters.

Recent research has shown dramatic declines in monarchs and their habitats leading conservation groups to petition the Service to list the species under the ESA. Ensuring adequate and sustainable habitats, meeting all the life history needs of these species is of paramount importance. The Service and its partners are taking actions to replace and restore monarch and pollinator habitat on both public and private lands across the U.S. landscape.

Bumble Bees

The southern plains bumble bee (*Bombus fraternus*) is found in the eastern temperate forest region on the coastal plain of the southeastern United States from central Florida north to New Jersey, Ohio west throughout the United States Great Plains. In July 2022, a petition to list the

species as endangered under the ESA was received by the Service. Historically, the southern plains bumble bee had broad distribution and had been found in 26 states. The species inhabits open prairies, meadows, and grasslands of the Midwest, mid-Atlantic states and the plains states from Texas to North Dakota, as well as to the grasslands and pine savannas of Florida and the southeast.

Once thought to be among the most common and widespread bumble bee species in North America, the American bumble bee (*Bombus pensylvanicus*) has experienced sharp declines in recent decades. According to an assessment published by the International Union for Conservation in Nature in 2014, American bumble bee losses amount to an 89 percent reduction in abundance relative to other bee species that share their habitat. These declines are most pronounced towards the northern extent of the species' range. The American bumble bee tends to live and nest in open farmland and fields. It feeds on several food plants, favoring sunflowers and clovers, and functions as a pollinator. Like most bumble bees, this species faces threats from multiple sources including pesticides, habitat loss or degradation, urban development, climate change, and diseases that can be introduced by non-native bee species.

Conservation Lands

In addition to their biological significance, the remaining bottomland hardwood forest wetlands and aquatic habitats of the YBA support intensive public use. There are an estimated 280,000 acres of existing public and private conservation lands within the YBA. Lands within the direct trusteeship of the Department of the Interior that are in the YBA include Hillside, Holt Collier, Mathews Brake, Morgan Brake, Panther Swamp, Theodore Roosevelt and Yazoo National Wildlife Refuges (86,000 acres total). These refuges were established for their nationally significant values to migratory waterfowl and the public's enjoyment of those values. In addition, there is the U.S. Forest Service's Delta National Forest (60,000 acres), the only bottomland hardwood National Forest in the United States. Other public lands include USACE owned lands and state-owned lands, including Lake George Wildlife Management Area (WMA), Howard Miller WMA, Mahannah WMA, Phil Bryant WMA, and Shipland WMA (50,000 acres).

There are also approximately 80,000 acres of Natural Resource Conservation Service (NRCS) easements on private lands in the YBA as of 2020. Currently, Mississippi ranks third in the nation for total acres enrolled into NRCS's Wetland Reserve Program (WRP), a voluntary program that offers landowners the opportunity to protect, restore, and enhance wetlands on their property. Approximately 150,000 acres across the state have been enrolled, with the majority located within the Lower Mississippi River Valley portion of the state. The volume of applications received during 2019 for WRP in the Lower Mississippi River Valley would indicate the popularity and demand for this program. In Mississippi alone, there were 309 applications representing 60,172 acres (NRCS, personal communication, May 14, 2020).

It's important to highlight the magnitude of reforestation efforts by the NRCS and non-governmental organizations in the YBA in the past couple of decades and the resulting benefit in non-structural flood reduction. The 2006 USACE Yazoo backwater planning effort proposed reforestation on up to 43,000 acres of existing agricultural lands below the one-year floodplain (87.0 ft). For the 2020 USACE planning effort, only 3,000 acres of these lands were still in agricultural production and available for reforestation, with the remaining 40,000 already being

reforested. We estimate this trend will continue in the future for agricultural lands between the one- and five-year floodplain.

Fish and Wildlife Resource Planning Goals and Objectives

The Service's planning goal for the Yazoo Backwater Area Water Management Project continues to be the implementation of a water management plan that will balance the needs of fish, wildlife, and wetlands alongside the need to provide flood risk reduction. The Service acknowledges the need to protect existing residential and commercial development and agriculture above the two-year floodplain from backwater flood damages. However, due to declines in species diversity and abundance within the basin, other needs of the basin should be considered, including the protection of remaining fish and wildlife values.

To achieve this planning goal, the Service in 2006 formulated three planning objectives and several corresponding evaluation criteria upon which our evaluation and assessment of the Corps' 2006 Recommended Plan were based; those planning objectives and evaluation criteria remain valid and are presented below.

Objective 1: Continue the ongoing realignment of land use and land capability to address the imbalance between agricultural development and wetland conservation in the YBA

Evaluation Criterion 1A: Existing wetlands are protected

Evaluation Criterion 1B: Further intensification of agriculture in wetlands is avoided

Evaluation Criterion 1C: A transition from agriculture to forest within the two-year floodplain

Objective 2: Achieve "new directions" in floodplain management for the MR&T project

Evaluation Criterion 2A: A specific nonstructural flood damage reduction zone is dedicated

Evaluation Criterion 2B: Impacts of a project design flood on environmental and economic sustainability are reduced

Objective 3: Restore natural floodplain values and functions

Evaluation Criterion 3A: Backwater floodplain hydrology is restored

Evaluation Criterion 3B: Flood-compatible land uses are protected and restored

Evaluation Criterion 3C: The carbon storage and nutrient assimilation functions of the floodplain ecosystem are increased over that level expected to occur without the project

Description of Alternatives

Four alternatives are being considered in the 2024 DEIS for the Yazoo Backwater Area Water Management Project. Alternative 1 is the no-action alternative and Alternative 4 is the nonstructural plan that would include voluntary acquisition of structures and croplands to the historical flood elevations (i.e., 98.2 ft). As these alternatives would have no adverse impacts to fish and wildlife resources, our report will focus on the remaining alternatives being proposed.

Alternative 2

This alternative includes a 25,000 cfs pump station adjacent to the Steele Bayou Water Control Structure (WCS). Two different pumping operations are being proposed to minimize and/or avoid potential adverse project impacts on the environment. During the crop season of March 16-October 15, water levels would be managed at 90.0 ft. During the noncrop season of October 16-March 15, water levels would be managed up to 93.0 ft. In addition, the Steele Bayou WCS would allow free movement of water into and out of the lower Yazoo Basin up to an elevation of 75.0 ft before closing the WCS gate. During low-water periods, the operation plan for the Steele Bayou WCS would require water levels to be maintained between 68.5 and 70.0 ft during low-flow conditions, consistent with how it's currently managed. The installation of 34 low-flow wells to provide a maximum of 5.0 cfs of water per well from shallow groundwater is also being proposed to improve current low-flow conditions for 654 miles (9,321 acres) of streams and rivers in the Big Sunflower, Deer Creek, and Steele Bayou watersheds. Finally, the nonstructural features of the proposed plan include mandatory acquisition of all structures (101) below 90.0 ft, the voluntary acquisition of residential and commercial properties (231) between 90.0 and 93.0 ft, and the voluntary acquisition of up to 39,491 acres of cleared agriculture land at or below the five-year floodplain through fee title purchase or restrictive easements.

Alternative 3

This alternative has the same features as Alternative 2, however, the pump operation schedule would differ by nine days. Water levels would be managed at 90.0 ft during the crop season (March 25-October 15) and up to 93.0 ft during the noncrop season (October 16-March 24).

Comparison to the 2007 and 2020 Plans

The current plan has a number of changes from previous planning efforts (Final Supplement No 1 [November 2007] and No. 2 [October 2020] to the 1982 Yazoo Area Pump Project). Most notably is the currently proposed “pump on” elevation of 90.0 and 93.0 ft for crop and noncrop seasons, respectively. Previous plans proposed a year-round “pump on” elevation of 87.0 ft.

There are approximately 231,247 acres within the two-year floodplain (87.0 to 90.0 ft) of the YBA with 79% of these acres being forested wetlands (DEIS, Appendix F3, Table 29 and 99). The previous plans would have resulted in up to 94,801 acres (41%; 2007 Alternative 5) of these lands seeing a shift in flood frequency and duration due to a year-round “pump on” elevation of 87.0 ft. The current plan will result in approximately 34,370 acres (15%) within the two-year floodplain seeing a shift in flood duration due to the new “pump on” elevation of 90.0 ft during the crop season. This change in “pump on” elevation results in 60,000 fewer acres within the two-year floodplain having potential adverse impacts associated with changes in flood duration and frequency.

In order to allow for a higher “pump on” elevation, a larger pump (25,000 cfs) is being proposed compared to the 2020 plan (14,000 cfs). The current plan also proposes to acquire up to 39,491 acres of cleared land below the five-year floodplain (i.e., below 93.0 ft) based on voluntary participation, whereas the previous plan proposed acquisition on up to 2,700 acres of cleared land below the one-year floodplain.

The current plan proposes mandatory and voluntary residential and commercial property acquisition within the two- and five-year floodplains, respectively, which was not proposed in the previous plan.

Another significant change from past plans is the determination of the extent of wetlands within the YBA. For the 2020 plan, wetland assessments were only conducted on areas within the two-year floodplain exhibiting a minimum flood duration of five percent of the growing season (corresponding to a 14-day flood hydroperiod). Consequently, the USACE limited their assessment of potential wetland impacts to only 83,065 acres of the YBA (2020 DEIS, Appendix F-5, Table 85). The acreage of functional wetlands (i.e., naturally flooded bottomland hardwoods) within the YBA, but outside the two-year floodplain were not included or evaluated in the 2020 plan.

The current planning effort has conducted wetland assessments on all wetlands within the five-year floodplain (approximately 225,000 acres of forested wetlands out of a total of approximately 351,000 acres of land) regardless of flood duration (i.e., flood durations less than 5% of the growing season). This assessment now covers all wetlands potentially being impacted by the proposed project as required by the FWCA, regardless of whether these wetlands meet the 2010 USACE wetland delineation criteria or if they were above the two-year floodplain.

The current planning effort has also calculated how often the proposed pump would turn on based on the 43-year Period of Record (POR) (1978-2020). For Alternative 2, the USACE determined that the pump station would have been pumping for 851 days over the POR (5.4% of time), with most of the pumping occurring during the months of March-June (780 days). For Alternative 3, the USACE determined that the pump station would have been pumping for 825 days over the POR (5.3% of time), with most of the pumping also occurring during the months of March-June (754 days). Both alternatives would have resulted in the pump operating in 20 of the 43 years based on the POR (47% of the years). For comparison purposes, the 2020 plan (pump-on elevation of 87 ft) would have operated in 27 of 42 years based on the POR (64% of the years).

As an additional component of the current water management plan, 34 supplemental low flow groundwater wells would be installed within 30,000 ft of the Mississippi River channel along streams in the northern portion of the YBA to re-establish environmental flows to streams and rivers in the Big Sunflower, Deer Creek, and Steele Bayou watersheds, thereby enhancing survival of aquatic species (see Figure 1), including federally listed mussels.

Each well is expected to deliver a maximum of 5.0 cfs during traditional low flow periods (i.e., late summer and fall months). This component was previously proposed in the 2020 version but was proposed as a mitigation feature to compensate for lost fish spawning and rearing habitat, not as a component or design feature of the proposed Project. Three criteria are being used to create “environmental flows” including: provide adequate water to avoid desiccation of established mussel beds, ensure periodic fish passage over weirs for spawning movements, and manage hydraulic connectivity between the river channel and low-elevation backwaters or tributary mouths. This proposed feature would benefit 654 miles (9,321 acres) of streams in the Big Sunflower, Deer Creek, and Steele Bayou watersheds. These streams support a diverse ichthyofauna characteristic of Mississippi Delta fish assemblages, including important game and

commercial fish species such as white crappie, bluegill, largemouth bass, channel catfish, blue catfish, flathead catfish, smallmouth buffalo, common carp, freshwater drum, and several gar species. These streams also support a diverse population of state and federally listed mussels. The federally endangered sheepsnose and threatened rabbitsfoot mussels can be found in the Big Sunflower River between Indianola and Ruleville in Sunflower County, Mississippi, with portions designated as critical habitat for the sheepsnose.

Finally, the current water management plan includes three Memorandums of Agreement (MOAs) between the USACE, EPA, and the Service. The first MOA will require agreement by the Agencies for any deviations of the pump operations plan and water control structure operation plan, the second MOA is designed to ensure the effective and timely development and review of the mitigation plan for each compensatory mitigation component, and the third is regarding the collection and evaluation of monitoring data to help inform adaptive management decisions regarding ongoing implementation of water management in the YBA.

Description of Impacts

The total acreage below 93.0 ft (i.e., five-year floodplain) is 351,205 acres, including 225,113 acres of potential forested wetlands, 104,674 acres of agricultural lands, and 21,418 acres of other lands (e.g., developed lands, open water). Approximately 169,839 (75%) and 175,482 (78%) acres of forested wetlands would see no change in flood frequency and duration from Alternatives 2 and 3, respectively (DEIS, F-3, table 53). For example, wetlands currently within the two-year flood frequency and flooding less than 2.5 percent of the growing season would have the same flood frequency and duration after the pumps are operational.

However, the depth of flood waters on these wetlands are expected to change as result of Alternative 2 or 3. These alterations in flood depth will result in less favorable conditions for some wildlife guilds and more favorable conditions for others.

The Service does not foresee any measurable adverse effects on fish and wildlife resources found on lands below 90.0 ft in elevation. There would be no loss of fish spawning and rearing habitat below 90.0 ft, and habitat for migratory birds including shorebirds, waterfowl and neotropical migrants would not be adversely impacted. Since existing agricultural lands below 90.0 ft would not benefit from the pumping station, such lands may be more likely to be converted to forested wetland habitat resulting in additional beneficial effects to fish and wildlife species.

For both Alternatives 2 and 3, we also do not anticipate measurable adverse impacts to lands above 93.0 ft (i.e., five-year floodplain). Riverine bottomland hardwood wetlands are those that occur in the one-to five-year floodplains (Smith and Klimas 2002) and are dependent on periodic flood pulses to exchange nutrients, sediment, and other organic and inorganic compounds. Based on the 43-year POR, backwater flooding has exceeded 93.0 ft only seven times (1979, 1983, 1997, 2009, 2018, 2019, and 2020). Up until the 2019 flood of record event, backwater flooding had never exceeded an elevation of 95.0 ft during the POR. Therefore, we conclude that riverine headwater flooding and local precipitation are the dominant hydrologic drivers for wetlands found in the YBA above 93.0 ft, and that the operation of a pumping station is unlikely to result in adverse impacts to fish and wildlife resources above 93.0 ft.

Therefore, the focus of our analysis is on the potential impact to fish and wildlife resources found on lands below 93.0 ft. Of the total 225,000 acres of potential mature forest wetlands within the YBA five-year floodplain, 170-175,000 acres will see no change in flood frequency and duration (76-78%) as a result of Alternatives 2 and 3. For example, wetlands currently within the two-year flood frequency and flooding less than 2.5 percent of the growing season would have the same flood frequency and duration after the pumps are operational.

Approximately 55,266 and 49,585 acres of mature forest wetlands within the five-year floodplain will see a change in flood frequency and duration as a result of Alternative 2 and 3, respectively. Approximately 82-83 percent of these wetlands (46,466-41,185 acres for Alternative 2 and 3, respectively) will experience a shift from one flood interval to the next flood duration interval (i.e., a change in wetland class). For example, some wetlands with a three-year flood frequency with flooding less than 2.5 percent of the growing season would shift to a four-year flood frequency with flooding less than 2.5 percent of the growing season. The remaining 17-18 percent of these wetlands (8,800-8,400 acres for Alternative 2 and 3, respectively) will see larger shifts in inundation duration and frequency (i.e., 3-yr, <2.5% to 5-year, <2.5%).

The response of these flood frequency and duration shifts to fish and wildlife species is difficult to fully quantify. For one, the currently proposed plan would allow flooding up to 93.0 ft during the noncrop season, therefore, no change in flood frequency and duration would occur to wetlands in the five-year floodplain during this time. Also, the role headwater flood events (as opposed to backwater events) and local precipitation have in supporting local wetland hydrology is difficult to fully quantify. Finally, the species-specific response to modifications in flood frequency and duration on existing forested habitat are expected to be subtle and difficult to measure. We could expect changes in forest composition and structure over time as a result of these hydrology changes that may result in improved habitat conditions for some species and less favorable conditions for others. For example, a wet overcup oak-bitter pecan dominated forest may transition to a slightly drier willow oak-water oak-sweetgum forest. Although shifts in these forest/habitat conditions can be expected from the proposed Project, the total loss of habitat for fish and wildlife species should not occur. The lands seeing flood frequency and duration shifts should continue to provide important habitat for fish and wildlife resources of the YBA.

However, 15,579 to 7,509 acres of wetlands will shift from at or below the five-year floodplain to above the five-year floodplain as a result of Alternative 2 and 3, respectively. These wetlands may no longer qualify as riverine bottomland hardwood wetlands according to the definition by Smith and Klimas 2002. Visible shifts in forest composition and structure could be more pronounced on these acres if headwater flooding and local precipitation are unable to support local wetland hydrology previously provided by backwater flooding events.

In an effort to quantify changes in these wetland functions, a hydrogeomorphic assessment was conducted to determine the differences in functional capacity index scores between flood duration intervals and the change in average annual functional capacity units was calculated. The results indicated there would be up to a 2.4 percent decrease in wetland function and that 7,650 acres of mitigation is required to offset the wetland impacts associated with the implementation of Alternative 2 and 5,722 acres required for Alternative 3. Mitigation would consist of re-establishing forested wetlands on agricultural lands with hydric soils within or near the YBA.

In order to quantify how this decrease in wetland function would impact fish and wildlife resources, multiple species assessments were conducted. The Envirofish program was used to assess the impact of the Project on fisheries resources. This program determined that up to 3,201 acres of agricultural lands would need to be reforested within the two-year floodplain to compensate for lost fish spawning and rearing habitat associated with the proposed Project.

Habitat models for a suite of migratory bird species and/or taxa (landbirds, shorebirds, great blue heron, waterfowl, and secretive marshbirds) were used as a framework for determining differences in habitat suitability with changing landscape alterations occurring as a result of the proposed Project. Habitat suitability index models were developed for four migratory birds found within the YBA to determine the project's impact on land birds and recommended mitigation. The results indicated up to 1,056 acres of agricultural reforestation at or below the two-year floodplain would be required to offset losses to the prothonotary warbler, the species showing the greatest adverse impact associated with the proposed Project. Similar models were run for the great blue heron to determine impacts to waterbirds and other wading birds. The results indicated up to 2,805 acres of agricultural reforestation would be required. Acreage of mitigation required would vary with distance from active heronries and distance from foraging habitat.

The Enviro-Duck Program was used to determine impacts to wintering waterfowl habitat within the YBA. The results indicated up to 347 acres of agricultural reforestation would be required, depending on the type of cropland that was to be converted. Modeling results for secretive marsh birds, including various species of bitterns, coots, gallinules, and rails; indicated there would be only minor losses in marsh bird habitat and that mitigation was not warranted because the Project did not result in any biologically relevant impacts to marsh birds in the YBA.

Finally, the shorebird migration model was used to quantify change in shorebird habitat quality between the alternatives. These shorebirds include multiple taxa, including plovers, yellowlegs, godwits, and sandpipers. The results indicated up to 404 acres of mitigation would be required to offset shorebird impacts. Mitigation would occur via acquisition of agricultural land with water management capabilities that maintain shallowly inundated open wet substrates with sparse vegetation (i.e., mudflats, most soil units).

The total mitigation required to compensate aquatic and terrestrial habitat is not additive. Therefore, up to 7,650 acres (for Alternative 2; 5,722 acres for Alternative 3) of bottomland hardwood reforestation on existing agricultural lands and 404 acres of shorebird managed habitat (i.e., agricultural lands with the ability to manipulate water levels in order to create shallowly inundated/recently dewatered open areas for foraging) will be required to offset terrestrial impacts. In order to offset aquatic habitat impacts associated with lost fish spawning and rearing habitat, up to 3,201 acres of the bottomland hardwood reforestation stated above will need to occur at or below the two-year floodplain. The USACE has committed to acquiring all mitigation before or concurrent with construction - and before operation of the pumping station, which is consistent with 404(b)(1) guidelines. Mitigation will be achieved through the use of an existing in lieu fee program or via USACE constructed mitigation sites. Ducks Unlimited (DU) has an existing Mississippi Delta In-Lieu Fee Program which was approved by the USACE, EPA, and Service on September 17, 2010. DU recently provided a draft prospectus outlining their plan to compensate for wetland impacts associated with the proposed Project. Based on the information contained in the prospectus, and the established track record of DU to successfully complete

wetland mitigation and restoration projects in the MAV and the rest of the country, the Service anticipates the DU Mississippi Delta In-Lieu Fee Program has the ability to fully compensate for lost bottomland hardwood and shorebird managed habitat resulting from the proposed Project.

In addition, the USACE, EPA, and Service are also developing an MOA designed to ensure the effective and timely development, review, and implementation of the mitigation plan for each compensatory mitigation component associated with the project.

The proposed environmental flows component of the proposed Project would have completely beneficial effects on fish and wildlife resources; therefore, we are supportive of this project component. Prior to the 1980's, low flow discharge of the Big Sunflower River at Sunflower, Mississippi was approximately 100 cfs. Since the 1990's into the 2000's, low flow fall discharge has fallen to less than 10 cfs, and lower reaches of the Big Sunflower River usually cease flowing under these conditions. These low flow conditions have resulted in multiple impairments to mussel and fish communities. "Low dissolved oxygen along with other major impairments to aquatic habitat in the Big Sunflower-Steele Bayou drainage has resulted in a fish community dominated by habitat and water quality tolerant species". (DEIS, Appendix F-6).

Therefore, the objectives of this project component are to provide sufficient water flow to keep existing mussel beds inundated, improve fisheries, and increase the cumulative total flow of multiple stream systems within the Big Sunflower-Deere Creek-Steele Bayou watersheds. The environmental flows are also being designed to ensure fish passage flows over existing weirs (i.e., Old Lock and Dam on the Sunflower River) for spawning movements and recolonizations; as well as to help alleviate the low dissolved oxygen conditions currently occurring during the fall low-flow period. This feature also complies with section 7(a)(1) requirements of the ESA to conserve endangered species within an agency's (in this case, the USACE) existing authorities.

As noted above, stream and groundwater levels throughout the Mississippi Delta have shown declines over several decades due in part to increases in irrigation to support agricultural production; creating conditions with detrimental effects to fish, mussels, and other riverine species. Extensive pumping from the Mississippi Delta alluvial aquifer with an apparent overdraft of about 100,000 ac-ft per year has caused the groundwater table to fall below the elevation of the Sunflower River thalweg in its upper reaches. This has resulted in the loss of base flow that threatens natural resources in the channel confines (USDA MS Delta Comprehensive, multipurpose Water Resource Plan, 1998). It is our understanding that the groundwater wells will be close to the Mississippi River where groundwater levels remain high. Therefore, this feature will not contribute to the groundwater deficit in the Sunflower River/Deere Creek/Steele Bayou drainage, but rather will contribute to its recharge.

Assuming the environmental flows component is successful, and additional demands for surface water withdrawal do not increase, then we anticipate this project component will have beneficial effects to aquatic resources within the YBA.

Conservation Measures and Recommendations

In order to achieve FWCA planning goals and objectives, the Service recommends the following:

1. Increase inter-basin water exchange via operation of the Steele Bayou Water Control Structure

According to the 2024 DEIS, the YBA is an isolated system in its current state due to the Yazoo Backwater levee and outlet structures preventing inflow of water from the Yazoo and Mississippi rivers (backwater flow/flooding). The Steele Bayou WCS gate is currently operated to only allow water to flow out of the YBA preventing any type of bidirectional flow. Under the proposed operation plan, water from the rising Mississippi and Yazoo rivers would be allowed free movement into and out of the YBA up to an elevation of 75.0 ft before closing the gate.

Floodplains are an integral part of large-river ecosystems, where high flows that provide connectivity between the floodplain and the main-stem river (Welcomme 1979) drive ecosystem productivity (Junk et al. 1989). Floodplains with open or partial river connections provide breeding habitats for fish, increase sediment deposition and nutrient processing in floodplain lakes and wetlands, and reduce downstream flood potential via attenuation (Opperman et al. 2010); with the annual flood pulse being the most biologically productive feature of a river's ecosystem (Thorp and Lelong 1994).

Installation of the pumping station creates a new opportunity to not only maintain floodplain connectivity up to 75.0 ft when the control structure is open, but to increase connectivity on up to 60,321 acres of primarily forested wetlands in the one-year floodplain. It has been estimated that based on the POR, setting the gate closure elevation at 75.0 ft would provide on average 21 days per year of inflows from the Yazoo and Mississippi rivers into the YBA, and that raising the gate closure elevation to 78.0 ft would provide on average 32 days per year of inflows. We anticipate these small incremental improvements in bidirectional flow could improve fish diversity and abundance in the YBA.

The DEIS states that the current operation plan at Steele Bayou is set at 75.0 ft because higher elevations may impact operations at Eagle Lake which call for, at certain times of the year, for the Muddy Bayou WCS to be opened to draw down the elevations of Eagle Lake from 76.0 to 75.0 ft in order to meet guidelines set for "wildlife, fisheries, and parks".

The current Eagle Lake water level management agreement calls for the lake level to be lowered to 75.0 ft beginning September 1 and raised and maintained up to 76.9 ft between January 1 and August 31. This agreement was established in part to mitigate fisheries impacts associated with the Yazoo Backwater Levee system completed in 1978. Since lowering Eagle Lake to 75.0 ft will occur in the fall months when typical low flow conditions in the basin exist, and raising the gate closure elevation at Steele Bayou WCS above 75.0 ft would typically occur in the spring months when higher flow conditions in the basin exist, we do not see why these two features cannot coexist. Regardless, we recommend the Eagle Lake water management agreement be revisited since operating the Steele Bayou WCS at higher elevations than 75.0 ft may provide significantly greater improvements to fishery resources in the YBA over what was envisioned with the original 1977 Eagle Lake water management agreement.

Another way to improve this bidirectional flow at the Steele Bayou WCS is by lowering the

elevation at which the gate closes during low flow conditions. The current proposal is to continue to maintain water elevations between 68.5 and 70.0 ft during low flow periods. Based on the POR, it is estimated that lowering this elevation to 65.0 ft during the months of September through November would add on average 12 days per year of bidirectional flow. With the reported hypoxic conditions observed in the YBA during low flow conditions, we expect this change in elevation would allow fish to flee potentially hypoxic waters of the YBA into the Yazoo and Mississippi rivers. As stated in the DEIS, Appendix F-8, “Unobstructed backwaters also provide horizontal and lateral avenues of escape from hypoxic waters. Once Steele Bayou water control structure is closed, the only avenue of escape is to move upstream or laterally into shallower water or smaller tributaries” and “the limited avenues of escape in regulated floodplains can lead to high mortality (Jones and Stuart, 2008)”. Just as closing the WCS gate too soon can act as a barrier for fish trying to enter the YBA when the MS River is rising, closing the gate too soon when the MS River is falling may act as a barrier for fish fleeing hypoxic conditions of the YBA.

Therefore, we recommend the USACE work with the Service, EPA, and state partners during the monitoring and adaptive management process to consider new or different operating elevations to further improve floodplain connectivity, encourage nutrient and dissolved oxygen exchange, and improve fish movement between basins. We also recommend the Eagle Lake water management agreement and Muddy Bayou WCS operation plan be revisited to determine optimal management strategies to benefit fisheries management once a pumping station is in place.

2. Encourage reforestation of the five-year floodplain.

The current plan includes the acquisition of up to 11,816 acres of cleared land at or below the two-year floodplain and 27,675 acres (DEIS, main report) of cleared land between the two- and five-year floodplain through fee or a restrictive easement based on voluntary participation. The Service understands the USACE’s efforts to acquire via acquisition or restrictive easement all cleared lands below the five-year floodplain (39,491 total cleared acres). This plan feature would not only reduce flood risk to existing crops within the five-year floodplain, but also restore these lands back to functioning bottomland hardwood forests. The Service recommends the use of restrictive easements on lands not adjacent to existing public lands in order to allow existing landowners to keep lands in their family for recreational purposes, avoid undue hardship of public agencies having to manage small, isolated tracks, and to continue supporting the local tax base.

To improve the potential success of this nonstructural feature, we recommend that the USACE provide additional implementation guidance for this feature in the FEIS. An implementation strategy outlining how interested landowners can sign-up for this feature, where funds will come from, the timeline for acquiring lands, and how the USACE will rank or prioritize sites would be beneficial.

3. Mitigate for past USACE projects in the YBA.

All mitigation for previous USACE project impacts in the YBA should be completed before additional impacts occur. The USACE has committed to satisfying these outstanding

mitigation obligations by 2035, which include the purchase and reforestation of 1,188 acres in the YBA. The Service recommends the USACE accelerate this effort since the majority of wetland impacts occurred 46 years ago when the Yazoo Backwater Levee was completed. The Service also supports the efforts of the USACE to determine the mitigation required for wetland impacts associated with levee improvements in the Rocky Bayou area that occurred before 1980 and include this acreage in the FEIS.

Additional Service recommendations:

4. Clearly articulate in the FEIS that pumping operations would not begin before March 15 and 25 for Alternative 2 and 3, respectively, provided water levels have not exceeded 93.0 ft NGVD 29 at the Steele Bayou WCS. We believe there may be confusion with the general public that on the first day of the growing season (March 15 or 25), the water levels would already be pumped down to at or below 90 ft. It's possible that the water levels could be up to 93.0 ft at the start of growing season, and that it would take some time to pump down to the targeted 90.0 ft growing season elevation.
5. The migratory landbirds assessment determined 1,056 acres of bottomland hardwood (BLH) restoration at or below the two-year floodplain would be required to mitigate landbird impacts. If the USACE or Ducks Unlimited is unable to acquire this acreage below the two-year floodplain, then the landbird assessment will need to be rerun to determine acreage required above the two-year floodplain.
6. To optimize mitigation for great blue heron and other wading species impacts, BLH reforestation efforts, when feasible, should be near active heronries and foraging habitat (water at less than 0.5 m depth throughout the breeding season). Further surveys to determine locations of active heronries are also recommended. Finally, reforestation efforts should also include cypress plantings which would be the most beneficial to wading bird species.
7. To minimize impacts to nesting migratory birds associated with the construction of the pump station and associated facilities, tree clearing should take place between August 1 and February 28.
8. Bald eagles (*Haliaeetus leucocephalus*) are found within the YBA and are protected under the Bald and Golden Eagle Protection Act. During project construction, on-site personnel should be informed of the possible presence of nesting bald eagles near the project boundary, and should identify, avoid, and immediately report any such nests to this office. If an active or inactive eagle nest is discovered within two miles of the pumping station construction footprint, then follow the bald and golden eagle guidelines found on-line at <https://www.fws.gov/library/collections/bald-and-golden-eagle-management> to determine whether disturbance will occur and/or an incidental take permit is needed.
9. In order to benefit the Monarch butterfly, we recommend revegetation of disturbed grassland areas (e.g., levees) with native plant species, including species of nectar-producing plants and milkweed endemic to the area.

10. The USACE should conduct annual monitoring of the bird species and taxa evaluated in Appendix F-4 to assess the long-term effects of the proposed Project on migratory birds of the YBA.
11. The USACE should monitor fish and turtle passage, entrainment, and impingement through the new pump station and develop mitigation strategies to offset any pump-induced mortality.
12. USACE should conduct fish surveys to determine benefits of new bidirectional flows at the Steele Bayou WCS gate on fish diversity and abundance.
13. Update or fund new water resource plans for the Mississippi Delta to address ways to recharge the aquifer and increase water table levels in the YBA. Updating or providing a water use plan that includes agricultural use may help reduce further dewatering or reverse this trend and address the source of the problem.
14. Coordinate further detailed planning of project features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) with the Service, the respective state wildlife agencies, and the EPA. The Service should be provided an opportunity to review and submit recommendations on those reports. Coordination regarding wetland mitigation site selection should occur with the Service and other resource agencies as well.

Summary of Findings and Service Position

The Service finds that the currently proposed water management plan for the YBA addresses many past concerns and objections noted in our 2006 and 2020 FWCA reports. Our previous position, which has not changed, has been the protection of a healthy backwater ecosystem within the YBA, most notably the protection of fish and wildlife resources within the two-year floodplain. Previous planning efforts would have encouraged agricultural production in marginal areas lying below the two-year floodplain and would not have supported ecologically and economically sustainable development. Since our 2006 report, we estimate over 40,000 acres of agricultural land within or near the one-year floodplain (87.0 ft) of the YBA have been converted to forests, showing clear evidence of the gradual and long-term movement away from agriculture to forest-based land uses within the poorly drained, frequently flooded portions of the YBA. We anticipate the currently proposed pump-on elevation of 90.0 ft during the crop season and 93.0 ft during the non-crop season will continue this movement away from agricultural production on poorly drained, frequently flooded portions of the YBA and towards reforestation efforts benefiting fish and wildlife resources.

The proposed water management plan also assesses impacts to all potential wetlands within the five-year floodplain and proposes a mitigation strategy to offset impacts, which was deficient in past planning efforts. In addition, the USACE has committed to fully mitigate impacts to fish and wildlife resources prior to project construction and operation, which would include up to 7,650 acres of BLH reforestation on existing agricultural lands and 404 acres of shorebird managed habitat (i.e., agricultural lands with the ability to manipulate water levels in order to create shallowly inundated/recently dewatered open areas for foraging). The USACE also proposes the

voluntary acquisition of all cleared lands below the five-year floodplain (39,491 acres), which depending on enrollment or interest of local landowners, could have significant beneficial effects on fish and wildlife resources of the YBA.

The proposed plan also includes three Memorandums of Agreement (MOAs) between the USACE, EPA, and the Service which we anticipate will provide a successful roadmap for continued collaboration on enhancing and protecting fish and wildlife resources in the YBA. The first MOA will require agreement by the Agencies for any deviations of the pump operations plan and water control structure operation plan, the second MOA is designed to ensure the effective and timely development and review of the mitigation plan for each compensatory mitigation component, and the third is regarding the collecting and evaluating of monitoring data to help inform adaptive management decisions regarding ongoing implementation of water management in the YBA.

The Service continues to advocate for historic backwater flows from the Mississippi and Yazoo rivers to be reintroduced into the YBA up to the one-year floodplain (87 ft). To that end, the USACE has committed to further evaluate and consider new or different operating elevations to further improve floodplain connectivity.

Therefore, we find the proposed Yazoo Backwater Area Water Management Plan, as proposed, attempts to develop an orderly, balanced, and environmentally sensitive approach to the water and related land resource problems and opportunities of the YBA. However, we believe it still requires some additional efforts to address some of our outstanding – and cited herein – concerns. We appreciate the collaborative efforts of the USACE to work with the Service, EPA, and other federal agencies to find a solution that balances flood risk reduction, sustained economic development, and natural floodplain values for the YBA.

Literature Cited

- Bayley, P.B. 1995. Understanding larger river floodplain ecosystems. *BioScience* 45(3):153-158.
- Department of Interior. 1988. The Impact of Federal Programs on Wetlands. Volume 1: The Lower Mississippi Alluvial Plains and the Prairie Pothole Region. A report to Congress.
- Environmental Protection Agency. 2008. Final Determination of the Assistant Administrator for Water Pursuant to Section 404(c) of the Clean Water Act Concerning the Proposed Yazoo Backwater Area Pumps Project in Issaquena County, MS. Federal Register 73:54398-54400.
- Goulding, M. 1980. *The fishes and the forest: Explorations in Amazonian natural history*. University of California Press, Berkeley, CA. 280 pp.
- Jester, D.B., A.A. Echelle, W.J. Matthews, J. Pigg, C.M. Scott, and K.D. Collins. 1992. The fishes of Oklahoma, their gross habits, and their tolerance of degradation in water quality and habitat. *Proc. Okla. Acad. Sci.* 72:7-19.
- Jones, M.J., and I.G. Stuart. 2008. Regulated floodplains - a trap for unwary fish. *Fisheries Management and Ecology* 15:71-79.
- Junk, W.J., P.B. Bayley, and R.E. Sparks. 1989. The flood pulse concept in river-floodplain systems. *Canadian Special Publication of Fisheries and Aquatic Sciences* 106:110-127.
- National Research Council. 1999. *New Directions in Water Resources Planning for the U.S. Army Corps of Engineers*. Washington, DC: The National Academies Press.
<https://doi.org/10.17226/6128>.
- Nichols, J.D., K.J. Reinecke, and J.E. Hines 1983. Factor affecting the distribution of mallards wintering in the Mississippi Alluvial Valley. *Auk* 100:932-946
- Odum, E.P., J.T. Finn, and E.H. Franz. 1979. Perturbation theory and the subsidy-stress gradient. *BioScience* 29:349-352.
- Opperman, J.J., R. Luster, B.A. McKenney, M. Roberts, A.W. Meadows. 2010. Ecologically functional floodplains: connectivity, flow regime, and scale. *Journal of the American Water Resources Association* 46:211-226.
- Reinecke, K.J., J.D. Moorhead, J.D. Hodges, and J.R. Nasser. 1989. Mississippi Alluvial Valley. Pages 203-247 in L.M. Smith R.L. Pederson, and R.M. Kaminski, eds. *Habitat management for migrating and wintering waterfowl in North America*. Texas Tech Univ. Press, Lubbock. 560 pp.
- Risotto, S.P., and R.E. Turner. 1985. Annual fluctuation in abundance of the commercial fisheries of the Mississippi River and tributaries. *N.A.J. of Fisheries Management*. 5:557-574.
- Sparks, R.E. 1995. Need for ecosystem management of larger river and their floodplains.

- Sparks, R.E., P.B. Bayley, S.L Kohler, and L.L Osborne. 1990. Disturbance and recovery of large floodplain rivers. *Env. Manage.* 14:699-709.
- Thorp, J.H., and DeLong M.D. 1994. The riverine productivity model: a heuristic view of carbon sources and organic-processing in large river ecosystems. *Oikos* 70:305-308.
- Twedt, D.J., R.R. Wilson, J.L. Henne-Kerr, and R.B. Hamilton. 2001. Nest survival of forest birds in the Mississippi Alluvial Valley. *J. Wildl. Manage.* 65:450-460.
- Welcomme, R.L. 1976. Some general and theoretical considerations on the fish yield of African Rivers. *J. Fish Bio.* 8:351-364.
- Welcomme, R.L. 1979. Fisheries ecology of floodplain rivers. Longman, London.
- Welcomme, R.L. 1985. River fisheries. Fish Technical Paper 262. FAO, Rome. 330 pp.
- Welcomme, R.L. 1986. International measures for the control of introduction of aquatic organisms. *Fisheries* 11(2):4-9.
- Wilson, R.R., and D.J. Twedt, and A.B. Elliott. 2000. Comparison of line transects and point counts for monitoring spring migration in forested wetlands. *J. Field Ornithol.* 71:345-355.
- Wilson, R.R., and D.J. Twedt. 2002. Spring bird migration in Mississippi alluvial valley forest. *Am. Mid. Nat.* 149:138-150.
- Ye, Q. 1996. Riverine fish stock and regional agronomic responses to hydrologic and climatic regimes in the upper Yazoo River basin. Ph.D. Diss., Miss. State Univ., Mississippi State, MS. 99 pp.