DEPARTMENT OF THE ARMY
VICKSBURG DISTRICT, CORPS OF ENGINEERS
4155 CLAY STREET
VICKSBURG, MISSISSIPPI 39183-3435

REPLY TO
ATTENTION OF:

MAY 0 2 2008

Executive Office

Mr. Lawrence E. Starfield
Deputy Regional Administrator
Environmental Protection Agency
Region 6
1445 Ross Avenue
Suite 1200
Dallas, Texas 75202

Dear Mr. Starfield:

I refer to:

a. Environmental Protection Agency letter of January 22, 2008, regarding review of the Yazoo Backwater Area Reformulation Report and Final Supplemental No. 1 to the 1982 Yazoo Area Pump Project Final Environmental Impact Statement.

b. March 19, 2008, Proposed Determination to Prohibit, Restrict, or Deny the Specification, or the Use for Specification, of an Area as a Disposal Site, Yazoo River Basin, Issaquena County, Mississippi (EPA-R04-OW-2008-0179).

The U.S. Army Corps of Engineers, Vicksburg District, responses to reference 1a above, as well as our comments on the Proposed Determination document, are enclosed (enclosure 1). I call your attention, specifically to the Response Introduction, which summarizes our major concerns. Please include these comments in the public submissions and as part of the administrative record.

If you have any questions, please contact either Mr. Kent Parrish, Senior Project Manager (telephone (601) 631-5006), or Mr. Mike Renacker, Project Manager (telephone (601) 631-5403).

Sincerely,

LTC, EN

for Michael C. Wehr
Colonel, Corps of Engineers
District Engineer

Enclosure

CONSOLIDATED COMMENTS
INTRODUCTION

On November 16, 2007, the Vicksburg District publicly released the Yazoo Backwater Area Reformulation Study's Final Report and FSEIS. The release initiated a public review comment period, lasting until January 22, 2008. During this period, the Vicksburg District received comments at a public meeting (November 29, 2008, Mayersville, Mississippi), as well as on the project website and through mail-in comment cards.

Federal and state agencies were also asked to submit comments during this period. On January 22, 2008, the Environmental Protection Agency (EPA) submitted comments and informed the Vicksburg District that it may make a predecisional referral of this project to the Council on Environmental Quality (CEQ). In addition, EPA stated that it also was considering whether to proceed with an additional project review of the project pursuant to their authorities under the Clean Water Act. On February 1, 2008, EPA informed the Vicksburg District that it would initiate a Section 404 (c) review due to what it calls "unacceptable adverse effects on the aquatic ecosystem, particularly to fish and wildlife resources."

Though EPA, the Vicksburg District, and the project sponsor continued consultation, EPA published the official notification in the Federal Register March 19, 2008, describing the review, their justification, and project concerns. As part of the Section 404 (c) review process, EPA has initiated a public comment period to include a public hearing held April 17, 2008, in Vicksburg, Mississippi. The Vicksburg District made a presentation at this meeting which is enclosed (enclosure 1).

The Vicksburg District has several areas of concern with the language in the Proposed Determination. 40 CFR §231.3 (b) (2) states that every public notice shall contain, "The location of the existing, proposed or potential disposal site, and a summary of its characteristics.' This information is not contained in the Proposed Determination, despite this information being readily available in the Yazoo Backwater Area Reformulation Study's Final Report and FSEIS. In addition, the Proposed Determination seeks to prohibit all sites in Issaquena County, Mississippi. 40 CFR §231.2 (a) states, 'Withdrawal specification means to remove from designation any area already specified as a disposal site by the U.S. Army Corps of Engineers . . . ." This disposal site is clearly specified in the Final Report and does not include all of Issaquena County.

During the February 29, 2008 meeting between EPA and Vicksburg District personnel, EPA stated that the 404 (c) veto process applies to the Recommended Plan. Yet, the Proposed Determination seeks to prohibit use of the site for any and all pump stations. This appears to be inconsistent with the intent of Section 404 (c) which is to prohibit the use of a specified site, because of unacceptable adverse effects associated with a specific proposal. As currently written, it appears that the Proposed Determination seeks to limit the Vicksburg District's discretion to evaluate and formulate flood damage reduction features.

On 25 March 2003, G. Tracy Mehan, Assistant Administrator, EPA, notified Mr. R. L. Brownlee, Acting Assistant Secretary of the Army (Civil Works), of his agency's key directions on this proposed project, as well as his thoughts as to how they should proceed. This direction was outlined through an attached memorandum from Mr. Mehan to Mr. James Palmer (EPA, Region IV Administrator) (Attachment 1). In the memorandum, Mr. Mehan instructed Region IV to "provide an objective critique of the adequacy of the science underlying the assessment of wetland acreage, values and environmental impacts." EPA Region IV has failed to provide this objective critique of the science. The EPA's project review and the Proposed Determination are scientifically flawed. The Proposed Determination lacks objectivity, is inconsistent, ignores the findings of other agencies, and is not founded on appropriate science. The EPA has based their conclusions on limited studies rather than the full body of scientific information available. Therefore, there is no substantive basis for the Proposed Determination that the disposal site for the Yazoo Backwater Reformulation Study's Recommend Plan be prohibited or restricted.

The U.S. Army Corps of Engineers, Vicksburg District's (Vicksburg District) Final Report and Final Supplemental Environmental Impact Statement (FSEIS) contain a detailed scientific analysis of project impacts. The Vicksburg District determined that the Recommended Plan, which includes both structural and nonstructural components, would increase the functional values of all resource categories studied. The EPA determined that the nonstructural component of the Recommended Plan was unfeasible, and therefore the benefits of the project were overstated. The nonstructural component includes the acquisition and reforestation of up to 55,600 acres of agricultural lands within the 2-year floodplain. The EPA's rejection of the Recommended Plan is based in part on their opinion that insufficient agricultural lands are available for reforestation. The Vicksburg District has provided data to the contrary and assurances that the structural component of the Recommended Plan will not be operated until 15,029 acres of compensatory mitigation lands are acquired. These 15,029 acres would provide 100 % of the required mitigation for all environmental resources studied. The remaining 40,571 acres would provide a net increase in functional values.

The EPA used inconsistent standards to evaluate the various alternatives. Since the Yazoo Backwater Project was first presented to the EPA in 1982, Region IV has opposed the project stating that it felt that a less environmentally damaging alternative was available. In 2000, Region IV proposed two non-structural alternatives. Both of these alternatives require the reforestation of more agricultural lands than the 55,600 acres proposed by the Vicksburg District (88,000 to 100,000 acres of reforestation). The Vicksburg District evaluated four nonstructural alternatives such as ring levees, floodproofing, relocation, and reforestation and concluded that they were not economically justified. The EPA's support for these nonstructural plans, which require up to 100,000 acres of cleared lands for reforestation, is inconsistent with their determination that insufficient lands are available for the Vicksburg District's Recommended Plan's nonstructural feature.

The wetland analysis in the FSEIS is one of the most comprehensive and detailed assessments of wetlands ever conducted. No one has ever calculated the impacts to wetlands based on changes in flood duration. Due to advances in computer modeling and the Geographic Information System, the wetland analysis contained in the FSEIS was able to compute the acres that may lose wetland states (if riverine flooding is the sole source of moisture) and those acres

of wetlands that would have a change in duration but still remain wetlands. The Vicksburg District model predicted 26,300 acres may lose their wetland status within the 2-year 5 % duration zone, and an additional 40,700 acres would experience a change in flood duration with the Recommended Plan. The EPA's Environmental Monitoring and Assessment Program (EMAP) predicted that 22,800 acres of wetlands in the 2-year flood plain would be affected. While EMAP was able to calculate the acres of wetlands that may lose their wetland status, their model is unable to locate the affected acres on a map, ascertain their land use (other than cleared versus wooded), or be certain of their duration. The Vicksburg District's wetland analysis is able to perform these functions. In addition, EPA's EMAP is also unable to compute, verify land use, or locate any wetlands that have a change in flood duration but still retain wetland status. The Vicksburg District's wetland analysis does perform these functions. Therefore, the Vicksburg District's wetland analysis is vastly superior to the EPA's EMAP. Although the project will affect a large number of wetland acres, the relative change in functional value will be small. Together, the 67,000 acres of wetlands affected by the project will reduce the base project wetland functions by less than 2 %. Compensatory mitigation to offset this 2 % loss of base wetland functions can be achieved by reforesting 3,800 acres of frequently flooded agricultural lands. The Recommended Plan calls for compensatory mitigation of 15,029 acres, which is nearly four times the mitigation requirement for offsetting wetland losses. Certainly this is not an unacceptable adverse effect.

The EPA claims that the FSEIS wetlands analysis is flawed because it did not use the entire 2-year floodplain and thus, wetland extent and project impacts are underestimated. Yet in 2005, EPA Region IV estimated that there were 176,700 acres of wetlands within the 2-year floodplain (Letter from Jim Giattina, EPA Region IV, 6 Dec 2006, Table 1, EMAP estimates of wetland extent in the 2 year floodplain with- and without project. The table estimated 179,120 acres, and the 176,700 acres was determined after a math error in the original table was corrected). The Vicksburg District determined that there were 189,600 acres of wetlands within the 2-year 5 % duration flood zone. The EPA estimated that 22,800 acres would be impacted, while the Vicksburg District estimated that 26,300 acres would be impacted. In both situations, the Vicksburg District's estimates were greater, and therefore more protective of wetlands.

The EPA's comparison of the FSEIS wetland impacts to national permits is misleading and not consistent with regulatory guidance on the use of functional analyses. Wetland 404 permits generally involve the complete draining or filling of wetlands for development. The 26,300 acres of wetlands impacted by the project would potentially lose approximately only 10% of their base functional value, but will not be drained or filled. The use of this functional analysis is consistent with Regulatory Guidance Letter 2-02 and the 1990 MOA between the EPA and Vicksburg District. EPA has not adhered to this agreed methodology in their proposed determination.

This project has been thoroughly studied. The original project report was released in 1982. This reformulation study effort was initiated in 1993 and concluded with the public release of a 5,400-page report in 2007. The need for flood relief is overwhelmingly supported by the substantial evidence of the administrative record that clearly demonstrates that through project redesign and avoid and minimization measures that the environmental losses of the original project are substantially reduced with all remaining losses being fully compensated. No credible

scientific data support the assertions of environmental damage raised by those opposed to the project.

The following responses address comments presented to the Vicksburg District from EPA's letter of January 22, 2008 (Attachment 2), and the Proposed Determination dated March 19, 2008 (Attachment 3), and are based on sound, scientific research gathered since the original report's release in 1982. These responses address EPA's concerns on a general level. For more specifics, please refer to the Final Report and FSEIS, which are incorporated by reference in this response.

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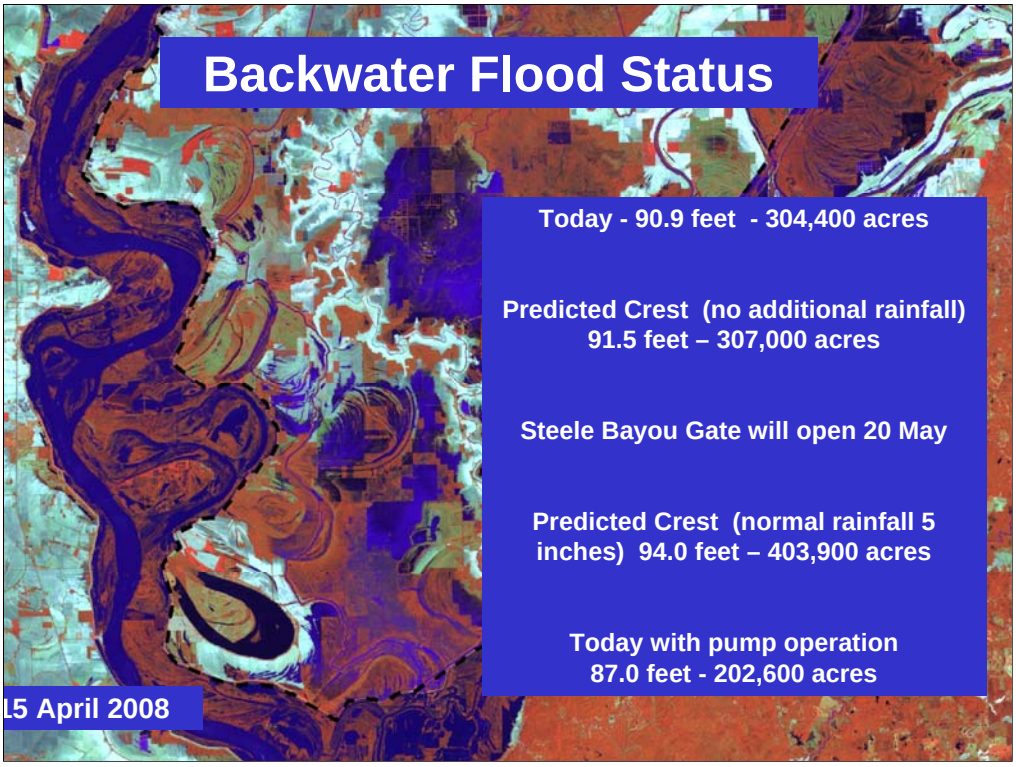
Yazoo Backwater Area Reformulation Study

EPA 404(c) Public Hearing

Vicksburg, MS

17 April 2008

Results with Safety, Integrity and Respect


Backwater Flood Status
Today - 90.9 feet - 304,400 acres
Predicted Crest (no additional rainfall)
91.5 feet – 307,000 acres
Steele Bayou Gate will open 20 May
Predicted Crest (normal rainfall 5 inches) 94.0 feet – 403,900 acres
Today with pump operation
87.0 feet - 202,600 acres
15 April 2008

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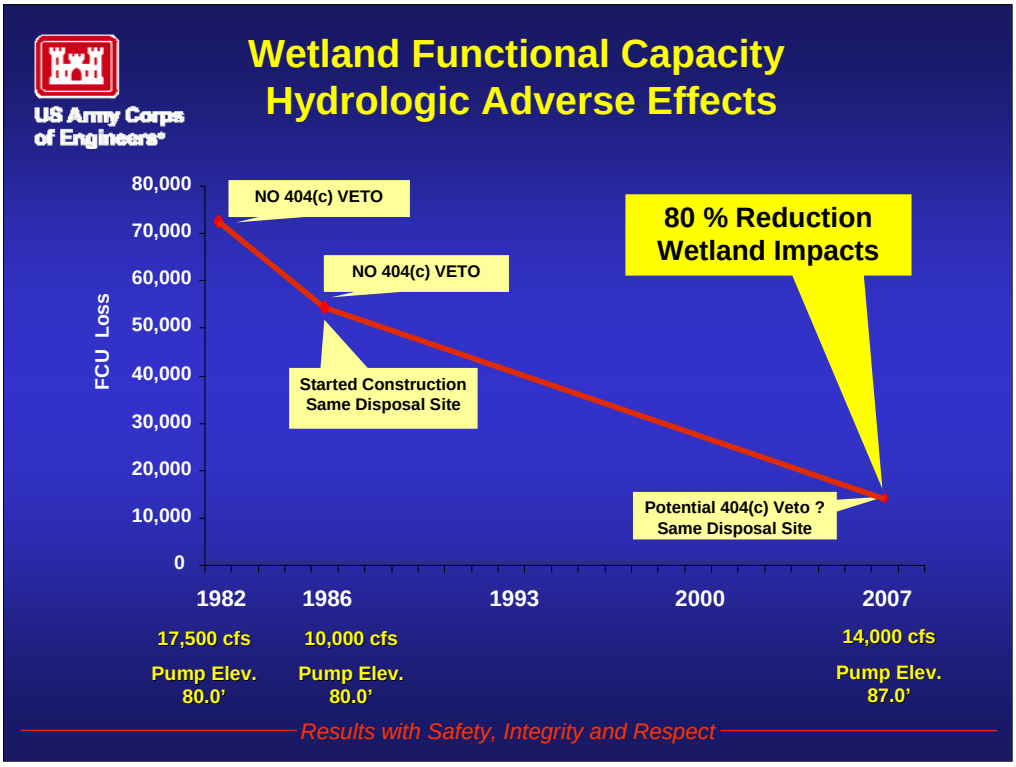
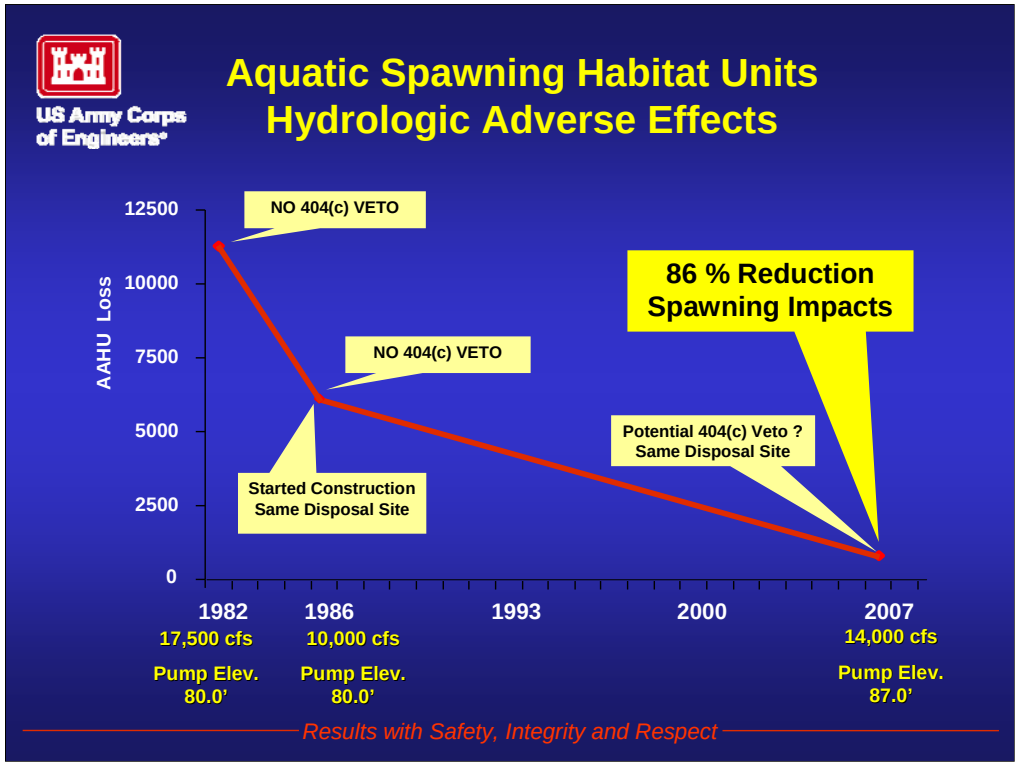
Historic Perspective

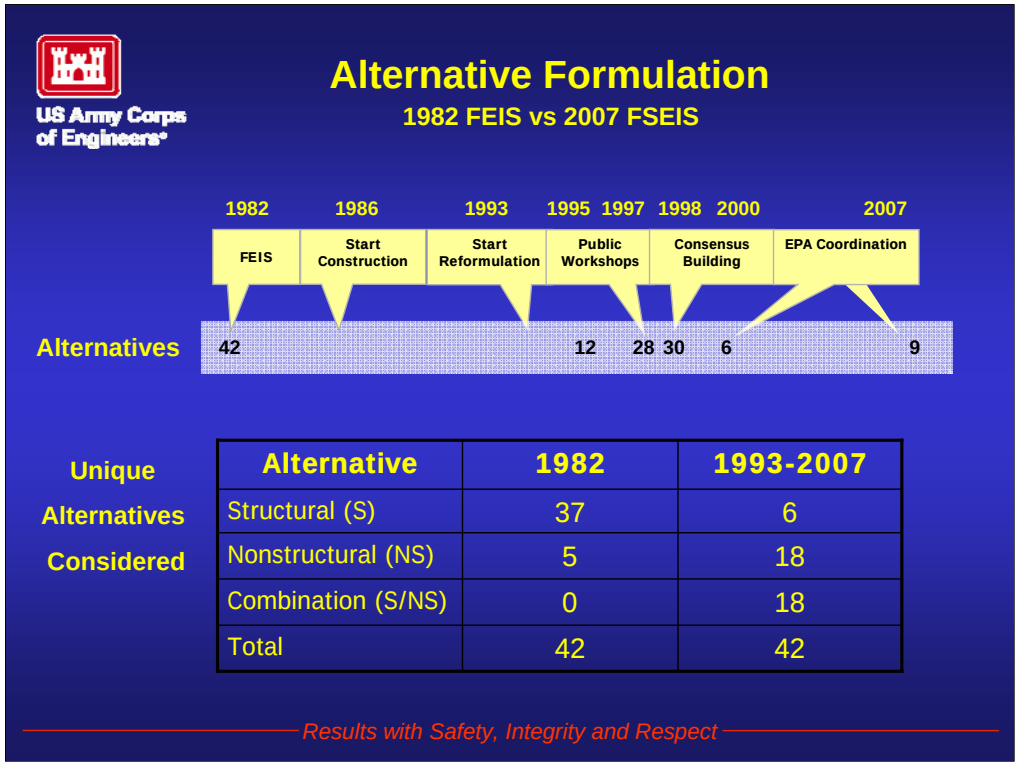
Results with Safety, Integrity and Respect



1. 80% reduction in adverse wetland effects since 1982 recommended plan.
2. Started construction on same disposal site now being considered for veto in 1986.
3. No veto in 1982 or 1986…Potential veto in 2008 despite being the same disposal site and an 80 percent reduction in adverse effects through extensive study and reformulation.
4. Smaller pump station and higher pump-on elevation in 2007 compared to 1982 or 1986.



1. Point same as previous slide, but for fish spawning adverse effects…In this case an 86 percent reduction in adverse effects.



1. District has taken an exhaustive look at nonstructural and combination non-structural/structural alternatives.
2. In fact, 3 times as many nonstructural and combination non-structural/structural alternatives compared to structural alternatives considered during reformulation.
3. Many of the non-structural features and plans were suggested by the U.S. Fish and Wildlife Service and the EPA.

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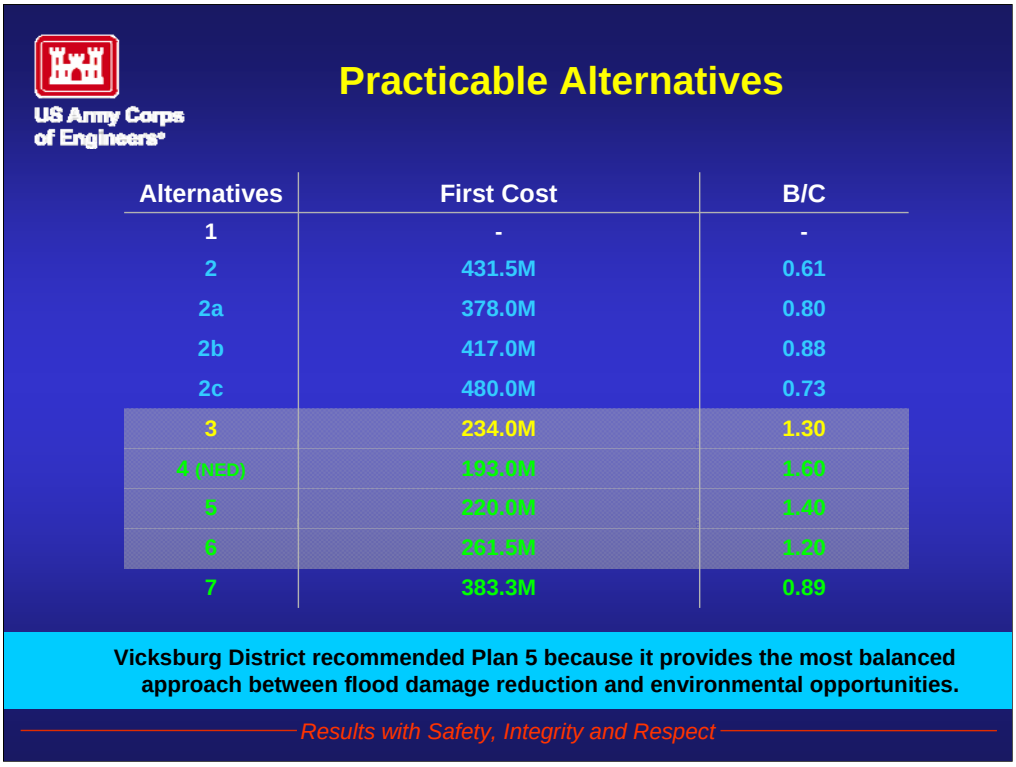
Practicable Alternatives

Clean Water Act… "An alternative is practicable if it is available and capable of being done after taking into consideration ***cost***, existing technology, and ***logistics in light of overall project purposes***." Emphasis Added



1. Plans 2, 2A, 2B and 2C were non-structural only plans…Plan 3 is a structural only plan (pump station)…Plans 3 through 7 are combinations (pump station and reforestation).
2. Based on Corps Planning and Guidance Regulations, only alternatives 3 through 6 are considered practicable based on previous slide definition.

1. Can protect structures with ring levees, but…
2. Still have no access, except by boat…no emergency services (safety issue)…no operable sewage system (health issue).
3. Huge social impacts still remain.

1. Cost more to protect the structure…than the structure is worth. Not economically justified.

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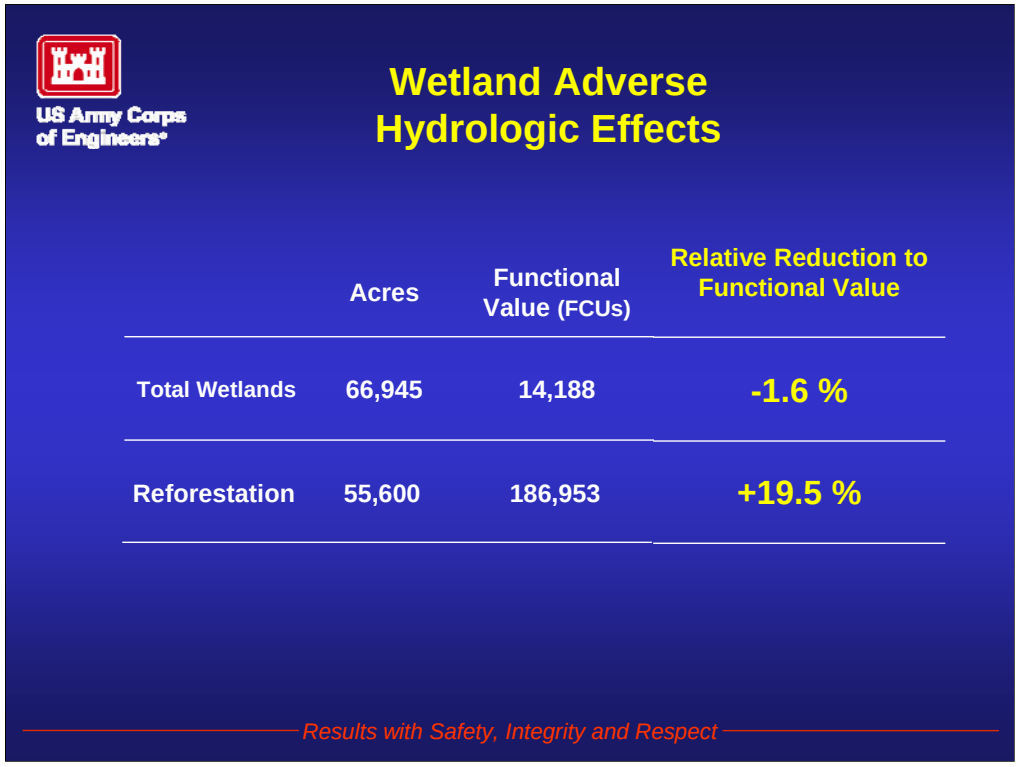
EPA states recommended plan has "Unacceptable Adverse Effects."

Vicksburg District's functional analysis indicates small relative adverse effects.

This functional approach is consistent with Regulatory Guidance Letter No. 02-2 and the 1990 Memorandum of Agreement between the Corps and EPA.



1. Functional effect is relatively small. Functional impact is the appropriate unit of measure, rather than acres. Using only acres does not provide an accurate measure of impact because it doesn't account for the quality of the wetland or the magnitude of impact to the wetland.
2. Wetland adverse effects fully compensated through reforestation.
3. Reforestation will provide a significant gain in wetland function.

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Inaccuracy

EPA's Proposed Determination

"…approximately 26,300 acres would be hydrologically modified to the extent that they would no longer be defined as wetlands and would lose CWA regulatory protection."

Vicksburg District

Analysis based only on backwater flooding.

With 54 inches of annual rainfall, many acres may remain protected.

Protection can only be determined by a field assessment.

Impacts are overestimated by not considering rainfall.

1. Vicksburg District offered potential project modifications to reduce "unacceptable adverse effects" after receiving notice of intent to prepare a proposed determination…Not mentioned in proposed determination file in the Ferderal Register.
2. Raised pumping elevation, increased reforestation and offered to modify real estate acquisition.
3. Proposed modification not given serious consideration by EPA.

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EPA's Inconsistency and Technical Disagreements

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EPA's Proposed Determination

"Specifically, we believe that an alternative may be available that would provide a less environmentally damaging and more sustainable approach…"

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"Such an alternative might incorporate,…

reforestation of farmlands…

relocation or flood proofing…

conservation easements…

localized flood protection structures, including pumps…

expansion of insurance programs to compensate for economic losses…"

Vicksburg District

EPA raises serious concerns about reforestation of farmlands and conservation easements in the Proposed Determination.

All of these features were extensively evaluated and documented in the 18 nonstructural and 18 combination plans.

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Other Pump Stations

State	Name	Capacity (cfs)	Area (sq. miles)	Capacity / Area (cfs / sq.mile)	Year	Veto
LA	River Styx	750	36	**21**	1994	**No**
AR	Lake Chicot	6,500	350	**19**	1987	**No**
LA	Tensas-Cocodrie	4,000	582	**7**	1986	**No**
LA	HaHa Bayou	750	113	**7**	2001	**No**
AR	Huxtable	12,200	2,013	**6**	1977	**No**
MS	**Yazoo Backwater**	14,000	4,093	**3**	???	**???**

Yazoo Backwater – Lowest capacity per square mile

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1. **Next 5 largest pumps within 200 miles of the Yazoo Backwater disposal site.**
2. **Yazoo Backwater pump station small in relative terms…when comparing capacity to drainage area.**
3. **No other pumps were vetoed.**

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Technical Disagreement

EPA's Proposed Determination

"…project could increase peak discharges and water currents in the Mississippi River, and exacerbate flooding problems downstream at a time when communities in the lower Mississippi River Valley are still struggling to recover from the effects of recent catastrophic flooding."

Vicksburg District

The project has no effect on the City of New Orleans

Floodways are in place to prevent flooding of New Orleans from the Miss. River

The peak stage on the Miss. River would be increased by 1 inch.

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Technical Disagreement

EPA's Proposed Determination

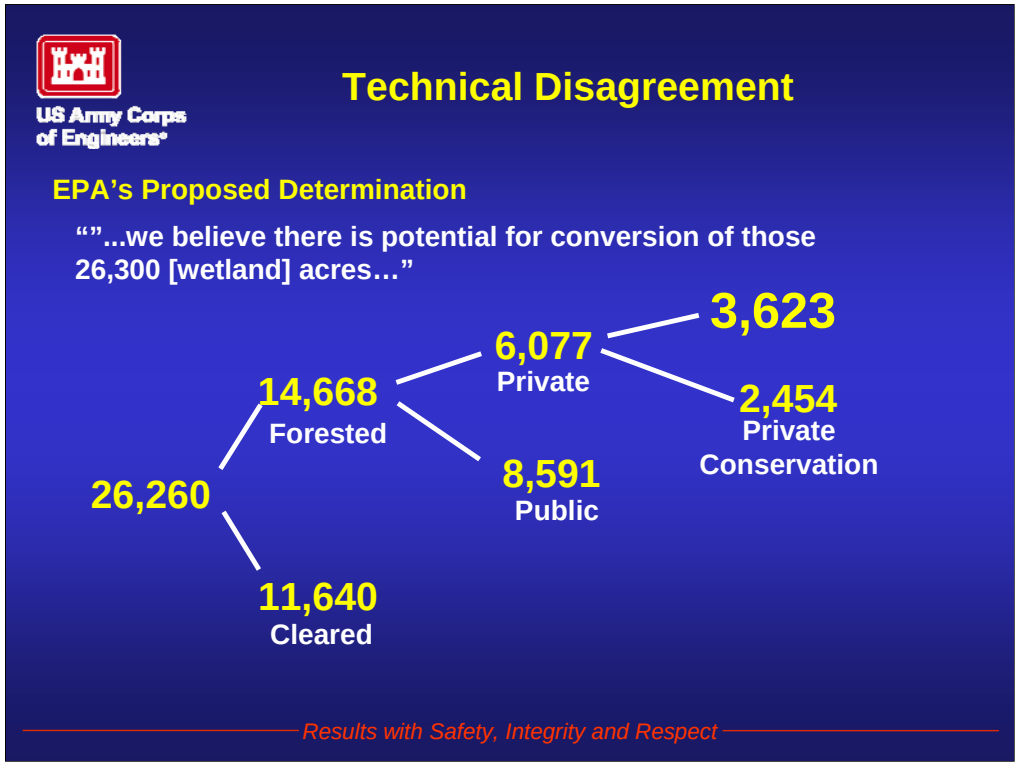
"By maintaining water levels of regular flood events at approximately 87.0 feet, NGVD, at the Steele Bayou gauge, water would not be allowed to collect for significant periods of time in the backwater wetlands."

Vicksburg District

The project purpose is not to hold water at 87 feet, but to reduce flood damages above that elevation.

Water levels will still rise and fall with pump station operation depending on rainfall.

The project will maintain a conservation pool between 70.0 and 73.0 during low flow periods.



1. The potential acreage is only 3,623…not 26,300 after considering what has already been converted and what has some form of existing protection from clearing.
2. Final Report and SEIS provide scientific analyses documented why the 3,623 acres have a low probability for clearing.
3. EPA provides no science to support their position. Only speculation about increases in commodity prices.

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Estimation of Adverse Effects

EPA's Proposed Determination

" The nine fish species selected for the…HEP assessment do not represent fish species whose life cycles would be affected by the proposed project's…"

Vicksburg District

Selected by professional biologists from the FWS, MDWFP and the Corps based on field data and knowledge of backwater fisheries.

EPA was invited to be a cooperating agency and participate in the HEP team in 1993. They did not participate.

EPA did not raise this issue in their 2000 comments on the draft EIS or on the revised technical appendices in 2005.

This fundamental issue was raised 15 years after interagency agreement.

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Mitigation

EPA's Proposed Determination

"If this project is going to rely on compensatory mitigation to reduce impacts to an acceptable level, there must be a very robust and detailed mitigation plan…"

Vicksburg District

More detailed than two previous plans in Yazoo Basin. No EPA objections to previous plans.

Successfully established 27,000 acres of bottomland hardwood mitigation in the Yazoo Basin.

Wetland monitoring program on mitigation properties since 2000.

Conservation Easements are the same as the very successful WRP in the basin.

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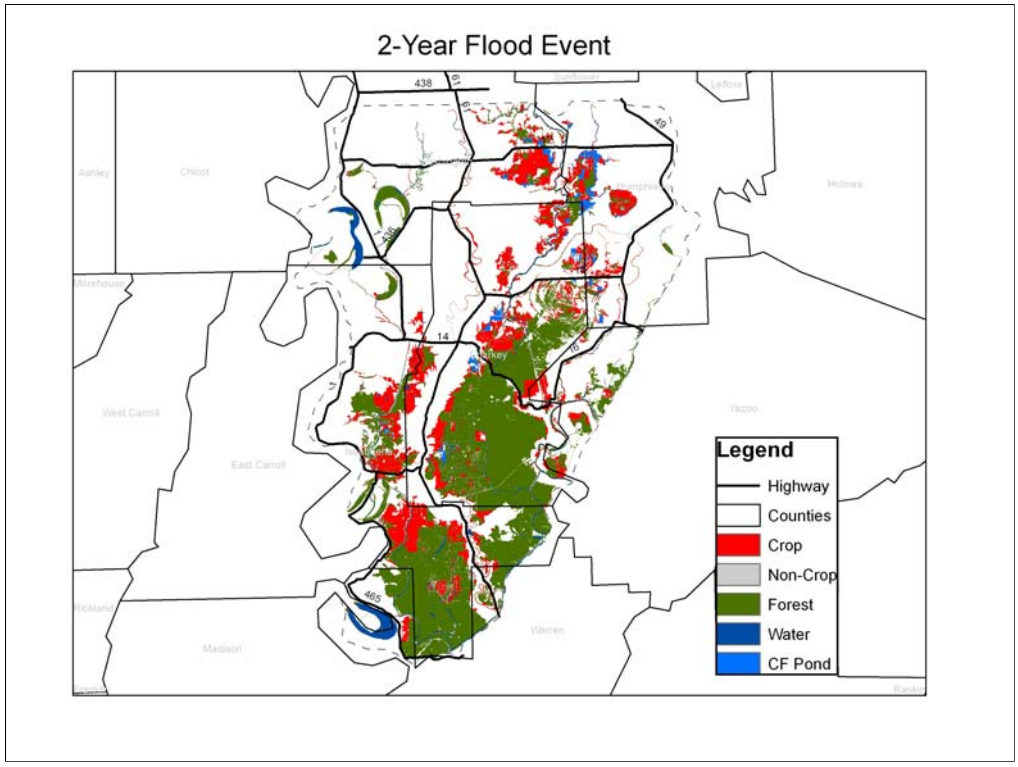
Uncertainty of Proposed Reforestation

EPA's Proposed Determination

"Reforestation sites have not been specifically identified in the FSEIS and…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."

Vicksburg District

Sufficient lands are available.



1. **Areas in red are lands potentially available for reforestation.**
2. **Note that the majority are adjacent to existing bottomland hardwoods….the reforestation will not result in a fragmented patchwork of reforestation.**

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Estimation of Adverse Effects

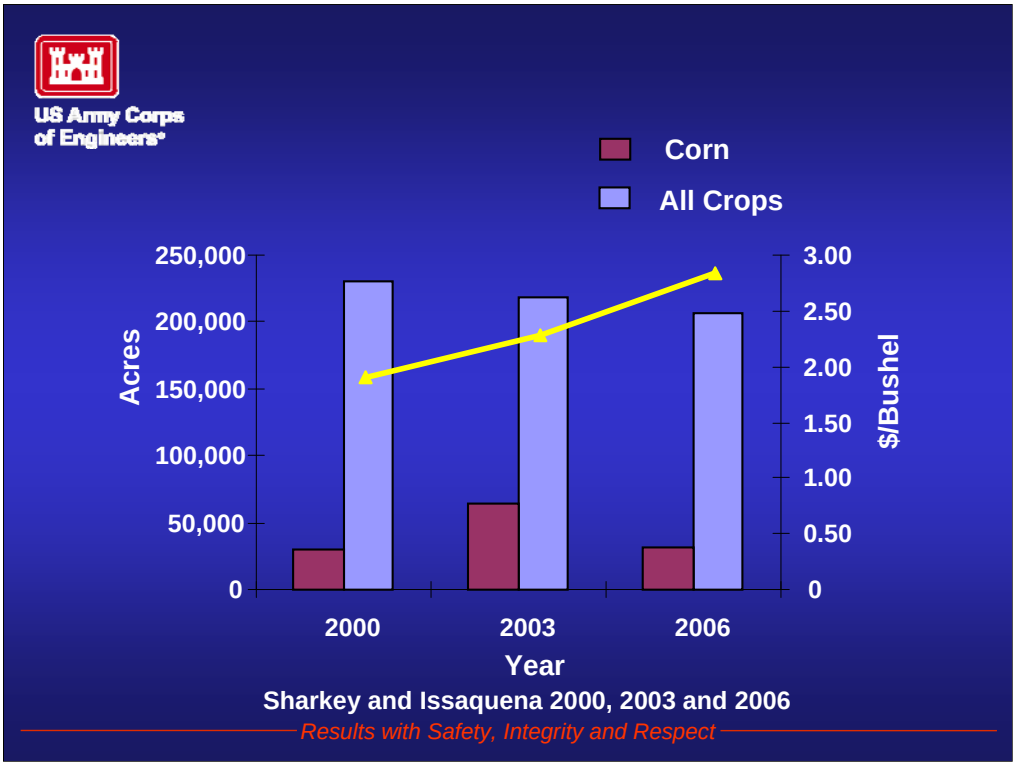
EPA's Proposed Determination

"”... given the rise in prices for agricultural products in the Mississippi Delta, and the strong increase in domestic production of corn nationwide, agricultural intensification is a serious possibility.

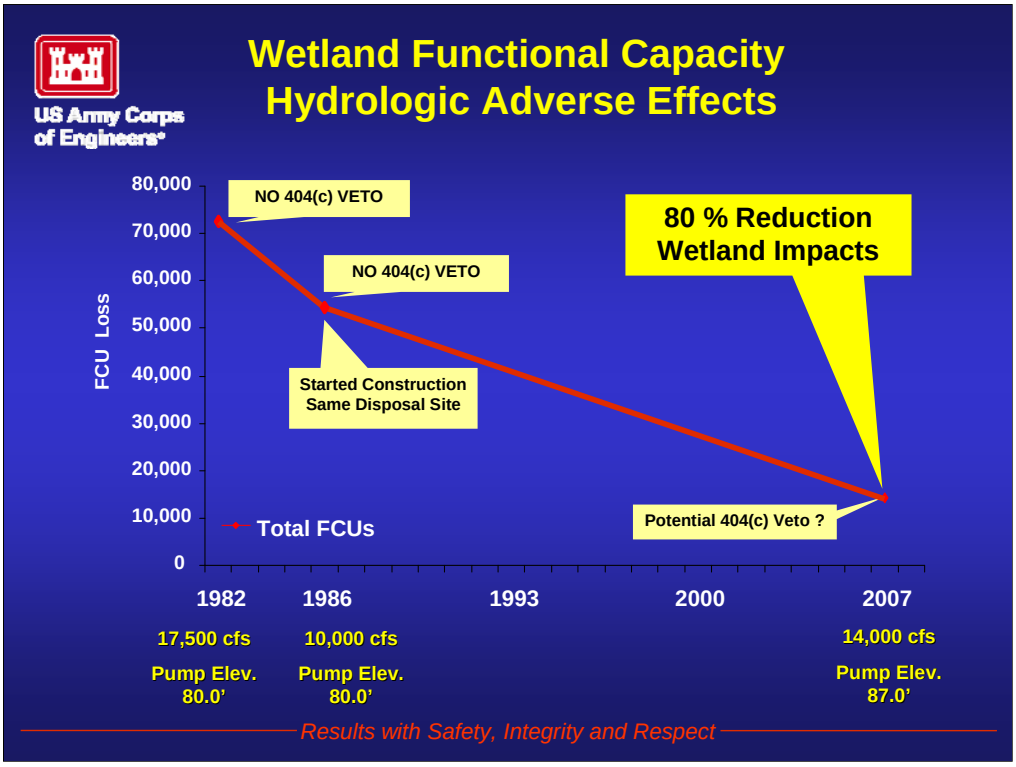
Vicksburg District

Increase in commodity prices has not led to additional land clearing in the project area.

Farmers simply substitute one crop for another on existing agricultural land.



1. Corn acreage increased between 2000 and 2003…but, total acreage went down. Clearly indicates that additional acres were not being cleared, but that corn was being substituted for other crops.
2. Despite corn prices continuing to raise between 2003 and 2006, corn acreage was reduced by 50 percent. Other decision factors are being considered by the farmers, not just price.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Wetland Functional Capacity
Hydrologic Adverse Effects
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
FCU Loss
NO 404(c) VETO
NO 404(c) VETO
Started Construction
Same Disposal Site
80 % Reduction
Wetland Impacts
Potential 404(c) Veto ?
Total FCUs
1982
1986
1993
2000
2007
17,500 cfs
Pump Elev.
80.0'
10,000 cfs
Pump Elev.
80.0'
14,000 cfs
Pump Elev.
87.0'
Results with Safety, Integrity and Respect

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Conclusion

AFTER 15 YEARS OF DETAILED SCIENTIFIC ANALYSIS AND COORDINATION:

The recommended plan is environmentally sustainable, providing a balance between flood damage reduction and environmental needs in the Yazoo Backwater Area.

The adverse effects are relatively small, more than fully compensated and do not represent an unacceptable adverse effect.

VICKSBURG DISTRICT'S PUBLIC RESPONSE AT EPA HEARING, APRIL 17, 2008

1. January 22, 2008, Letter: Response to Environmental Protection Agency's (EPA) Primary Concerns.

On January 22, 2008, EPA completed its review of the Yazoo Backwater's Reformulation Final Study and FSEIS. The EPA concluded that the project Recommended Plan was to be a candidate for referral to CEQ, as well as a probable Section 404 (c) review under the Clean Water Act. The EPA provided the Vicksburg District with its list of concerns. Below is the Vicksburg District's response to each concern.

a. Project Description. EPA asserts that the Recommended Plan's nonstructural feature will reforest 40,751 acres, the correct number is up to 55,600 acres. The difference of 15,029 acres is the portion of the acreage that will be purchased prior to the pump station operating.

(1) EPA stated the Yazoo Backwater Area maintains a hydrologic connection with the Mississippi River. This connection is controlled by levees and two water control structures which were completed by 1978. During high water on the Mississippi and Yazoo Rivers, the Steele Bayou and Little Sunflower structure gates are closed. One of the few times the two structures have their gates fully opened is to evacuate floodwaters from inside the basin once the Yazoo River stage is lower than the interior basin flood stage. During low water, the Steele Bayou structure is operated to maintain water within the basin for fisheries and conservation purposes. The Little Sunflower structure gates are also closed at this time. The EPA implies that the Yazoo Backwater pump would alter the remaining connection, when in fact the pump would not alter the existing connectivity at all. With or without the Recommended Plan, there is no connectivity.

(2) The Final Supplement Environmental Impact Statement (FSEIS) addressed impacts to fish and wildlife in its Environmental Resource appendixes. Multiagency teams of biologists from the Vicksburg District, ERDC, Mississippi Department of Wildlife, Fisheries and Parks (MDWFP), and U.S. Fish and Wildlife Service (FWS) participated in Habitat Evaluation Procedure (HEP) teams to evaluate these resources based on species and models selected and agreed to by the team members. The EPA was invited, but chose not to participate on any of these teams, and these issues have never been raised in previous review comments to the Draft 2000 Report and the 2005 Draft Technical Appendices.

(3) Pursuant to Section 7 of the Endangered Species Act, Biological Assessments (BA) for the endangered plant pondberry and the threatened Louisiana black bear were sent to FWS on December 5, 2005 (Appendix 14). The BA determined that the project was not likely to adversely affect either species. The FWS did not concur with the determination that the project was not likely to adversely affect pondberry. The Vicksburg District requested initiation of Section 7 formal consultation with FWS to ensure the project did not jeopardize the continued existence of pondberry. The FWS initiated Section 7 formal consultation for pondberry on January 18, 2006. The FWS provided its pondberry Biological Opinion (BO) July 2, 2007. The

formal consultation enabled the Vicksburg District and FWS to examine possible impacts on pondberry in greater detail. Each agency drew different conclusions, despite analyzing the same data, about the role of backwater flooding on pondberry. Despite these differences, FWS concluded the project would not jeopardize the continued existence of the endangered plant pondberry. The Vicksburg District's Recommended Plan in compliance with the Endangered Species Act.

(4) To help conserve and recover the pondberry, the Vicksburg District has significant ongoing or planned activities designed to address data and recovery tasks contained in the FWS 1993 Pondberry Recovery Plan. In 2003, the Vicksburg District, the U.S. Department of Agriculture Forest Service, and USFWS entered into a 7-year, $5 million interagency agreement to conduct extensive research on pondberry's biological and ecological requirements. Final results of this study have not yet been published. In addition, in 2007, the Vicksburg District and FWS signed a Memorandum of Agreement to establish two new pondberry populations in the study area and conduct additional field experiments evaluating the effects of flooding, stand thinning, competition, and pathogens.

(5) The water quality analysis paid particular attention to the wetland functions that impact water quality. While there would be some losses in function based on direct and indirect impacts, the analysis showed that the functions provided from reforestation of cleared land within the 1- and 2-year frequency flood plain would exceed these losses. Because much of the Yazoo Backwater Area is characterized by soils with low hydraulic conductivity (< 0.1 inch per hour), groundwater recharge into the Mississippi River Alluvial Aquifer and maintenance of stream base flows are not major functions performed by Yazoo Backwater wetlands. According to Arthur (2001), approximately 20 inches of the more than 50 inches of precipitation is runoff, leaving approximately 32 inches for evaporation, transpiration by vegetation, and replenishment of the ground-water reservoir. Approximately 30 inches of precipitation are utilized in evapotranspiration processes each year. Usually only approximately 2.6 inches replenishes the ground-water reservoir.

b. Magnitude of Wetland Impacts.

(1) Due to the size of the project area, site-specific wetland delineations were not feasible, and therefore a landscape delineation technique was required. In response to comments from EPA received on 2000 Draft Report, the Vicksburg District developed a Geographic Information System (GIS) based technique that would map both the extent of base wetlands and the wetlands that would likely be impacted and agreed to use the HGM method to analyze impacts. A thorough understanding of wetland hydrology is necessary to manage these goals. The Vicksburg District based its method on the Federal definition of wetlands in the 1987 Wetland Delineation Manual (WDM). Other sources of information on wetlands, such as "Wetlands," Mitsch and Gosselink, 2000; and "Southern Forested Wetlands Ecology and Management," eds. Messina and Conner, 1998, were utilized to supplement the information in the WDM.

(2) The joint EPA/Vicksburg District wetlands definition: “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for a life in saturated soils conditions.”

(3) The GIS based delineation technique includes the following steps:

(a) Determine the wetland elevation at all gages in the study area.

(b) Find a satellite scene with stages similar to the wetland elevation, classify the scene, and map the extent of flooding in the satellite scene.

(c) Field verify the wetland extent as delineated by the satellite scene.

(d) Model the extent of the 5 percent duration flood with a GIS flood simulation model (Flood Event Assessment Tool (FEAT) and Flood Event Simulation Model (FESM)).

(e) Model the with-project extent of the 5 percent duration flood for each project alternative and compute the extent of impacts.

(f) Use Hydrogeomorphic Method (HGM) to calculate the base and with-project functional values of wetlands.

(4) For the first step, the Vicksburg District chose to use the 2-year frequency, 5 percent flood duration as the wetland elevation. This decision is supported by the hydrology section of the WDM. Table 5 in the U.S. Army Engineer Research and Development Center (ERDC) Technical Report Y-87-1 (Corps Wetlands Delineation Manual, WDM) summarizes wetland hydrology in the following manner. Areas that are inundated or saturated less than 5 percent of the growing season are not wetlands. Areas that are seasonally inundated or saturated for 12.5 percent (34 days) of the growing season continuously are wetlands. Many areas that are intermittently inundated or saturated between 5 and 12.5 percent (14 to 34 days) of the growing season in most years (50 percent probability of recurrence) may or may not be wetlands. The Vicksburg District elected to use the upper boundary of possible wetlands (5 percent continuous duration) as the upper limit for wetland hydrology.

(5) By using the upper boundary, the Vicksburg District assured that all areas likely influenced by riverine flooding were included. The 5 percent duration elevation at the gages in the study area were determined by the WETSORT program. WETSORT calculates the annual 5 percent (and the 2.5, 7.5, 10, and 12.5 percent duration elevations) and sorts them by elevation. The program also computes the mean and median elevation for the period of record at each gage for all of the duration intervals. (Note. The Vicksburg District could have calculated only the 5 percent duration elevation and reduced the reported impacts to wetlands by approximately 40,000 acres. The District could also have restricted the gages to the Steele Bayou and Little Sunflower structures. Using all the gages in the study area created a sloped 5 percent duration

flood surface. The base wetland acres were significantly increased by this decision. The sloped 5 percent duration flood surface (~190,000 acres) was more than double the extent of the flat 5 percent duration flood (~90,000 acres). The project will only affect backwater flooding, which by definition does not have a sloped flood surface. A backwater flood starts at the downstream end of a basin and moves upstream, it does not have a sloped flood water surface. This is one of the major distinctions between a headwater flood and a backwater flood.)

(6) The second step was finding and classifying an appropriate satellite scene. This is basic remote sensing, and is covered in the FEIS. The third step, field verification, was accomplished by sampling 54 sites in and adjacent to the mapped wetland extent using the field techniques described in the WDM. A more extensive field verification study was designed by EPA and jointly executed by EPA, USACE, the Natural Resources Conservation Service, and FWS. The results of the EPA's Environmental Monitoring and Assessment Program (EMAP) field study are reported in the FEIS (Appendix 10, Wetlands).

(7) The next step in the process was to model the extent of the 2-year frequency 5 percent duration flood. This was a necessary step for the following reasons: (a) it would be difficult to locate satellite scenes which represented each of the project alternatives, (b) the satellite scenes included wetlands sustained by both riverine flooding and precipitation, and (c) the GIS model would provide a common tool to evaluate the extent of the base and with-project wetlands for all alternatives. The HGM lists three possible sources of water to sustain wetlands--precipitation, groundwater, and surface water. The HGM approach identifies seven basic wetland subclasses--depression, tidal fringe, lacustrine fringe, slope, mineral flat, organic flat, and riverine. Only the riverine subclass is sustained by surface water from rivers. The Yazoo Basin does not have any ground-water (slope) sustained wetlands, so all wetlands are either sustained by precipitation or surface water. A complete description of the wetland subclasses for the Yazoo Basin are found in "A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Selected Regional Wetland Subclasses, Yazoo Basin, Lower Mississippi River Alluvial Valley," (Smith and Klimas, 2002). Because the basin contains wetlands sustained by two different sources of water, the Vicksburg District applied a GIS based flood simulation model to identify those areas that contained riverine wetlands.

(8) The following assumptions were made to simplify the modeling process:

(a) If an area meets the hydrologic conditions of a wetland, then it also meets the vegetative and soils conditions as well.

(b) The 2-year frequency 5 percent duration flood describes the extent of riverine wetlands in the project area.

(c) Wetlands above the 2-year frequency 5 percent duration flood elevation are disconnected depressions and will not be affected by the project.

(d) Backwater flooding is the sole source of water that sustains wetlands in the project area.

(e) All areas flooded by the 2-year frequency 5 percent duration flood, flood instantly.

(9) The first assumption over estimates the extent of wetlands, as not all sites which meet the hydrology conditions will actually meet the other two conditions. With regard to the second assumption, if an area is flooded for 14 days every 2 years, it meets the minimum hydrology criterion and does not require another source of moisture to sustain the wetland status. Again, the WDM states that only some of the areas with this hydrology are wetlands and this assumption likely overestimates wetland extent. It does provide a dividing line between riverine and precipitation driven wetlands. The third assumption suggests that wetlands above the 2-year frequency 5 percent duration elevation do not receive riverine flooding with a frequency and duration sufficient to sustain their wetland status. Thus, precipitation is the major source of moisture that sustains those wetlands. It was not meant to suggest that these wetlands are totally isolated from riverine influence. Streams are normally one-way conduits of flow. Water normally only flows down slope, but in backwater areas streams can be two-way conduits of flow. The Vicksburg District assumed that the limit of two-way exchange (backwater hydrology) was the 5 percent duration elevation. This assumption is consistent with the WDM. Assumption four is important and is best explained with a water budget equation as is found in "Wetlands" (2000). The basic water budget for wetlands is as follows:

$$dV/dt = Pn + Si + Gi - ET - So - Go +/- T$$

where
V = volume of water storage in wetlands
dV/dt = change in volume of water storage in wetland per unit time, t
Pn = net precipitation
Si = surface inflows, including flooding streams
Gi = groundwater inflows
ET = evapotranspiration
So= surface outflows
Go= groundwater outflows
T = tidal inflow (+) or outflow (-)

(10) For the Yazoo Backwater Area: T and Go = 0, Gi = ET, Pn and ET are constant across the basin and Pn>ET. According to Messina and Conner in "Southern Forested Wetlands" (1998), the minimum hydrology for a forested wetland is that Pn > ET. Thus, all forested areas in the basin meet that basic requirement, which makes it difficult to isolate those areas which are wetlands solely due to riverine flooding. By assuming Pn = 0, the equation simplifies to dV/dt = Si – So, and all areas with a 2-year flood duration greater than 14 days are wetlands. During any flood event the change in water volume within the wetland will be Si – So –Gi –ET, and during the winter ET will be zero. Here Gi refers to floodwater lost to infiltration. (With regard to the ground-water terms, Gi and Go, basin soils have a high clay content and very low infiltration rates. Infiltration rates are as low as 1 inch per day. All the water that infiltrates

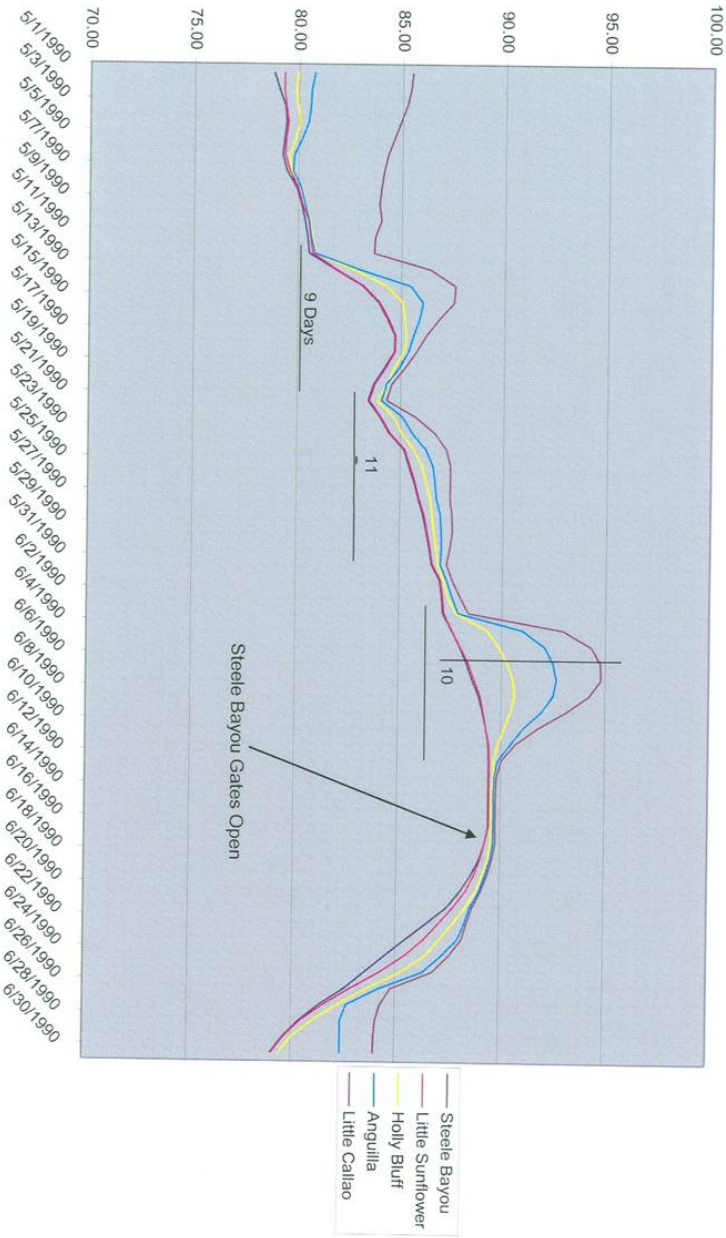
into the soil during the winter when P > ET, is removed during the summer when ET > P (Mitsch and Gosselink, 2000 and Messina and Conner, 1998). Studies by USGS (O'Hara, 1996 and Arthur, 2001) have shown that only a small part of the backwater area with nonhydric soils show any movement of surface water into the ground water. Eighty-five percent of the Basin is comprised of hydric soils. The major area where this occurs is the Deer Creek ridge, which is an elevated area that separates the Steele Bayou subbasin from the Big Sunflower subbasin. Most of the Deer Creek ridge is above the 100-year flood elevation.

(11) The final assumption is that all flooding occurs instantly, again over estimates wetland extent and function. Flooding does not occur instantly due to friction. Backwater flooding is generally a slow process where the flood surface elevation only increases by a few inches per day. The lateral spread of the flood is also slow. The two flood models (FEAT and FESM) both over estimated the flood extent in the 5% duration flood zone, because the models did not consider friction. The Yazoo Backwater Study Area is large enough that a flood can be receding in the upper part of the basin while increasing in the lower part of the basin. Runoff from precipitation falling in Clarksdale, Mississippi, can take up to 2 weeks to reach the Yazoo Backwater area. Figure 1 shows a typical backwater flood event (1990). The water surface on the landside of the Steele Bayou Structure slowly rises from less than 80 feet on May 1, to nearly 90 feet by mid June. There are three small storm events during the period. Followed by intervals where there was little difference between the downstream and the upstream water surface elevations (backwater flooding). The event ends in mid June with a week of classic backwater flooding, where there is less than 1 foot of elevation difference between all of the gages. The Steele Bayou Structure was opened around 20 June 1990. At that time, stages on the Mississippi and Yazoo Rivers were lower than those on the landside and the interior water is allowed to flow out.

c. Compliance with Clean Water Act Guidelines.

(1) The Vicksburg District has complied with all applicable environmental laws, executive orders, and regulations including Section 309 of the Clean Air Act and Sections 401 and 404 of the Clean Water Act, and the National Environmental Protection Agency and CEQ regulations during the course of this study to improve the human and natural environment of the Yazoo Backwater area. The Vicksburg District diligently sought the public views and recommendations, which included Federal and state agencies, recognized Federal Indian tribes, and other organizations, including conservation groups and interested individuals. Coordination

Figure 1
May_Jun_1990



efforts were continuous on Yazoo Backwater Draft and Final Reports with EPA's requested comments in accordance with Section 309(b) of the Clean Air Act.

(2) Contrary to EPA statements, the Recommended Plan would not degrade the water quality enhancement, floodwater storage, or carbon sequestration functions provided by project area wetlands. Although most of the Yazoo Backwater study area is characterized by fine-grained backswamp or abandoned course deposits with low permeabilities (< 0.1 inch per hour), there could be minimal decreases in aquifer recharge in areas with reduced flooding where the predominant landforms are more permeable. However, increased water storage in streams during the late summer should improve recharge from project area streams where permeabilities are greatest.

(a) Water Quality Enhancement. The Vicksburg District's analysis of water quality showed that reforestation of the compensatory mitigation required to provide no-net-loss to aquatics (identified as the limiting resource) would provide a no-net-loss to the three water quality wetland functions affected by changes to hydrology due to operation of the pump station. Reforestation of additional acres up to the recommended 55,600 would provide additional water quality improvements for each of these categories and would result in up to a 12 percent improvement in water quality (Table 16-36). In addition, reforestation would reduce sediment and nitrate loading in the Mississippi River each year by up to 4 and 9 percent, respectively (Table 16-32). From these data, it is clear that the Recommended Plan would result in improvement of the nation's waters rather than significant degradation as the EPA asserts.

(b) Floodwater Storage. The study area will still provide ample flood storage. Approximately 216,000 acres (the 1-year frequency flood plain) will be flooded before the pumps are turned on. The post-project 2-year frequency flood would inundate 244,000 acres, while the 5-year frequency flood would still inundate 287,500 acres of land in the lower Delta.

(c) Upstream Impacts. These changes to flood extent and duration would be slow and gradual. In a static system, if the pump station were the sole means of evacuating floodwater, it would take 25.2 days to reduce the water surface elevation at the Steele Bayou structure from 91.0 to 87.0 feet, National Geodetic Vertical Datum (NGVD) (87.0 feet, NGVD, being the pump on/off elevation for the Recommended Plan). This amounts to an average daily change in the water surface elevation of 0.16 foot. It would take just over 6 days to lower the water surface elevation 1 foot. Lowering water surface elevations during floods greater than the 2-year frequency would result in smaller average daily changes in the water surface elevation at the Steele Bayou structure. The actual change in the water surface elevation will be greatest near the pump station and less in the headwaters. Based on the Period of Record (POR), the pump station would operate, on average, 31 days each year. Flood durations provide ample time for wetland functions that process organic carbon, nutrients, and other elements and compounds to occur.

(d) Downstream Impacts. For the 14,000-cubic-foot-per-second (cfs) pumping station with an initial pump startup elevation of 87.0 feet, NGVD (Recommended Plan), the period of record routing model shows that the maximum increase in peak riverside stages would be approximately 3 inches in the Yazoo River immediately downstream of the pump station site.

This increase in riverside stages will decrease to 1 inch at the Mississippi River Vicksburg gage. At 87.0 feet, NGVD, riverside water surface elevations are below major damage levels for developed areas downstream of the pump station along the Yazoo and Mississippi Rivers. For the start pump elevation of 87.0 feet, NGVD, on the riverside of the pump station and a comparable stage of 40.77 feet on the Mississippi River at the Vicksburg gage (gage zero = 46.23 feet, NGVD), the flow in the Mississippi River is approximately 1.1 million cfs. The maximum discharge of 14,000 cfs from the pump station would be approximately 1 percent of the total flow in the Mississippi River at the pump start elevation of 87.0 feet, NGVD.

(e) Carbon Sequestration.

1. The Recommended Plan will not have unacceptable adverse effects on carbon sequestration. The 26,300 acres of wetlands that may lose jurisdictional wetland status will still remain in the postproject 2-year frequency flood plain and will continue to flood up to 13 days every 2 years. Project impacts to changes in land use are discussed in more detail in a later section of this document. Vicksburg District analysis demonstrates an extremely low probability that the forested lands in the 26,300 acres will be converted. After considering what has already been converted and what currently has some form of existing protection from clearing, the acreage that may be subject to potential clearing is only 3,623, not 26,300. Of the 26,300 acres, 11,640 acres are already cleared for agricultural purposes. Of the remaining 14,668 acres of forested wetlands, 8,591 are in public ownership and will not be converted. Of the remaining 6,077 acres of privately-held forested wetlands, 2,454 acres are being managed for conservation or forestry related purposes. This leaves only 3,623 acres of forested wetlands which, based on the analysis in the FSEIS, have an extremely low probability of being cleared. The farmed or cleared acres are some of the acres that would be reforested under the nonstructural reforestation feature. Because ongoing HGM monitoring of tracts previously reforested by the Vicksburg District have shown that wetland functions in these forests have been improving as projected (Appendix 1, Attachment 1), these reforested acres will either retain or develop wetland functions and provide carbon sequestration benefits to the lower Delta. Recognized wetland experts agree that bottom-land hardwood primary productivity increases when flood duration is reduced (Megonigal, et al., 1997 and Mitsch and Gosselink, 2000).

2. Although the Recommended Plan would allow normal timber harvesting practices, timber harvest for economic return normally does not occur during the first 50 years of a bottom-land hardwood stand. Perpetual easements on the reforested lands would ensure that the land is not clear cut or reverted to agricultural crop production. The reforestation management practices proposed in the Recommended Plan are consistent with management practices on other reforestation projects in the Yazoo Backwater Project Area such as those promoted by FWS and the USDA Wetland Reserve Program.

3. While private entities such as energy companies have begun to trade in carbon credits, the emerging markets in carbon credits, including carbon sequestration in forestry, have not developed to a point that they can be considered as commodities with proven markets for Federal project justification purposes. Current U.S. Army Corps of Engineers policy does not allow for inclusion of these benefit categories in economic justification of proposed projects. Current

guidance (HQUSACE memorandum dated June 26, 2001) states that proven markets for carbon sequestration must exist before benefits can be used for justification. While the USACE is unable to claim economic benefits for carbon sequestration, landowners with perpetual easements will retain all carbon sequestration rights. Acquisition of conservation easements and reforestation of up to 55,600 acres could add an additional 15 million trees to the project area. This would be a significant increase in the carbon sequestration function within the project area.

(f) Groundwater Recharge.

1. Ground-water recharge was discussed in the water quality analysis (Appendix 16). O'Hara (1996) evaluated the various regions of the state for local ground water susceptibility to contamination. Soil permeability was one of the factors used to estimate the relative ease with which pollutants might reach the saturated zone. According to O'Hara, most of the Yazoo Backwater Study Area is characterized by backswamp deposits and by fine-grained deposits in abandoned channels and abandoned courses. Soil permeabilities in these deposits range from < 0.1 inch per hour in the backswamp areas to 0.5 inch per hour in the Big Sunflower River and Deer Creek channels. In contrast, permeabilities along the Mississippi River and the lower Yazoo River are 2.0 inches per hour or more. This suggests that the riverbeds and streambeds have the greatest potential for localized recharge of the alluvial aquifer; however, some point bar deposit landforms can also be permeable enough to be important sources of local recharge during wet periods. Under average rainfall conditions, areal recharge to the alluvial aquifer from precipitation is approximately 2.6 inches per year (Arthur, 2001). In addition, approximately 30 inches of precipitation that filter into the upper saturated zone are utilized in evapotranspiration processes. The Yazoo Backwater project will not alter project area geology or affect soil or sediment permeability. There could be some minimal decreases in aquifer recharge in areas with reduced flooding where the predominant landforms are more permeable. Because of the predominance of landforms with low soil/sediment permeabilities in most of the project area, however, changes to hydrology due to the structural feature should have only a minimal, localized effect on the Mississippi River Valley Alluvial Aquifer. Increasing water levels in project area streams by the Steele Bayou Structure (73.0 feet, NGVD, rather than 70.0 feet, NGVD) would increase the hydraulic head for longer periods within the stream channels where the permeability has been shown to be greatest.

O'Hara, C. G. (1996), "Susceptibility of Ground Water to Surface and Shallow Sources of Contamination in Mississippi." U.S. Geological Survey Atlas HA-739, U.S. Department of the Interior. Jackson, Mississippi.

Arthur, J. K. (2001), "Hydrogeology, Model Description, and Flow Analysis of the Mississippi River Alluvial Aquifer in Northwestern Mississippi." U.S. Geological Survey Water-Resources Investigations Report 01-4035, U.S. Department of the Interior. Jackson, Mississippi.

Mitsch, W. J. and J. G. Gosselink (2000), "Wetlands, 3rd Edition." John Wiley & Sons, Inc., New York. 920 pp.

Megonigal, J. P., W. H. Conner, S. Kroeger, and R. R. Sharitz (1997), "Aboveground Production in Southeastern Floodplain Forests: A Test of the Subsidy-Stress Hypothesis." Ecology, Vol. 78, No. 2 pp. 370-384.

2. In addition, the Vicksburg District has maintained compliance by having no violation of Water Quality Standards. Some of these examples are listed below:

a. The EPA WASP Model showed that raising the water level behind the Steele Bayou structure would not impact dissolved oxygen concentrations.

b. The Methyl Mercury Analysis showed that none of the proposed YBW project features would contribute to issuance of a fish advisory.

c. Fish Tissue Studies show that DDT concentrations in fish are decreasing – reforestation would continue the trend.

d. Reforesting 15,029 acres would result in no-net-loss of wetland water quality functions. Average stream concentrations of suspended sediment, total phosphorus, and nitrate would remain the same.

d. Uncertainty of the Proposed Reforestation.

(1) One of the arguments made by EPA is that uncertainty of obtaining the needed reforestation for project mitigation, as well as the Recommended Plan's nonstructural component. The Recommended Plan has a detailed plan for acquiring the conservation easements and reforesting up to 55,600 acres in the Mitigation Appendix. This plan is more in depth than the two previous plans developed for other Yazoo Basin projects, which the EPA had no objection. The District has completed compensatory mitigation on one project and is concurrent with construction on the other project. The nonstructural feature is derived from the very successful USDA Wetland Reserve Program. In addition, the Vicksburg District has experience developing reforestation acreage, as evident from the 27,000 acres already established in the Yazoo Basin and the wetland monitoring program on mitigation properties.

e. Changes in Land Use.

The Vicksburg District used the best available data in its careful evaluation of land-use trends in the Mississippi Delta and the Yazoo Backwater Project Area in particular. The Vicksburg District based its determinations on historic trends in agricultural land use and cropping patterns documented by USDA statistical data. The Vicksburg District defines intensification as a change in cropping patterns which allows farmers the potential to change from a less profitable crop to a more profitable crop or an increase in the acreage planted. Farmers in the lower Delta will always react to the market by changing from a less profitable crop to a more profitable one. This will occur regardless of Corps projects. Trends in cropping patterns in Sharkey and Issaquena Counties show that while farmers shift the number of acres planted in a particular crop to take advantage of market trends, the total number of acres planted

decreased in the past 10 years, probably due to USDA reforestation programs (shown in Figure 2). In addition to these historic cropping trends, there are approximately 73,000 acres of privately owned nonwetland forests in the project area that have never been converted (since the early 1970s), despite lacking jurisdictional protection. The NRCS has indicated that clearing of bottomland hardwoods in the entire Mississippi Delta area over the last 20 years has totaled only 1,105 acres.

In addition, an analysis of Mississippi statistical market data (shown in Table 1) show that clearing forested lands has not happened despite the increase in market prices since 2000. (Data for 2007 were not available as of 17 April, 2008).

TABLE 1

Market Prices and Land in Production for the State of Mississippi (USDA)						
	2000		2006		Change	
Crop	Acres (x 1000)	Market Prices ($)	Acres (x 1000)	Market Prices ($)	(1000 acres)	% change
Corn	390	1.91	960	2.84	+570	+ 48.7
Cotton	1,300	.505	660	.45	-640	- 10.9
Rice	220	5.68	190	9.15	-30	+ 61.1
Soybeans	1,700	4.71	1,450	6.23	-250	+ 32.3
TOTALS	3,610	-	3,230	-	-350	-

(1) Trends in Corn and Soybean Production.

(a) Corn production in Issaquena and Sharkey counties has increased since the early 1990s. Typically, corn was rotated with cotton on Class 1 and Class 2 soils with good drainage. However, improvements in corn varieties and drier soil conditions in the last several years have allowed farmers to plant in denser soil types. As a result, farmers now have the option of rotating corn and soybeans. In 2007, increases in corn prices resulted in increased corn production in the Delta. These increases were spurred, in part, by an increased interest in biofuel production across the country. Sharp increases in fuel and fertilizer costs in 2008, however, have made corn production less profitable. Increases in operational costs for corn production and sharp increases in market prices for soybeans (which have no fertilizer requirements) have directed farmers to shift toward soybean production. This cropping trend is a continuation of the same trend documented in the preceding figure and table. This trend of farmers responding to market prices is expected to continue in the Yazoo Backwater Project area as it does for the rest of the State.

(b) A 2003 feasibility study for ethanol production in Mississippi prepared by Sparks Companies, INC. and Mississippi State University indicated that at the time there was interest in locating ethanol plants at 3 locations in the Delta area. In 2007, construction began for an ethanol plant in Vicksburg, MS. The plant is scheduled to begin fuel production in the summer of 2008. Other sites could also proceed with construction. Although Mississippi provides incentives to new ethanol produces who utilize Mississippi grown corn, according to the study

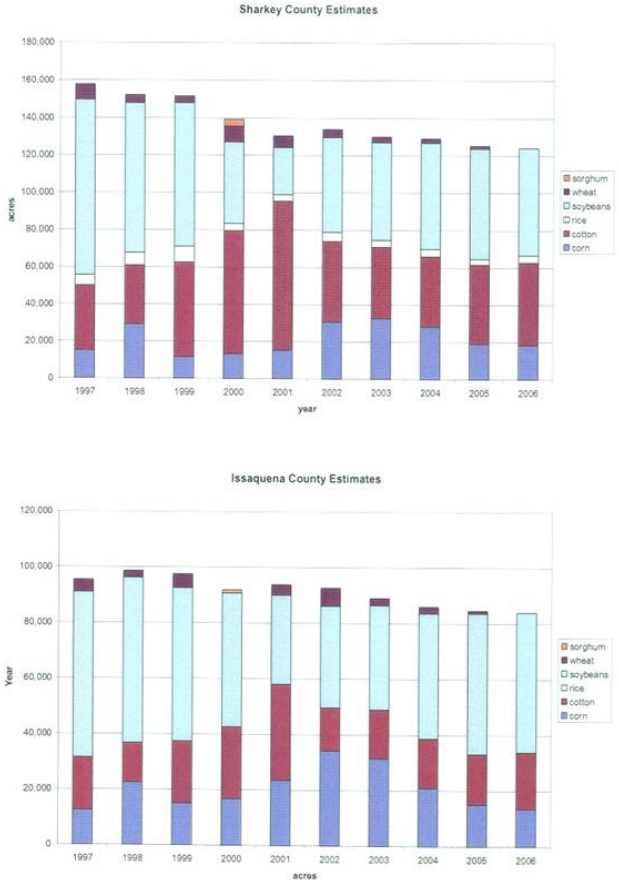


FIGURE 2 – Trends and cropping patterns in Sharkey and Issaquena Counties, Mississippi

generic ethanol financial models showed that the anticipated returns are very sensitive to the cost of corn, the price of ethanol, the cost of natural gas and the price received for distillers dried grain with solubles (DDGS). The study estimated that if an ethanol producer (30 million gallons) took advantage of the producer payment of $0.20 a gallon by buying Mississippi corn, their net gain might actually only be $0.10 a gallon as the demand for corn in the region would be expected to bid up corn prices, thus lowering the full benefit to the ethanol producer. As made evident by the agricultural switch to soybeans in 2008, ethanol producers may not be able to depend upon local farmers to provide sufficient quantities of corn if market prices for other commodities offer the farmer better profits. The Vicksburg ethanol site is located in the Vicksburg Port Complex where it will also have easy access to barged corn produced in other parts of the country, if necessary.

(2) There are several reasons why the amount of land in crop production will not increase in the project area. First, current laws (Swampbuster, 404, other…)prohibit land clearing on lands that are classified as wetlands without severe penalties. Second, there is a high cost associated with land clearing compared to potential crop profits. Third, land enrolled in Government programs (WRP and CRP) prohibit or severely limit conversion back into agricultural row crop production. Fourth, existing land-use value associated with hunting and recreational uses is higher than that for these croplands.

f. Environmental Justice Considerations.

(1) EPA comments on the Environmental Justice (EJ) evaluation do not clearly reflect that the EJ analysis was prompted by a letter from Senator Thad Cochran dated 4 January 2004 that was addressed to both EPA and the Vicksburg District. The Vicksburg District initiated conversations with EPA Region 4 concerning how to address Senator Cochran's concerns. EPA's staff agreed with the Vicksburg District that an EJ analysis was not appropriate for discussing speculative impacts from not building a project. Furthermore, several conversations between the Vicksburg District, EPA's EJ coordinator, and others in Region 4 were conducted to draft a statement of work for the contract whereby EPA strongly suggested the selection of Ken Weeden & Associates (KWA) to perform the EJ analysis due to his good job evaluating EJ for the I-69 project area in northwest Mississippi. In addition, drafts of the Yazoo Backwater work product from KWA were reviewed by EPA staff several times over several months before the EJ report was finalized. Not only had EPA recommended KWA, but they reviewed the draft conclusions on this analysis. KWA also substantiated in his document that his EJ report was in compliance with EPA guidance on EJ evaluations.

(2) The EJ analysis was to consider the environmental justice impacts if the project were built, not if it were not built. Population and economic data projected in this document (Table 8-16, page 29) were made based on current conditions. No attempt was made to project economic growth caused/resulting from project construction and operation. Certain members of the local community have taken the position that they were "owed" a project. The EJ analysis, which is Attachment 8A of the Socioeconomic Appendix 8, adequately addresses the concerns expressed in Senator Cochran's letter. No EPA comments on the statement of work or the draft report

indicated otherwise.

(3) Portions of the EPA's comments remark about the lack of flood data on communities in the post-project condition. Sufficient flood protection/risk data are presented in pages 18-20 of the KWA report and in Table 11 on page 19. The comment, however, is not relevant to addressing the thrust of the EJ study for analyzing the project area if the project is not built.

(4) Also, communities impacted by flooding in the study area were illustrated on the Flood Damage Impact Map presented to EPA in a meeting on February 29, 2008. The presentation on ring levees around the towns of Cary, Rolling Fork, and Anguilla illustrated that the vast majority of those homes were outside the 100-year frequency flood event. There are homes around Valley Park, Holly Bluff, and throughout the basin that would still remain susceptible to flooding at the 100-year event. However, the majority of these structures are so scattered, the construction of ring levees to protect them would neither be feasible or practicable. Furthermore, existing flood damages to residences and other structures for the total study area were provided by flood frequency in the report (Appendix 7, Economic Appendix, page 7-81). These damages can be identified and tabulated for each community if needed.

(5) EPA has also expressed concerns that economic development of the area has not been fully addressed with the Recommended Plan. The economic analysis conducted to determine flood control benefits and costs was based on existing land-use within the Yazoo Backwater Project Area. Economic development is not utilized in determining project justification. This analysis followed current Federal economic guidance for the evaluation of water resource projects. Economic impacts for the alternatives evaluated in the final array have been thoroughly discussed throughout the Economic Appendix (Appendix 7), the Socioeconomic Profile (Appendix 8), and the EJ Evaluation (Attachment 8A). Furthermore, economic impacts are illustrated through a broad summary of socioeconomic indicators and their projections, displayed in Appendix 8 (Table 8-18, page 8-40). Current statistics are based on the latest data available for the impact area from the Bureau of the Census and Bureau of Economic Analysis, data from which evaluations and comparisons could be made. Future projections were based on an extrapolation of historical and current data and trends in conjunction with OBERS projection factors which are only available for larger communities or broader areas of the State of Mississippi. In-depth analyses were also conducted by KWA which resulted in the conclusions that are outlined in Attachment 8A. These were based on a comprehensive collection and analysis of socio-demographic data in correlation with individual interviews of residents and public officials of the communities in the area, which were conducted for nearly a year. Also, the KWA document provides historical economic development comparisons between communities in the study area and communities of similar size in the region (pages 35 and 36), as specifically requested in Senator Cochran's letter.

(6) The above-mentioned sources discuss the economic impacts that are expected to occur with and without implementation of the Recommended Plan. Unfortunately, the availability of economic indicators and statistical information is limited for the smaller communities of the study area. Data for such small areas are mostly unavailable due to disclosure of private information of individuals. However, further economic analyses may be

performed through the utilization of Regional Economic Impact Models in determining multiplier effects and broader regional economic impacts from implementation of the project. However, regional economic development (RED) is not a benefit category that can be used in the benefit-cost computations which determine project feasibility and Federal participation in a project. For this reason, RED was not included as part of this evaluation.

(7) The Recommended Plan's effects on subsistence fishing and hunting were not addressed because, according to the environmental evaluations, fishing and hunting resources will not have significant adverse impacts with implementation of the project. For example, with reforestation, hunting presumably will increase because of increased habitat for squirrels, rabbits, turkey, ducks, and deer and, with less flooding, opportunities would actually improve. In addition, no segments of the Yazoo Backwater Study Area population have been identified as dependent on subsistence hunting or fishing for their livelihood. Hunting and fishing proprietors are not expected to be negatively affected by the project. Many of the residents partake in hunting and fishing for recreational purposes more so than for their livelihood. It should also be noted that the area has been under a fish tissue consumption advisory since June 2001 whereby residents are recommended not to consume more than one meal every two weeks of specified fish due to health concerns.

g. Economic Analysis. Several items mentioned by the EPA Headquarters economists during their review of the 2007 Final Report needed correction. Benefits from the alternatives evaluated were derived from structural and nonstructural components or a combination of the two. The Recommended Plan has both structural and nonstructural benefits. The nonstructural benefits accrue from lands that are reforested. The structural benefits are obtained on lands that remain in crop production (excluding reforested cropland) and on existing residential and non residential properties located in the project area. No increase in crop yields/profits was claimed on lands reforested under any of the with-project alternatives. The following paragraphs attempt to explain the benefit methodology utilized to calculate those benefits and to show that benefits were not double counted.

(1) Benefits to Lands Reforested.

(a) Non-structural components of all the combination alternatives evaluated included conservation easements with reforestation as a primary method of reducing flood damages to crops and non crop categories. Flood damage reduction benefits are gained on all cropland that is reforested which are located primarily at or below the current 2-year frequency elevation because the land use changes from crop to forest under with-project conditions. No quantifiable damage occurs to lands that are forested when flooded. In absence of the project, these reforested crop acres will continue to be farmed as they are and when floods occur, flood damages to crops will occur. This non-structural component of this project will remove all of these damages on lands when reforestation is achieved. This category of flood damage reduction benefits is similar to flood damage benefits claimed for residential and non residential properties flood proofed or removed from the flood plain in the nonstructural alternatives Plan 2A and 2B.

(b) As stated in the report, reforested lands benefit from reforestation in four ways:

1 Flood Reduction to Crops. When land use is changed from crop production to forest it was assumed that a 100% reduction in flood damages would occur on these lands. In absence of the project there are no reforestation programs available for land owners in the two counties that comprise the majority of the study area (Sharkey and Issaquena counties). The Wetland Reserve Program (WRP) has reached the cap for these two counties and therefore under without project conditions it was assumed that these lands would continue in the current land-use and thus when flooding occurred damage would be done to crops grown on these lands. The method for calculating the flood damages to these lands was detailed in Appendix 7, beginning on page 7-62.

2 Flood Reduction to Non-Crop Items. Benefits result from this category because of the same rationale explained above. Page 7-58, paragraph 95 gives a brief description of non-crop damages and attachment 7E details the methodology utilized to compute per acre damage. The methodology used in calculating non-structural non-crop benefits begins on page 7-66.

3 Timber values. Timber harvesting will be allowed using normal silverculture practices on lands that are reforested under this project. Therefore a value of $140/acre was used as the timber value associated with the cost per acre to reforest and the annual timber value for the acres in reforestation. This value was annualized over the 50-year economic life and equates to a value of less than $8 per acre per year. Under without project conditions these lands would remain in crop production. Calculation methodology for this benefit category is displayed on page 7-68.

4 Hunting Leases on Lands Reforested. All lands reforested have the potential to be leased for hunting rights. The demand is extremely high especially in the delta for duck and deer hunting. Lands in forest are more highly valued from a wildlife leasing perspective than those that are open land. Therefore, landowners who reforest will have the opportunity to lease their land for higher land lease prices than under current without-project conditions. The values (Table 7-45) used in calculation of the hunting lease values are extremely conservative $7 to $14 for irrigated lands and $5 to $10 for non-irrigated acres. Most lands that are leased for hunting purposes in the Delta (that have timber and irrigation potential) lease in the $15 to $30 range per acre. There are documented leases that range as high as $40 per acre. The methodology used to calculate land lease values begins on page 7-68.

(c) The next point of clarification deals with the costs and the misconception that 3 components make up costs. The conservation easements are just that “easements” and not a purchase in fee title. The landowners will retain full ownership rights with the exception of a recorded deed restriction that will not allow crops to be grown on these lands. There are additional costs displayed in Table 7-76 which break costs down in greater detail than the three items mentioned. Since the combination alternatives evaluated had both structural and nonstructural measures the cost were broken out separately. The structural component is comprised of all cost associated with construction and operation and maintenance of the pump station and also includes any mitigation required to offset environmental habitat losses. For the

Recommended Plan, the first costs for the structural costs were $162.7 million. The first costs for the nonstructural components was $57.4 million and included easement costs $45.6 million, fish and wildlife structures $9.7 million, and $2.1 million for planning, engineering and design and construction management.

h. Project Alternatives.

(1) EPA has stated that there are more practicable, less environmentally damaging alternatives to the Recommended Plan and that these plans have not been fully evaluated. The Vicksburg District analyzed EPA's flood reduction measures and included the results in the Final Report. These measures were included as follows; 1) all alternatives evaluated (with the exception of Alternative 3) included reforestation of frequently flooded farmland as a flood reduction feature, 2) flood proofing or relocation measures were included in alternatives 2A, 2B, and 2C, 3) alternative 2B's flood protection features included ring levees and small pumps, and 4) Alternative 2A incorporated 1-time lump crop insurance payment to farmers operating within the 100-year flood plain. All of these alternatives were evaluated based on the current economic guidance and results were displayed in the Final Report. The Vicksburg District evaluated both EPA's Shabman Report and the Economic and Environmental Restoration Initiative and provided detailed comments pertaining to the viability and implementability of these plans. Based on current Federal guidelines, neither of these plans are economically justified.

(2) Since 1982, the Vicksburg District has evaluated a variety of project alternatives, ranging from purely structural plans to total evaluations of nonstructural alternatives. Through the public workshops and consensus building process, the Vicksburg District worked with state and federal agencies, as well as local governmental officials to develop alternatives that met the needs and preferences of all interested parties. Throughout this process, the Vicksburg District has considered a total of 18 structural and 18 nonstructural plans. The end result was introduced as the Final Array in the Final Report: 1 structural alternative, 4 nonstructural alternatives, and 4 combination alternatives. Of these, the Vicksburg District chose its Recommended Plan. The plan not only provides the best balance of economic and environmental needs of the area, it dramatically decreases the wetland and aquatic impacts over the original 1982 plan: a plan that had less controversy than the current project.

2. Response to Section 404(c) Requirements and Basis for the Proposed Determination.

On March 19, 2008, EPA publicly released its Proposed Determination to prohibit, restrict, or deny the specification, or the use for specification, of the project's pump station location as a disposal site. Construction on the pump station site began in 1986. The site was cleared, inlet and outlet channels were constructed, and the excavated material was used to build coffer dams on the site. As of 2008, the site remains cleared and although occasionally flooded, the site's wetland functions remain significantly reduced. Under 404 (c) of the Clean Water Act, EPA has the authority, after an appropriate public comment period, to restrict the use of this site, if EPA concludes that the Recommended Plan will have unacceptable adverse impacts to at least one of the following resources: municipal water supplies, shellfish beds and fishery areas, wildlife, and recreational areas. This section discusses the Vicksburg District's response to impacts to these five resources. However, the Vicksburg District objects to EPA's Proposed Determination to veto a $220 million flood control project of which $70 million is for the nonstructural component of reforestation, based upon impacts to less than 50 acres of wetlands and other waters of the United States.

Two of the resources mentioned above may be considered 'not applicable' and require very little response. First, the Recommended Plan will not result in any degradation of municipal water supplies. The project is not located near the source of any municipal surface water supplies. The City of Vicksburg and the Eagle Lake Water District use the Mississippi River Alluvial Aquifer for drinking water. Documents from the MDEQ indicate that both well fields were developed down to 200 feet, below ground surface (bgs). The Vicksburg well field is in the vicinity of the Long Lake community approximately 4 miles south of the pump site on the opposite side of the Yazoo River. The Eagle Lake well field is approximately 6 miles to the northwest of the pump station site near the Mississippi River. During the pump station construction, the site will be dewatered to keep surface water 5 feet below the deepest excavation depth. The radius of influence for the dewatering well field has been estimated to range between 0.5 and 1.3 miles. Because of the distance between the pump station site and the difference in the depth between the dewatering elevation and the well screens, the Recommended Plan will have no impact on municipal groundwater supplies.

In addition, the Recommend Plan will not result in any loss of or damage to shell fishing. Shellfish beds in the Yazoo Backwater Project Area will not be affected by dredging, filling, or changes to hydrology. Dredge and fill activities are limited to the immediate construction site and to periodic maintenance of the inlet and outlet channels. Shellfish beds will not be impacted by changes in hydrology because the project area will flood up to the 1-year frequency flood plain before the pumps would be turned on. However, shellfish beds would benefit from improvements in water quality resulting from reforestation of up to 55,600 acres of agricultural land. In addition, raising the surface water elevation by 3 feet in the low-water periods will provide more wetted surface in project area streams and will help reduce late summer desiccation of any exposed beds.

Since municipal water supplies and shellfish beds are not identified as a issue of concern, the following responses will be directed towards EPA comments concerning impacts to fishery areas, wildlife, and recreational areas.

a. Fishery Areas (to Include Spawning and Breeding).

(1) The EPA was provided a draft copy of the draft aquatics analysis in 2005, but did not submit comments to the Vicksburg District. Contrary to views expressed by the EPA in 2008, the Recommended Plan will not result in significant loss of or damage to fisheries. In evaluating project impacts to fisheries, the Vicksburg District examined a number of impact categories: impacts at the construction site, impacts from changes in hydrology, impacts from reforestation, and impacts from operation of the pump station. In the aquatics analysis, the Vicksburg District followed the 7 February 1990 Memorandum of Agreement between the EPA and the Department of the Army concerning the determination of mitigation under the Clean Water Act Section 404(b)(1) guidelines. The Vicksburg District assessed resource functional value rather than acres impacted. Section III.B of the MOA states ". . . such mitigation should provide, at a minimum, one for one functional replacement (i.e., no net loss of values) . . . ." Overall the aquatics analysis showed that fish spawning was the limiting resource category and would require the most mitigation acres to replace loses in functional value due to direct losses at the pump station site and indirect losses from changes in hydrology. The Recommended Plan's hydrologic effects would reduce spawning habitat values by 8.2 percent and reduce the rearing habitat values by 5.3 percent. Reforestation of agricultural lands will produce up to a 30.4 percent net gain in spawning value and up to an 8.1 percent net gain in rearing value.

(2) Project impacts to aquatic resources (fisheries) were determined using the FWS Habitat Evaluation Procedures (HEP). HEP Team members included: Marvin Cannon and Gary Young, Vicksburg District; Garry Lucas and Dennis Riecke, Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP); Larry Marcy and Ken Quackenbush, United States Fish and Wildlife Service (FWS); and Dwayne Templet, Geo Marine Inc. EPA was also invited to be a cooperating agency on this study, but declined to participate. While FWS did participate, their current findings are inconsistent with decisions made by previous FWS Biologists. The Vicksburg District furnished landuse within the flooded acres. Fish sampling was conducted by Dr. Jack Kilgore and Dr. Jan Hoover of ERDC, who also prepared the Aquatic Appendix. Interagency meetings were held in March 1994, November 1994, and March 1995. During these meetings, the team determined approaches for habitat quantification (floodplain habitat delineation for larval fishes), selected evaluation species, and agreed on Habitat Suitability Index (HSI) Scores. Team members were updated during a meeting in January 1999.

(3) The interagency HEP Team selected six evaluation species, and based on subsequent fish collections in the Yazoo Delta, three additional species were added to better represent the overall fish community that would be susceptible to project impacts. Overall, evaluation species represented greater than 80% of the taxa documented in the system. Evaluation species for the Yazoo Backwater Reformulation Project included: Threadfin shad, Dorosoma petenense; Channel catfish, Ictalurus punctatus; Blacktail shiner, Cyprinella venusta; Flathead catfish, Pylodictis olivaris; Ghost shiner, Notropis buchanani; White Crappie, Pomoxis annularis;

Speckled chub, Macrhybopsis aestivalis; Freshwater drum, Aplodinotus grunniens; and Smallmouth buffalo, Ictiobus bubalus. All evaluation species were either numerically abundant in fish collections (> 4.0% of total individuals) or are recreationally/commercially exploitable. All evaluation species can be potentially impacted from reduced floodplain inundation and loss of forested areas. Most evaluation species live in main channel environments as adults, but may move laterally into the floodplain during spring and early summer to spawn or rear as larvae. The smallmouth buffalo, in particular, is a species that utilizes floodplains for reproduction.

(4) The aquatics evaluation showed that HSI scores for each evaluation species indicated a similar trend of increasing habitat value from cleared to forested lands. Studies have confirmed that fishes in delta habitats preferentially occupy bottomland hardwood forests during seasonal inundation, and that larvae are more abundant in structurally complex habitats and permanent water bodies. Agricultural lands afforded minimal protection from predators and consequently had low spawning and rearing value for all evaluation species. Fallow fields had higher value for species that spawn and/or rear in floodplains. For example, smallmouth buffalo and minnows have been found to spawn over herbaceous cover typical of fallow fields or littoral areas of permanent water bodies, and ghost shiners may have a similar preference.

(5) For the aquatics evaluation, the 2-year frequency flood was used to evaluate hydrology and land use of the floodplain for two primary reasons:

(a) Most fish species reach sexual maturity at age one or two. Thus, a flood that typically occurs once every two years is considered necessary to maintain reproductive populations in the basin. The more extreme hydrologic events may result in higher fish abundance, but do not represent flooding regimes that maintain baseline population levels over the life of the project (i.e., 50 year project life).

(b) The life span of small-sized species is 2-3 years and some may only reproduce once. Thus, a flood frequency less than 2-years may result in successive reproductive failures by species with short life spans. Flood frequencies greater than two years are an overestimate of the usable floodplain utilized by species with short life spans. Larger-sized species can live up to 10 years, but those that utilize floodplains to reproduce on an annual basis require regular flooding to maintain population integrity.

(6) Fish spawning acres were defined as the number of acres flooded at least 1 foot in depth for at least 8 days. The 1-foot depth was considered necessary for adults to move into the flood plain. Eight days of flooding are required for egg incubation since eggs can be stranded and desiccated if water levels drop before hatching. Eight days of flooding was also a conservative estimate that allowed sufficient time for adult fish to move into the flood plain and construct nests, for eggs to hatch, and for fry to leave the nest. In contrast to spawning, rearing fish do not have specific hydraulic requirements other than a preference for slack-water or swift-water conditions, depending on the species. Larval fish can exploit a variety of depths, and most species tend to move along the shoreline with fluctuating water levels without stranding or injury. Pre-project studies showed that larval fish abundance was related to the presence of vegetation, shade, and structure. The highest concentrations of larval fish were found in the

fringing flood plain and in oxbow lakes contiguous with the river. Overall, permanent flood plain water bodies provided better habitat value for rearing fish than did cleared land. Additionally, HSI scores showed flooded bottom-land hardwoods, contiguous oxbow lakes, and tributary mouths had the best flood plain habitats for spawning and rearing. More than 200,000 acres of these types of habitat will be flooded prior to pump initiation and will remain flooded when pump operation ceases and prior to opening the Steele Bayou Structure. The Aquatics Appendix showed project alternatives that included reforestation resulted in a net gain in Average Annual Habitat Units (AAHU) for spawning and rearing of fish. The highest gains were for combination plans that included conservation easements and reforestation. Reforestation/conservation measures proposed in the Recommended Plan will increase AAHUs for spawning by up to 30.4 percent and increase AAHUs for rearing by up to 8.1 percent.

(7) Given the distribution of fish species above the Steele Bayou Structure, only a small percentage of the regionally available fish are likely to be in the waters above the structure in the periods of flooding when the pump station will be operating. There is no particular fishery habitat need that would concentrate fish in the waters above the pump station during flood stages. However, during pump station operation, there is the possibility that fish and other aquatic organisms could become trapped and move through the intake structure (entrainment) where they could potentially be harmed or killed from pump impellers and excessive hydraulic forces. There is also the possibility that organisms, including adult fish, could become trapped against the screening devices associated with pump intakes (impingement). The Vicksburg District acknowledges that entrainment may occur during operation of the pump station, but does not anticipate significant impacts to fish populations in the study area for the reasons stated in Appendix 11. Impingement against the trash rack is also a possibility, but with a 6-inch wire mesh most fish will either go through the rack into the pump or avoid the intake. Therefore, no significant adverse impacts are anticipated for impingement.

b. Wildlife.

(1) The Recommended Plan will not result in significant loss of or damage to wildlife habitat. Results of the terrestrial habitat evaluation reveal that the habitat values of the bottomland hardwood forests would be increased overall by 11.2 percent by implementing the recommended plan (reforestation of up to 55,600 acres of cleared land in the 1- and 2-year frequency flood plain). Results of the waterfowl evaluation show that inclusion of waterfowl habitat on 5 percent of the easement land would increase waterfowl foraging values by up to 52.8 percent.

(2) Terrestrial habitat evaluation team members first met in May 1994 to discuss selection of potential evaluation species to be used in order to determine the project effects to the bottomland hardwood forest resources in the study area. The Terrestrial Habitat Evaluation Team for the Yazoo Backwater Project consisted of Mr. Ken Quackenbush (US Fish and Wildlife Service), Mr. Don Brazil (Mississippi Department of Wildlife, Fisheries, and Parks) (MDWFP), and Mr. Gary Young (US Army Corps of Engineers, Vicksburg District). Dr. James Wakeley (ERDC) prepared the Terrestrial Appendix. EPA was also invited to be a cooperating agency on this study, but declined to participate.

(3) Because it is not practical to evaluate each species that can utilize the forests, the team decided to maintain consistency with the previous components of the Yazoo Basin flood control projects and use the same six evaluation species used in previous studies. In accordance with the FWS' Habitat Evaluation Procedures, the species selected represent a range of ecological value and wildlife habitat requirements of the relatively mature forests existing in the basin. Habitat was sampled to determine habitat quality based on HSI models developed by the FWS for selected evaluation species to the bottomland hardwood forests. These models can be used to determine the affects, both beneficial and adverse. Four species (the barred owl (Strix varia), gray squirrel (Sciurus carolinensis), Carolina chickadee (Parus carolinensis), and pileated woodpecker (Dryocopus pileatus)) inhabit upland forests and forested wetlands. Barred owls and pileated woodpeckers prefer mature forests with closed canopies and large trees. Woodpeckers excavate nesting cavities in live trees or snags, and owls use pre-existing cavities. Carolina chickadees nest in small cavities and forage in closed forests with abundant tree foliage. Gray squirrels prefer mature forest with dense understory vegetation and abundant mast-bearing trees such as oaks and hickories. The remaining two species (wood duck (Aix sponsa) and mink (Mustela vison)) also inhabit forested areas but require the presence of surface water for at least part of the year. Wood ducks build their nests in large cavities in live trees or snags, or will use artificial nest boxes, if present. Brood-rearing habitat consists of areas that are flooded continuously during spring and have abundant cover near the water's surface. Mink inhabit wooded swamps and upland forests adjacent to lakes and streams. Much of their diet consists of fish and aquatic invertebrates, although they also capture birds, small mammals, reptiles, and amphibians.

(4) The team also agreed to evaluate the possible addition of more water-dependent resident species. Team members reviewed published models for the beaver (Castor canadensis), bullfrog (Rana catesbeiana), slider turtle (Pseudemys scripta), and swamp rabbit (Sylvilagus aquaticus). The consensus was that these additional species models were not appropriate or added little additional information to the analysis.

(5) The results of the Terrestrial HEP evaluation are presented in Appendix 13 and are also discussed in the Main Report, SEIS, and Mitigation Appendix. The results of the evaluation reveal that the habitat values of the bottomland hardwood forests would be increased overall by 11.2 percent by implementing the recommended plan (reforestation of up to 55,600 acres of cleared land in the 1- and 2-year frequency flood plain). Results of mitigation calculations show that loss of 38 acres of bottomland hardwood forest at the pump station site would require 72 acres of reforestation to offset losses. The remaining reforested acres (up to 55,528) would provide additional benefits to the terrestrial species in the study area.

(6) The final waterfowl appendix was prepared by Darrell Evans, a research wildlife biologist at ERDC. This methodology used by ERDC to predict potential project impacts was developed in 1992 by Mr. Robert Barkley (U.S. Fish and Wildlife Service, Vicksburg Field Office) and Dr. Kenneth J. Reinecke (United States Geological Survey, Mississippi Valley Research Field Station). This method has been used on previous Vicksburg District and other Corps flood control projects to quantify the impact of altering hydrology on traditional waterfowl

wintering areas and for designing appropriate mitigation measures. This method has also been used by the Lower Mississippi Valley Joint Venture in setting habitat management goals for wintering waterfowl habitat in the MAV. Wintering waterfowl species are primarily puddle ducks consisting of the mallard, northern pintail, American widgeon, gadwall, green-winged teal, northern shoveler, and blue-winged teal. The EPA had no objection with this methodology on past projects.

(7) The method uses food as an index of wintering waterfowl carrying capacity, which is expressed as the number of duck-use-days (DUDs) per acre. Information needed to estimate DUDs include land use and crop type, extent, duration, and depth of flooding, amount of winter food present by crop type, energy of food types, and energy requirements of waterfowl. The Vicksburg District prepared a GIS database tailored to identify the acres of available foraging habitat under existing conditions and future conditions (with and without the project). For a determination of existing and future carrying capacities (based on the implementation of an alternative), land use was broken down into available foraging habitats having food value to wintering waterfowl, these included: fallow fields, rice fields, soybean fields, bottomland hardwood forested wetlands, and reforested areas. Foraging habitats used were soybeans, rice, fallow, and bottom-land hardwoods flooded 18 inches or less during the winter waterfowl season (November 1 to February 28). The acres of available waterfowl foraging habitat were calculated using the period-of-record hydrologic data (1943-1997). This methodology is discussed in the Engineering Appendix (Appendix 6) and the Waterfowl Appendix.

(8) The analysis determined that direct impacts from pump station operation during the waterfowl season would be minimal. For the 55 years between 1943 and 1997, the pump station would have operated less than 3 days per year during the months of December and January. Most of those days during that 55-year period were for large flood events which began in December, such as the 1973 flood event (the largest flood event on record in the backwater area) and the 1983 flood event. During the waterfowl season, the Mississippi River is normally experiencing low water; therefore, the gates at the Steele Bayou Structure would be open and the pump station would not operate.

(9) The increase in minimum water surface elevation behind the Steele Bayou Structure from 70 feet, NGVD, to 73 feet, NGVD, would provide a slight increase in flooded winter crop fields and would result in increased DUDs. Reforestation would result in a net loss of foraging value per acre. Reforestation, however, is the FWS preferred mitigation measure because reforestation addresses all wintering waterfowl habitat requirements. Bottomland hardwood forests provide food, courtship sites, shelter, protection from predators, cover in extreme weather, roosting sites, and isolation from disturbance. Reforestation also represents an ecosystem level approach and would provide a stable, low maintenance, highly reliable mitigation feature. In order to improve waterfowl habitat, the Vicksburg District incorporated an easement provision to allow land owners to place up to 5 percent of their easement land into winter waterfowl foraging habitat.

(10) The results of the Waterfowl evaluation are presented in Appendix 12 and are also discussed in the Main Report, SEIS, and Mitigation Appendix. The results of the evaluation

show that waterfowl foraging value would increase by up to 52.8 percent for the Recommended Plan (reforestation of up to 55,600 acres). If only the minimum 15,029 acres are reforested, waterfowl foraging value would increase by 1.4 percent.

(a) Estimating Effects of Hydrologic Change to Bottom-land Hardwood Forests.

1. On 2 April 1990, a workshop was convened at the Waterways Experiment Station (WES) to consider approaches to predicting future forest condition in the Yazoo Basin as a result of proposed flood control projects. Workshop participants were Mr. Steve Meadows, US Forest Service Southern Hardwoods Laboratory, Stoneville, MS; Mr. Adrian Farmer, USGS Biological Resources Division, Fort Collins, CO; Mr. Will Conner, Belle Baruch Institute of Clemson University, Georgetown, SC; Drs. Jean O'Neil and Charles Klimas, WES; and Mr. Jim Teaford, formerly of WES.

2. The workshop participants concluded that there was unlikely to be any significant changes in forest cover types or in overstory conditions during the 50-year economic life of the Yazoo Basin projects. Although changes in the understory were possible (i.e., changes in coverage and density of shrubs and herbaceous vegetation), the only anticipated effects on the tree layer were increased growth and productivity resulting from less frequent and shorter duration flooding. This conclusion is still valid (as stated in the Final Report, Appendix 13). The participants further recommended that a USGS bottomland hardwood succession model called FORFLO be used to provide more quantitative predictions of forest changes under altered hydrologic regimes. The FORFLO simulation results supported the conclusion of the experts by confirming that the major indirect effect of reduced flooding over the life of a project is slightly increased growth and productivity of trees. These changes generally benefited barred owls, Carolina chickadees, and pileated woodpeckers. Similarly, increased flooding would have a slight negative effect on habitat suitability for these species. The effects on mast-producing trees and, therefore, on gray squirrels, were less predictable but, on average, appeared to be neutral. The results of the FORFLO analysis were taken into consideration by the Terrestrial HEP Team during their evaluation. They concluded that any changes in habitat quality would likely be insignificant because most forest tracts in the project area would not experience the levels of hydrologic change that were simulated with FORFLO.

(b) Estimating Impacts to Species Not Included in the HEP Analysis.

1. Other Resident and Migratory Birds.

a. Aware that the bottomland hardwood forests in the Yazoo Backwater area provide habitat for migratory wintering and breeding birds as well as resident species, the four evaluation bird species selected by HEP team categorize the ecological communities of birds that use the forests. Results of the HEP models for these species can be used to determine how habitat variables for the other groups of species that use the same forests could be affected by the project's alternative features. For example, the passerine migrants are primary carnivores that feed in the canopy of trees and shrubs like the Carolina chickadee used in the terrestrial evaluation. Effects to the Carolina chickadee have been determined as accurately as possible so

that the effects of project alternatives on this species also represent the effects to the passerine migrants that feed in the same areas. The barred owl is a top carnivore that also represents other resident and migratory owls and hawks. Impacts to this and other owl and hawk species can also be determined with the use of the barred owl species model.

b. Several shorebirds are present at times in the backwater area. Some of them use aquatic areas, margins of aquatic areas, or mudflats; while a few use swamps. Aquatic areas (streams, oxbow lakes, and sloughs) and the margins of aquatic areas should not be affected by the recommended plan. Since the 1-year frequency flood (over 200,000 acres) is not affected by the Recommended Plan, there should be ample mudflats remaining along stream banks and within the 1-year flood plain. In addition, there will be several hundred thousand acres of flooded forest and muflat habitat available in the unprotected Yazoo Backwater and Mississippi River adjacent to the project area. There could be a reduction in mudflats in cleared agricultural land once reforestation of lands within the 1- and 2-year frequency flood plain is completed. The potential loss of these agricultural land mudflats would be the same under any of the reforestation plans proposed by any of the agencies. Wading birds should not be significantly affected for the same reasons given for shorebirds. There will be a substantial increase in forested wetlands in the study area that will provided additional wetland habitat for over-water nesting birds as replanted forests develop over the next 50+ years.

2. Reptiles and amphibians.

a. Vicksburg District records show that neither EPA nor FWS mentioned potential impacts to reptiles or amphibians in their comments to the 2000 Draft Report or the 2005 Draft Terrestrial Appendix. There are no reptile or amphibian species of special concern and no Federal or State threatened or endangered species within the study area. As stated previously and in the draft Terrestrial Appendix that is included in the final Terrestrial Appendix for the FSEIS, the Terrestrial HEP team (composed of wildlife biologists from the Vicksburg District, FWS, and the MDWFP) considered including impacts to reptiles and amphibians as part of the HEP but came to the consensus that the only available FWS HEP models (bullfrog and slider turtle) were not fully appropriate or added little information to the HEP analysis. The team determined that the HEP models alone for the bullfrog and slider turtle could not be used to accurately quantify impacts to the larger group of reptile and amphibian species that more typically should utilize the Yazoo Backwater Project area. Bullfrogs are an extremely hardy species occupying most aquatic habitats and are even found invasive in some parts of the country. It was determined that this species would not be suitable as an appropriate indicator of available amphibian habitat. More appropriate models for amphibian and reptile habitat are still not available.

b. The reptiles and amphibians historically or potentially known to occur throughout the study area typically utilize both temporary and permanent water bodies, including woodland ponds, swamps, and other forested areas. Most of these amphibian species depend upon temporary, fishless, forested or semi-forested pools (created by rainfall) for their reproductive activities. Both reptiles and amphibians will utilize more permanent, fish-inhabited bodies of water or the immediate habitat surrounding these bodies of water but the presence of fish is not

generally conducive to most species of amphibian (particularly salamander) reproduction. 'Although wetland recharge and availability of pooled water are essential for many species, protracted and extensive flooding can cause declines in herpetofauna species richness and abundance through inundation of terrestrial ecotones, loss of eggs, larvae, and adults to scouring and flow of floodwaters, and dispersal of vertebrate predators into ephemeral breeding pools (Horton and Grant 1988).'

Horton, J. .M. and Grant, B. W. (1998). "A Herpetofaunal Inventory of the Lower Roanoke River Floodplain." Journal of the Elisha Mitchell Scientific Society, 114: 43-55.

c. Much of the current available habitat in the study area is produced from riverine flooding (contains fish species) of agricultural lands cleared of forest shelter and woody debris. Completion of the recommended plan will improve habitat for reptiles and amphibians by providing up to 55,600 acres of additional forested areas within the 1- and 2-year flood plain. These areas will develop structure (depressions to hold precipitation, leaf litter, or woody debris) that will improve reptile and amphibian habitat. In addition, by reducing the extent and duration of riverine flooding (which would contain fish), the recommended plan will increase the number of ephemeral, fishless forested pools (created by rainfall) for amphibian reproduction. These temporary fishless depressions used by amphibians for reproduction would improve as the reforested lands provide woody debris to the areas over time. Reptiles would continue to utilize the permanent forested bodies of water and surrounding associated habitat for their life history requirements, including reproduction.

c. Recreation.

(1) Recreational Areas. As EPA notes, significant seasonally inundated public lands are located in the Yazoo Backwater Area including: (a) the Delta National Forest; (b) the Yazoo National Wildlife Refuge Complex (consisting of Yazoo NWR, Holt Collier NWR, Theodore Roosevelt NWR and part of Panther Swamp NWR); (c) Twin Oaks Mitigation Area; (d) Mahannah Mitigation Area; and (e) Lake George Wildlife Management Area. Impacts to public lands were included in the impact analysis for each environmental resource but not on an individual basis. However, the Recommended Plan would have no direct impact on these areas. The only possible effects would be changes in flooding, which were evaluated for the entire project area. The Vicksburg District reviewed the designated uses of these public lands and did not find that the Recommended Plan would significantly impact those uses. Without the project, on the other hand, flooding would continue to cause damage to roads, bridges, structures, and camping areas. Flooding can delay planting in wildlife food plots and could result in reduced natural wildlife food production throughout the year of the flood. West Nile virus, a mosquito borne disease, has become a serious cause for concern in Mississippi in recent years. Spring flood waters provide an ideal habitat for mosquito hosts such that West Nile could cause problems for people in the lower Delta. In areas with no mosquito control programs, West Nile could become a problem for visitors to public recreation areas.

(a) Delta National Forest. Has 5 greentree reservoirs managed for waterfowl and 40+ additional water control structures operated to benefit waterfowl and fisheries; however flooding is rotated to protect trees. Delta National Forest maintains rookery areas with water control structures. These water bird areas will not be impacted. Water control structures maintain water in Cypress Bayou, Howlett Bayou, Six-mile Bayou and several small permanent forest lakes. Fishing is allowed but fish are not stocked. Delta National Forest will receive some reductions in flood frequency and duration. These reductions will not impact areas maintained with water control structures, levees or pumps. Deer and other mammals will benefit from reduced flooding.

(b) Yazoo NWR. Established in 1936 to provide wintering needs for ducks and geese in the Mississippi flyway; the refuge is also managed for deer. The refuge is protected by levees and water control structures built in a previous Vicksburg District flood control project. These structures allow the refuge managers to impound water for waterfowl. The levees and water control structures prevent poor quality water from entering Swan Lake and hold water within Yazoo NWR during low water periods. The Yazoo Backwater project will not alter the hydrology in the Yazoo NWR.

(c) Holt Collier NWR. Established in 2004 near Darlove, MS. Not all of Holt Collier NWR property has been obtained. Recently the Vicksburg District transferred the management of approximately 633 acres of recently reforested agricultural land (mitigation) to FWS. Although no final refuge map is available, Holt Collier NWR appears to be just outside of the 100-year frequency flood plain.

(d) Theodore Roosevelt NWR. Authorized in 2004 near Onward, MS. Only 1 parcel of land has been acquired to date (April 2008). Attempts to contact FWS to obtain a GIS location map of the NWR have not been successful. The Vicksburg District cannot evaluate project impacts to a NWR that does not yet exist and to which no boundary information are available. Based on 2005 land use, however, cleared agricultural land east of Onward would generally remain in the 1- and 2-year frequency flood plain and would not receive any major changes in flood duration with implementation of the Recommended Plan.

(e) West Panther Swamp including Panther Creek. Established in 1978, Panther Swamp has 21,000 acres of bottomland hardwood forest. Panther Swamp provides wintering needs for ducks and geese and provides habitat for Neotropical migratory birds. A review of current maps of Panther Swamp shows that the area impacted by the Yazoo Backwater Project is currently closed to waterfowl hunting. This area could receive some changes in flood frequency and flood duration as a result of the Yazoo Backwater Project. A review of satellite images and flood extent of a true (flat) backwater flood, however, show that a 2-year backwater flood does not extend into Panther Creek. This area requires a sloped or headwater flood to force floodwaters into and up Panther Creek. The proposed Yazoo Backwater Project should not impact deer, game hunting, fishing, or migratory waterfowl. According to FWS, the management of Panther Swamp is challenged by regular flood events and wet conditions throughout most of the year (http://www.fws.gov/refuges/profiles/index.cfm).

(f) Twin Oaks WMA. Most of Twin Oaks will remain within the 2-year flood plain; however there could be some changes in duration. The greentree reservoir, which is enclosed by levees and supplied by water from the Little Sunflower River, should not be impacted by the Yazoo Backwater Project. With project, the 3 foot increase in low water surface would be a benefit to the management of lands adjacent to the Little Sunflower River.

(g) Mahannah WMA. Most of Mahannah will remain in the 1-year flood plain. The eastern portion of Mahannah, including the waterfowl sanctuary is protected by a local levee. These protected lands will not be impacted by the Recommended Plan. The western portion of Mahanna is at or below the one year frequency event and would not be impacted by the project.

(h) Lake George WMA. Lake George WMA will not be impacted by the Yazoo Backwater Project. Lake George is enclosed by a levee at elevation 100 feet, NGVD, which uses a pump and gated structure to control the water surface within the management area.

(2) Activities.

(a) Bottom-land Hardwoods. As noted previously in the discussion on impacts to wildlife, a team of experts determined that future flood control projects such as the Yazoo Backwater Project were unlikely to cause any significant changes in forest cover types or in overstory conditions as a result of change in flood frequency or flood duration. Although changes in the understory were possible (i.e., changes in coverage and density of shrubs and herbaceous vegetation), the only anticipated effects on the tree layer were increased growth and productivity resulting from less frequent and shorter duration flooding. In addition, results of a FORFLO model simulation supported this conclusion by confirming that the major indirect effect of reduced flooding over the life of a project is slightly increased growth and productivity of trees. In fact, two public areas (Panther Swamp and Lake George) have reported problems with excess water and beaver activity that has impacted tree growth and made the areas more difficult to manage. Managers in Delta National Forest rotate flooding on a two year cycle in the 5 greentree reservoirs to protect the bottomland hardwood trees.

(b) Birdwatching. Reduced flooding will not only benefit bottomland hardwood tree growth; the changes generally will benefit many bird species prized for recreational bird watching and would improve access to these areas. The Yazoo Backwater Project will not impact rookery areas in Delta National Forest, Yazoo NWR, or Panther Swamp NWR. Most of these areas are permanently flooded through the use of water control structures. Whites Lane Rookery in East Panther Swamp is outside the study area. Reforestation would add additional habitat for many species. Postproject, there should be sufficient mudflats and aquatic areas to provide foraging habitat to sustain resident and migratory populations of wading and shore birds.

(c) Hunting. Reduced flooding will not only benefit bottomland hardwood tree growth; the changes generally will benefit many terrestrial species prized for recreational hunting such as deer, squirrel, rabbit, and turkey. During flooding, hunting is usually suspended because these animals are displaced from flooded forests and often congregate on higher ground. Generally, Yazoo Backwater flood events occur during the Spring, when the only hunting season open is turkey season.

(d) Wildlife Observation/Photography. The Yazoo Backwater Project will not impact wildlife observation or photography. During flooding most mammals are in a stressed condition and are best left alone as they seek high ground. Reduced flooding, both extent and duration, will benefit these animals by either not displacing them or allowing them to retreat to their natural habitat more quickly. In addition, reduced flooding is not likely to adversely affect the threatened Louisiana black bear population known to inhabit the area. In a letter dated August 10, 2006, the FWS concurred with the Vicksburg District that the Yazoo Backwater Project Recommended Plan was not likely to adversely affect the Louisiana black bear. The FWS stated that "The potential for re-forestation for mitigation purposes in the YBWA could result in a significant gain in forested wetlands. With proper planning, those efforts could contribute to areas important for bear movements and habitat expansion, and thus could result in a possible benefit to this species." Reduced flooding could reduce maintenance costs for road and trail repair and allow wildlife enthusiasts continued access to trails and observation sites.

(e) Waterfowl. Most of the wildlife management areas and refuges contain active greentree reservoirs flooded during the winter for waterfowl. Other refuges lease fallow agricultural land with water control structures for winter waterfowl use. In addition, Ducks Unlimited has assisted many landowners in the construction of water control structures used to pond water during the winter for waterfowl use. The Yazoo Backwater Project will not impact recreation on areas enclosed by greentree levees or actively managed for waterfowl through the use of water control structures. Because most project areas streams will be bank-full (1-year flood frequency) before the pump station would be turned on and would remain flooded when pump operation ceases and prior to opening the Steele Bayou Structure, waterfowl inhabiting small tributary steams or sloughs should not be impacted. In general, there will be limited pump operation during the waterfowl season.

(f) Fishing. The Yazoo Backwater Project will not impact fish resources. As was noted in the Aquatics Appendix, the project would improve fish spawning and rearing habitat. Increasing the low-flow water depth behind the Steele Bayou Structure would provide more wetted surface along stream banks to provide additional summer fish rearing habitat. Fisheries in the public lands listed above would not be impacted. Yazoo NWR does not allow fishing. The bayous and lakes within Delta National Forest are fishable and would still receive flooding and replenishment of fish stock from seasonal floods overtopping their weirs. Panther Creek would still receive flooding from headwater floods. Reforestation would improve water quality by establishing a permanent ground cover on previously tilled land. This should reduce the amount of nutrients and pesticides entering project area streams. Contrary to EPA's opinion, the Vicksburg District analysis does not indicate that implementation of the Yazoo Backwater

Project will lead to land clearing of existing forests, which could exacerbate existing water quality conditions such as the fish consumption advisory in the Mississippi Delta. According to USDA, over the last 20 years only 1,105 acres have been cleared in the entire Mississippi Delta.

3. Responses to Section 404(b)(1) Guidelines.

As stated in the Section 404(b)(1) Guidelines (40 CFR Part 230), EPA may 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. Vicksburg District responses to these are listed below.

a. There is a Less Damaging Alternative Available to Meet the Project Purpose.

(1) While the EPA and others continue to state that there is a less damaging alternative available to meet the project purpose, they do not describe it. The EPA and FWS maintain that remaining area inhabitants should be satisfied with flood flowage easements, ring levees, floodproofing, relocation, or forests maintained for non-inhabitant hunters (ecotourism). The local inhabitants have stated that they want protection for their homes, infrastructure, livelihoods, and the potential for future economic development. Three less environmentally damaging plans have been submitted to date by EPA and FWS, our analysis determined that none of the three were economically justified. If the EPA and FWS have any economically justifiable plan that will achieve these goals, they should have presented it to the public for review and consideration. The additional statements by these agencies concerning underdefined nonstructural alternatives would leave residences isolated in a sea of muddy water with no protection for infrastructure such as utilities (power, water, sewerage) and roads needed to maintain day to day existence and safety.

(2) Current Project Authorization as described by Congress: In the 1941 Flood Control Act, Public Law 228, the 77th Congress, approved Plan C for the control of flooding in the lower Mississippi Delta. That plan, found in House Document 359, provided for the construction of three pumping plants with a combined capacity of 14,000 cfs. The pumps would be operated in such a way that the impounded drainage would not rise above the 90 foot, mean Gulf level contour, more frequently than once in 5 years on the average. The Act contained a grant of discretion to the Chief of Engineers to make certain modifications to the project plan. The Yazoo Backwater Recommended Plan would construct one pump station west of the Steele Bayou Structure and would reforest up to 55,600 acres of land in the 1- and 2-year frequency flood plains. Completion of the recommended plan would adjust the 5-year frequency flood plain to elevation 89.6 at the Steele Bayou Structure. The Recommended Plan was determined to be the least damaging plan that met the goal set by Congress.

b. The Proposed Project Would Violate Other Environmental Standards, Including Applicable Water Quality Standards.

(1) EPA's determination that the Recommended Plan would violate other environmental standards, including applicable water quality standards is incorrect and inconsistent with EPA's comments following their 2005 review of the Yazoo Backwater Project – Draft Water Quality Appendix. In a letter from Mr. Jim Giattina, dated 6 December 2005, EPA stated that "With regard to the Water quality Appendix, the Corps has addressed our most significant concerns at this time." It is unclear to the Vicksburg District as to when and why the EPA made the determination that the proposed Yazoo Backwater Project would violate water quality standards, especially if, as the EPA maintains, "no substantive modifications had been made to the structural component of the proposed project since November 2000". While the EPA ignores the non-structural reforestation component of the Recommended Plan, the Draft Water Quality Appendix reviewed by the EPA in 2005 included the same water quality wetland functional analysis that now seems to be in question.

(2) The water quality analysis, presented in Appendix 16, evaluated each of the listed water quality impairments (i.e., nutrients, total suspended solids (TSS) , legacy pesticides, organic enrichment/low DO, and pathogens) for the Yazoo Backwater Project Area. Based upon the results of the HGM and stormwater runoff analyses, rather than violating any water quality standards, the nonstructural feature of the Recommended Plan would improve downstream water quality. Reforesting only the minimum acreage of compensatory mitigation would result in a slight improvement (approximately 1 percent) in water quality. Reforestation of additional acres up to the recommended 55,600 would provide additional water quality improvements for each of these categories and could result in up to a 12 percent improvement in water quality. In addition to the HGM and stormwater runoff analyses, the Vicksburg District also evaluated the impacts of increasing low flow water depth behind the Steele Bayou Structure. The results of the EPA's WASP model suggest that increasing the water surface elevation during the late summer months will not impact dissolved oxygen concentrations (Martin, 2006). As for impacts to stream segments impaired by pathogens, the Yazoo Backwater Project would have no impact. However, during flooding, saturated soil conditions will impact sewerage systems surrounding individual homes and businesses surrounded by flood waters such that dangerous levels of pathogens can accumulate during flood conditions.

(3) With regard to the legacy pesticides DDT and toxaphene, the Recommended Plan will not disturb area sediments away from the immediate construction site. Results of the Yazoo Backwater Project sediment analysis are presented in Appendix 16 in the section "Sediment Organochlorine Pesticides Data." Overall, 78 percent of the 149 sediment samples evaluated had pesticide concentrations too low to be classified as likely causes of harmful biological effects to aquatic organisms based on comparisons to their respective EPA probable effect concentrations (PECs). In addition, all of the sediments collected for evaluation in the Yazoo Backwater Project had DDT concentrations less than the EPA risk-based criteria that are used in site evaluation and remediation of soils containing DDT compounds. The chemical-specific target remediation goals for unrestricted development of a site for these compounds are DDD – 2.66 mg/kg, DDE – 1.88 mg/kg, and DDT – 1.88 mg/kg (MDEQ, 2002). The highest Yazoo Backwater Project Area

concentrations of these compounds, found in sediment collected in Deer Creek, were DDD – 0.155 mg/kg, DDE – 0.482 mg/kg, and DDT – 0.121 mg/kg. Based on these data, a piece of land with soil DDT concentrations identical to the Deer Creek sediment concentrations would be suitable for unrestricted residential development without concern for human health.

(4) The Vicksburg District determined from sampling in historic cotton fields that these soils have much higher concentrations of organochlorine pesticides than are found in sediment. Any feature that controls the amount of soil entering an adjacent water body will also reduce the amount of organochlorine pesticides entering that water body and would reduce environmental exposure to these pesticides. Implementation of the Yazoo Backwater Project recommended plan's reforestation feature would have the direct impact of reducing erosion. Runoff calculations for the Yazoo Backwater study area indicate reforestation would reduce sediment yield by 11 percent and reduce legacy pesticide yield by 2 percent. In addition, the reforestation feature should increase the filtering capacity of suspended sediment from out-of-bank floodwater by up to 4 percent. Since DDT and other organochlorine pesticides are attached to sediment, reducing the amount of suspended sediment will also reduce the amount of DDT in the water by 4 percent.

(5) One of the major concerns with DDT is that it bioaccumulates in organisms. Toxicity tests using project area sediment show that the concentrations in the sediment are below the threshold that would kill many of the sensitive aquatic organisms that are used as food by fish. Because these organisms do not die, pesticides become concentrated in the bodies of these organisms and, eventually, in the fatty tissue of fish. Consumption of fish containing DDT is the major pathway that DDT enters the body of higher consumers, including humans. In 2001, the state listed a fish advisory for DDT and toxaphene in the Mississippi Delta. It stands to reason that reducing the amount of DDT available in sediment would lead to reductions in fish tissue concentrations. DDT adheres to fine-grained soils such as the clay and silt found in the Mississippi Delta. When these soils wash into adjacent streams, they become deposited in areas that do not maintain enough velocity to keep the sediment suspended and flushed out of the stream. Removing existing sediment from these areas will reduce the opportunity for DDT uptake in fish. This fact has been observed in the Upper Steele Bayou Basin. A comparison of pre- and postproject sediment data has shown a significant reduction in postproject DDT sediment concentrations in upper Steele Bayou. The combination of removing existing sediment contaminated with DDT and installing agricultural best management practices to prevent erosion has led to decreases in DDT fish tissue concentrations. In 2005, only 2 of the 69 Steele Bayou fish analyzed for DDT exceeded the 1.0 mg/kg fish consumption criterion. The average DDT fish tissue concentration for the 2005 Steele Bayou fish was 0.182 mg/kg. This results in a 95% reduction over preproject conditions.

(6) Impacts from the potential changes in land use are discussed in the response to other comments.

Martin, James L. (2006), "Final Project Report: Modeling the Lower Big Sunflower River." Prepared for the Vicksburg District. (Attachment 2 to Appendix 16, FSEIS Yazoo Backwater Project.)

MDEQ (2002), "Risk Evaluation Procedures for Voluntary Cleanup and Redevelopment of Brownfield Sites." MDEQ, Jackson, Mississippi.

c. The Proposed Project Would Cause or Contribute to Significant Degradation of the Nation's Waters.

(1) The Vicksburg District disagrees with the statement that the proposed Yazoo Backwater Project would cause or contribute to significant degradation of the Nation's waters. The EPA's Proposed Determination is inconsistent with their statement in 2005 that "With regard to the Draft Water quality Appendix, the Corps has addressed our most significant concerns at this time."

(2) The Water Quality Appendix (Appendix 16) evaluated water quality impacts from the Recommended Plan both qualitatively and quantitatively. Water quality impacts resulting from changes to hydrology as a result of operation of the pump station were evaluated using the HGM analysis prepared by ERDC. Of the eight wetland functions identified as significant to wetlands in the Yazoo Backwater Project Area, three were directly associated with water quality and could be linked to listed water quality impairments existing within project area water bodies. The water quality functions that would lose value are the export of carbon (associated with organic enrichment), the physical removal of elements and compounds (associated with removal of TSS and sorbed materials such as phosphorus, legacy pesticides, and heavy metals), and the biological removal of elements and compounds (associated with removal of nitrogen and other compounds that undergo microbial degradation). The direct and indirect project impacts would cause each of these wetland functions to lose approximately 5 percent of their current value. The HGM analysis also shows that this loss in functional value will be offset by the increased value of wetland function achieved when currently farmed lands in the 1- and 2-year flood plain are reforested. Reforestation of the minimum 15,029 acres would replace the lost wetland functional values that are associated with water quality and would remove these reforested acres from agricultural production such that erosion would be reduced as would the use of fertilizers and pesticides. Reforestation of additional cleared lands up to the recommended 55,600 acres would improve water quality by up to 12 percent and would reduce sediment and nitrogen loading in the Mississippi River each year by up to 4 and 9 percent, respectively.

(3) With regard to the HGM analysis, the EPA has stated (personal communication 5 March 2008) that they do not agree with some of the assumptions made by ERDC wetland scientists in the preparation of the HGM analysis for the Yazoo Backwater Project. With regard to ERDC assumptions for the assessment model – Physical Removal of Elements and Compounds – one of the three functions used in the water quality analysis, the EPA has stated that they do not agree that micro-depressions will form in areas that will be reforested. The result of this and other assumptions made by ERDC and disagreed with by EPA is that EPA believes that the Vicksburg District overestimated project improvements in wetland

functionality. The Vicksburg District believes that the determination and scoring of assessment variables are best made by experienced wetland scientists who have knowledge of and have worked in the Yazoo Backwater Project Area for a number of years. As to the existence or development of micro-depressions, an examination of aerial photographs taken on 15 March 08, shows that much of the agricultural land in the 1- and 2-year flood plains already contains micro-depressional areas. In fact, many of these were filled with water (from precipitation not riverine overbank flooding) at the time the photographs were taken. The photographs show that despite 30 + years of cropping, these areas have not lost all of their original geomorphology and should readily develop wetland functionality once converted to forest lands. The potential for wetland restorability (including restorability of water quality functions) of many of these areas is described by Lin, Bourne, and Kleiss (2006) and O'Hara, C.G., A.A. Davis, and B.A. Kleiss. (2000). Maps in both documents identify many of these same farmed areas as locations that would benefit from restoration as were identified by the Vicksburg District in the FSEIS.

(4) The EPA has also expressed concern that changes in hydrology will impact wetland HGM functional values by moving flood waters out of the system before they can physically remove suspended sediments or biologically process other materials such as nutrients. As the EPA correctly points out, denitrification processes depend upon the system becoming anoxic and achieving the correct redox conditions. The EPA suggests that soils can become anoxic after about 14 days of flooding. The Vicksburg District's HGM analysis correctly indicates that changes to hydrology will result in decreases in the water quality wetland functions that provide the physical and biological removal of elements and compounds. The HGM analysis also shows that reforestation of cleared lands in the 1- and 2-year frequency flood plain will improve these functions by adding structure to these frequently flooded lands. The Vicksburg District also determined that because the average postproject pumping period will be 31 days, there should be no change in suspended sediment or pollutant (pesticide, nutrient) removal due to reduced flood duration. This determination was based upon results of settling tests and TSS monitoring in WRP lands along the Little Sunflower River. Settling studies conducted by ERDC on Little Sunflower River sediment indicate that 90 percent of the TSS is removed after 7 days and that 97 percent of the TSS is removed after 11 days (Wade, 2001). In addition, TSS data collected during three backwater floods in WRP lands along the Little Sunflower River showed that more than 60 percent of the TSS was removed from floods over a 17 day period. These data also showed that TSS decreased significantly as flood waters move away from the river through brush and grasses to the sampling site. When pumping stops, 200,000 acres of land will still be flooded prior to the gates opening at the Steele Bayou Structure. These acres will continue to perform wetland function. For these reasons, the Vicksburg District determined that the water quality wetlands functions would not be impaired beyond what was indicated in the original HGM analysis.

(5) Another area of concern for water quality is whether lands potentially losing jurisdictional wetland status would be subjected to agricultural intensification and would thereby impact water quality. The Yazoo Backwater Project Economics analysis determined that agriculture in the project area would continue with historic cropping patterns. This determination

was based, in part, on past trends in cropping patterns within the project area as shown for the four major Yazoo Backwater Project counties in Figure 3. Based on the best available data at the time of analysis, the Vicksburg District concluded that the 26,300 acres that would move into the < 5% duration band would not be cleared or converted to intense agricultural production. The graphs show that while farmers shift the number of acres planted in a particular crop to take advantage of market trends, the total number of acres planted has remained fairly constant or has decreased. In fact, the total number of acres planted in Sharkey and Issaquena counties actually decreased in the past 10 years, probably due to USDA reforestation programs. In addition to these historic cropping trends, there are approximately 73,000 acres of privately owned nonwetland forests in the project area that have never been converted (since the early 1970s), despite lacking jurisdictional protection. The NRCS has indicated that clearing of bottom-land hardwoods in the entire Mississippi Delta area over the last 20 years has totaled only 1,105 acres. A complete discussion is included in the wetland appendix (Appendix 10).

(6) The recent move to ethanol and bio-diesel production has raised this possibility in the mind of the EPA and non-government organizations. This topic and possible impacts to water quality will be discussed in depth in the response to comments on changes in land use.

Lin, J. P., S. G. Bourne, and B. A. Kleiss. (2006). "Creating a wetland restoration decision support system using GIS." ERDC-TN-EMRRP-EM-05. Vicksburg, MS: U.S. Army Engineer Research and Development Center. http://el.erdc.usace.army.mil/emrrp/emrrp.html.

O'Hara, C.G., A.A. Davis, and B.A. Kleiss. (2000). "A decision support system for prioritizing forested wetland restoration in the Yazoo Backwater Area, Mississippi." Water Resources Investigation Report 00-4199, U.S. Geological Survey.

Wade, R., (2001). "Little Sunflower River Dredged Material Sedimentation and Chemical Clarification Studies – Rolling Fork, Mississippi." U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

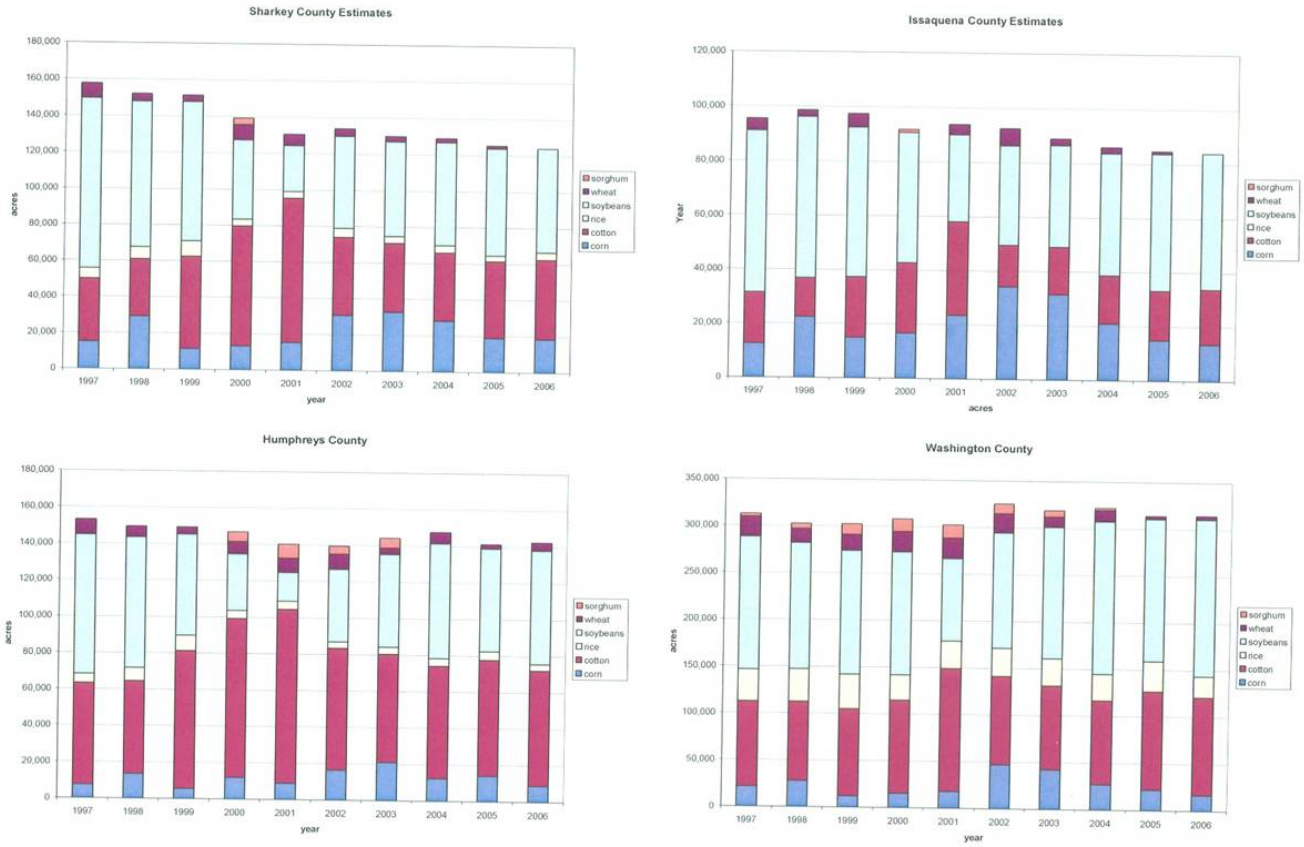


Figure 3. Acres planted in major crops in four Yazoo Backwater Area counties show that the total number of cropped acres have remained fairly constant or have decreased in the past 10 years (USDA county statistical data).

Acres planted in major crops in four Yazoo Backwater Area counties show that the total number of cropped acres have remained fairly constant or have decreased in the past 10 years (USDA county statistical data).

d. The Proposed Project Fails to Adequately Minimize and Compensate for Wetland and Other Aquatic Resource Losses. The terrestrial and aquatic resource evaluations use models that were developed using the HEP from the FWS. The waterfowl resource evaluation model was also developed by FWS, while the wetland evaluation used HGM methodology developed by ERDC with assistance from EPA. Species evaluated in each habitat model were selected by an interagency team of wildlife biologists or aquatic biologists with representatives from the State of Mississippi, the FWS, the Vicksburg District, and ERDC. Selected species for the terrestrial model represented a range of ecological value and wildlife habitat requirements for forested areas. In 1994, during development of the Yazoo Backwater Project terrestrial HEP, the team reviewed published models for amphibian and reptile classes, the bullfrog (Rana catesbeiana) and slider turtle (Pseudemys scripta). The consensus was that these additional species models were not appropriate or added little additional information to the analysis. While the terrestrial model includes four bird species (barred owl, Carolina chickadee, pileated woodpecker, and wood duck); no models were found at the time that addressed impacts to resident species of wading birds. Aquatic biologists from MDWFP, FWS, and the Vicksburg District worked cooperatively to establish the HEP methodology used to evaluate aquatic resources. Fish species selected represent a range of ecological value and fisheries flood plain habitat requirements, including buffalo a species that utilizes the floodplain for spawning. The methodology used to predict potential project on waterfowl impacts was developed by the FWS and is based on using food as an index of wintering waterfowl carrying capacity (expressed in terms of the number of duck-use-days (DUD)). Impacts to wetlands were determined using HGM methodology, which assessed changes to eight wetland functions based upon functional capacity units (FCUs). Each environmental resource model identified direct impacts resulting from construction at the pump station site, from changes in hydrology, and from reforesting up to 55,600 acres of cleared land in the 1- and 2-year frequency flood plains. Impacts to each environmental resource were evaluated to determine mitigation requirements. In the case of waterfowl, the nonstructural reforestation feature was adjusted to provide increased waterfowl benefits. For the recommended plan, aquatics-spawning was identified as the limiting resource and was used to determine mitigation acreage. Once the 15,029 acres of mitigation land are reforested, the aquatics-spawning resource will have no-net-loss, the wetland resource will have an increase in functional value of 2.4 percent. Terrestrial resource functional value will increase by 2.1 percent and waterfowl resource value will increase by 1.4 percent. Using the models provided by the FWS, the ERDC and the EPA, the Vicksburg District believes that it did address impacts to wetland and other aquatic resources to the extent practicable.

4. Proposed Determination's Factual Inaccuracies and Omissions.

In reviewing the Proposed Determination, the Vicksburg District recognized several inaccurate statements and omissions made by EPA. Since the 404(c)veto process is dependent on the information within this document as well as public input, the Vicksburg District has identified these specific statements and has provided appropriate responses below.

a. Comment - Page 10, paragraph 2 continuing to the next page. Construction of the proposed pumps involves the discharge of dredged or fill material into approximately 52.6 acres of forested wetlands or other waters of the United States in Issaquena County, Mississippi.

Response. It is unclear where the EPA obtained the number 52.6 acres of forested wetlands. The Vicksburg District has stated that no more than 38 acres of forested wetlands will be impacted at the pump station construction site. The construction site within the coffer dam contains between 50 and 55 acres.

b. Page 11, paragraph 3 comment. In April 1982, EPA provided comments on the Draft Environmental Impact Statement (DESIS) for the 1982 version of the proposed project. In our comments on the DEIS we highlighted our concerns regarding the proposed project's potentially extensive impacts on wetlands and associated fish and wildlife habitat and our belief that a less environmentally damaging design would meet the project's objectives. We stressed the importance of the flood water storage and water quality enhancement functions provided by area wetlands and expressed our concerns that the proposed project would degrade these critical functions.

Response. EPA's April 1982 comments on the Draft Environmental Impact Statement for the Yazoo area pump (Yazoo Backwater Area) stated "since the DEIS contains some excellent alternatives and/ or elements thereof, we believe a less environmentally damaging design will meet the projects objectives. We have assigned a rating of ER-2, i.e., we have some significant environmental reservations to the selected alternative, but feel opportunities exist to reach a mutually acceptable accommodation". The proposed mitigation was the purchase and development of 6,000 acres in fee simple title. The April 1982 letter from EPA did not raise any concerns about the adequacy of the proposed mitigation to minimize and offset the adverse environmental impacts associated with the proposed project.

c. Page 12, paragraph 2 Comment. The US Fish and Wildlife Service (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 resource as a result of the construction of the Yazoo Headwater Project and Yazoo Backwater Project would be large, and that the proposed pumps would promoted 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).

Response. FWS indicated they would not oppose the project assuming that mitigation was authorized and implemented as an integral project feature. The potential FWS CEQ referral was in reference to the alteration or elimination of the proposed mitigation plan. The June 11, 1982 Fish and Wildlife Coordination Act report for the Yazoo Backwater project actually stated:

> The service does not support the implementation of the selected plan. However, since an adequate and acceptable mitigation plan (Fish and Wildlife Mitigation Report) has been developed and agreed upon by this Service and the Corps of Engineers, we will not oppose the project, assuming that mitigation is authorized and implemented as an integral project feature. The Fish and Wildlife Mitigation Report, to be submitted to Congress for authorization, recommends land acquisition of 32, 800 acres in fee title, or 40,000 acres in easements, or a combination thereof. The recommendation for fee title acquisition of all or a portion of the 32,800 acres of forested wetlands is contingent upon adequate funds, at project expense, for development, operation, and maintenance. First cost for initial development would be approximately $3,604,600, with approximately $ 319,200 required for annual operation and maintenance, per 10,000 acres acquired. If provisions for these funds to provide intensive management are not obtained, an alternative to this recommendation should be fee title acquisition of approximately 38,900 acres of forested wetlands.
>
> If as a result of the review process, if the mitigation plan is eliminated or substantially altered, the Service would oppose the project and consider it a candidate for referral to the Council on Environmental Quality (CEQ). The possibility of CEQ referral has been discussed on numerous occasions in formal coordination meetings and in preliminary, revised preliminary, and draft Fish and Wildlife Coordination Reports officially transmitted on April 1, 1980, August 19, 1980. June 4, 1981, and January 7, 1982.

d. Page 17, paragraph 2 (continued on page 18) comment. Extensive studies of the Yazoo Backwater Area Demonstrate that it includes some of the richest wetland and aquatic resources in the Nation. These include a highly productive floodplain fishery, a highly projective but increasingly rare bottomland hardwood forest ecosystem that once dominated the LMRAV, hemispherically important migratory bird foraging grounds and one of only four remaining backwater ecosystems with a hydrologic connection to the Mississippi River.

Response. The bottomland hardwood forest ecosystem that once dominated the Lower Mississippi River Alluvial Valley (LMRAV), is only a portion of the foraging grounds of hemispherically important migratory bird foraging grounds. Neotropical migratory birds also use other suitable areas in North America to breed and these species winter in South and Central America. Effects to migratory birds are discussed in the Vicksburg District responses to the

Department of Interior's comments. Effects to migratory waterfowl that winter are discussed in the final Main Report, FSEIS, Waterfowl Appendix, and Mitigation Appendix on the final Backwater report. The waterfowl evaluation was developed by the U.S. Fish and Wildlife Service and assesses impacts to habitat that supports waterfowl during the time period of 1 November through 28 February. The highest caloric waterfowl foods are normally depleted before the backwater flood season begins. Pump station operation does not usually coincide with the waterfowl season.

e. III Characteristics and Functions of the Site, page 16 comment.

(1) The first paragraphs of this section on pages 16 and 17 try to describe the background conditions within the alluvial valley, but the description omits pertinent information. In order to fully understand the flooding situation in the lower Mississippi Alluvial Valley, one must go back to the founding of our country. When European settlers first came to North America, most of the country east of the Mississippi River was forested and flooding in the lower alluvial valley was a seasonal event, which generally occurred in April, May or June. Figure 4 shows the annual peak flood stage at Natchez, MS from 1802 through 2004. In the early half of the 19th century the annual flood peak was quite constant. The average peak from 1802-1851 was 46.0 +/- 2.03 feet, with a maximum flood of 48.6 feet. The average annual flood peak for the four periods in Table 2 below is fairly constant, but the standard deviation increases from 2.03 feet to 5.94 feet. The maximum peak increases by nearly 10 feet from 48.6 to 58.0. These changes in hydrology are the reasons why the flood control measures described in the EPA Proposed Determination were necessary. These changes in hydrology were not due to clearing of the forests in the lower Mississippi River Alluvial Valley, but are due to forest clearing in the upper Mississippi, Ohio, Cumberland and Tennessee River valleys. The first settlements in the Ohio River Valley were made in the 1790s, and the clearing of the forests for farmland started soon after. It took the settlers more than 100 years to clear the land to its present state.

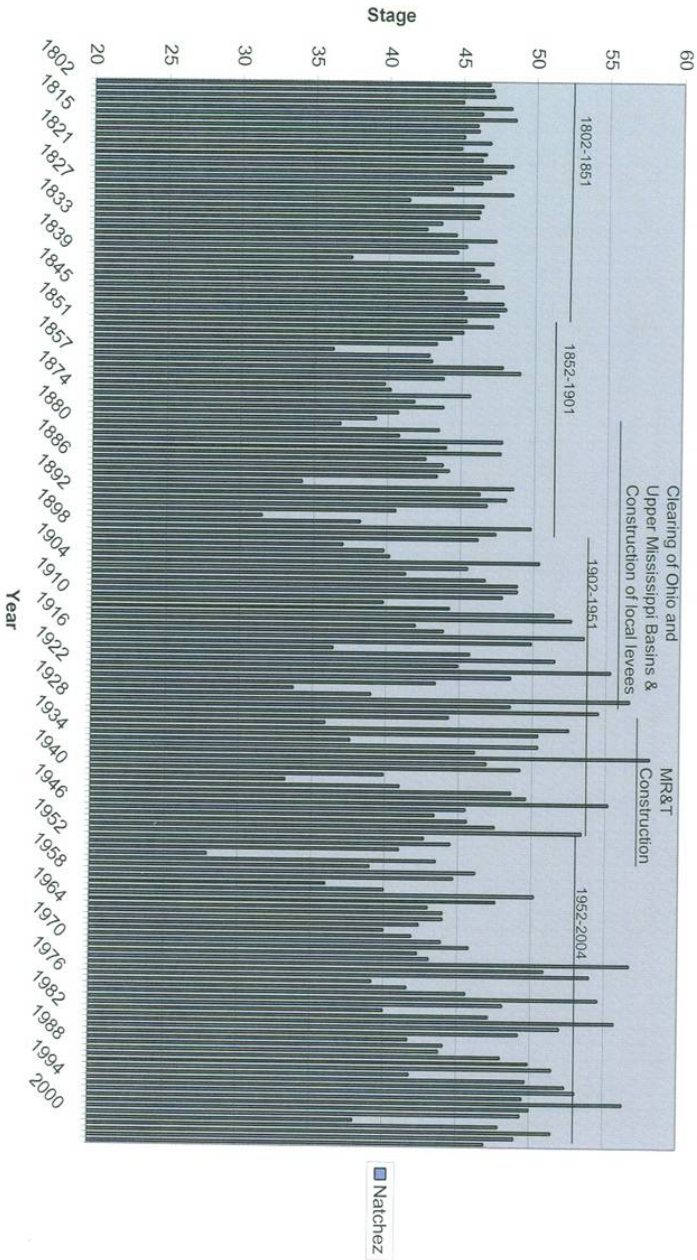
TABLE 2

Natchez, MS - Peak Stages

	1802-1851	1852-1901	1902-1951	1952-2004
Mean	46.0	43.0	46.4	46.0
Min	37.5	31.5	33.2	27.9
Max	48.6	49.8	58	56.7
Std_Dev	2.03	4.27	5.93	5.64

(2) Initially, no connection was made between the increased number and frequency of floods and the change in land cover. However, in the 1913 report "The Ohio and Mississippi Floods of 1913", by Alfred J. Henry, U.S. Department of Agriculture, Weather Bureau, Bulletin Z, the author observed the following, "It must be admitted that atmospheric precipitation is the

Figure 4
Natchez Peak Stages
1802-2004



sole source of the water which fills the streams. Meteorologists have known for many years that that element is variable both in time and space. The one other cause which enters largely in flood formation is the character of the surface covering the watershed. It is conceivable that if the character of the surface cover be suddenly changed there might be a profound change in the run-off, but since all artificial changes in a river system are brought about slowly, and since some of them may augment the run-off while others may retard it, it becomes a matter of great difficulty to integrate the total effect of artificial changes in the watershed or stream flow for any given epoch. The Department of Agriculture is now carrying on experimental work in the Rio Grande Forest Reserve that, when completed will throw considerable light on the subject." Scientists with the Department of Agriculture later developed the Universal Soil Loss Equation, which relates the amount of run-off from a parcel of land to the slope, soil type and ground-cover of that parcel. Forested watersheds retain the most precipitation and cleared lands retain the least. Although it took a hundred years to clear the Ohio Valley, today it retains only 4 percent of its historically forested area. The Upper Mississippi Valley retains more forested lands, but still 80 percent of its forests were cleared for agriculture. The effect of clearing all of this forested land has been the increased flood stages observed in the lower Mississippi Alluvial Valley.

(3) Page 17, paragraph 3 comment. "Extensive studies of the Yazoo Backwater Area demonstrate that it includes some of the richest wetland and aquatic resources in the Nation. These include a highly productive floodplain fishery, a highly productive but increasingly rare bottomland hardwood forest ecosystem that once dominated the LMRAV, hemispherically important migratory bird foraging grounds and one of only four remaining backwater ecosystems with a hydrologic connection to the Mississippi River."

Response. The above comment makes four statements, which are: 1. highly productive fishery, 2. highly productive bottomland hardwood forest, 3. hemispherically important bird foraging grounds, and 4. one of only four remaining backwater ecosystems. There has never been extensive studies of the Yazoo Backwater Area until ERDC began in the late 1980's. Even then, sampling was sporadic. It's only been in the last ten years that detailed fish studies have been conducted. The Vicksburg District is not aware of any field study that concluded the floodplain fishery was highly productive. In fact, TMDL's have been designated for most streams due to sediments, poor water quality, and pesticides. The Vicksburg District has identified restoration and mitigation measures that will improve existing degraded habitats in the Yazoo Delta, which could lead to substantial improvement compared to existing conditions. Although the Vicksburg District acknowledges that productivity studies have shown some wetlands are among the highest producing areas in the world. Other studies have shown some forested wetlands have relatively low productivity. The reported range of productivity in riparian forested wetlands is from 750 to 1370 g/m^2/year (Mitsch and Gosselink 2000). The reported range for all wetlands is 560 to 1980 g/m^2/year (Mitsch and Gosselink). Without the benefit of specific productivity studies in the Yazoo Basin, the EPA cannot assume these wetlands will fall into the highly productive end of the observed range. Furthermore, other scientific studies have shown that forest productivity is inversely related to flood duration, and that decreased flooding in the Yazoo Basin will likely increase forest productivity (Megonigal, et al., 1997). Thus, in the

after project environment, the forests will produce more seeds, nuts, leaves and biomass in general and will better support the wildlife communities that live within them.

The EPA Headquarters Office of Water states in regards to fishery productivity in wetlands, "In general, quantitative data on wetland fish community structure has not been uniformly collected from a series of statistically representative wetlands in any region of the country. Thus, it is currently impossible to state what are "normal" levels for parameters such as fish density, species richness, species richness, biomass, Index of Biotic Integrity (IBI, Karr 1981) and their temporal and spatial variability, in any type of wetland, http://www.epa.gov/OWOW/wetlands/wqual/fish.html)."

The FWS and EPA asserts that the Yazoo Backwater Area is an island of habitat for migratory birds within a virtual desert. The truth is that, when conditions are such that the pump station would be operated, the entire area is flooded and provides habitat for migratory birds. When the Steele Bayou gates are closed due to high water on the Mississippi and Yazoo Rivers, the protected Yazoo Backwater Area provides about one-third of the total flooded area (between Vicksburg and Greenville, MS). The Landsat 5 scene obtained on April 15, 2008 illustrates this point. There are approximately, 626,000 acres flooded on that date and only 210,000 are within the protected Yazoo Backwater Area.

f. Comment - Page 18, paragraph 1 continued from previous page. ". . . one of only four remaining backwater ecosystems with a hydrologic connection to the Mississippi River."

Response. The Yazoo Backwater Area does not maintain a hydrologic connection with the Mississippi River. This drainage area is controlled by levees and two water control structures, which were completed by 1978. During high water on the Mississippi and Yazoo Rivers, the Steele Bayou and Little Sunflower structure gates are closed. One of the few times the two structures have their gates fully opened is to evacuate floodwaters inside the basin once the Yazoo River stage is lower than the interior flood stage. During low water, the Steele Bayou structure gates are operated to maintain water within the basin for fisheries and conservation. The Little Sunflower Structure remains closed during this time. The EPA implies that the Yazoo Backwater pump would alter the remaining connection, when in fact the pump would not alter the existing connectivity at all. Water flows out of the Backwater Area into the Yazoo River, but not into it.

g. Page 18, last paragraph comment. As stated in the Yazoo Basin HGM Guidebook, 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 return period; the primary source of hydrology to the wetland is backwater; and floodwaters largely drain form the site back to the channel as flood stages fall (as opposed to being retained on the site in depressions).

Response. Although the Regional Guidebook states the 5-year frequency flood was used to determine whether wetlands were connected or isolated, Appendix 10 stated that the 2-year frequency, 5 percent duration flood would be used to make this determination. Areas connected less frequently than once every two years fail to meet the WDM criteria for hydrology.

Although there are wetlands within the 5-year frequency floodplain, riverine flooding cannot be the dominant source of hydrology, because the frequency of flooding is insufficient to meet the minimum required flood interval. HGM is not a method for delineating wetlands, and if the regional guidebooks are at times inconsistent with the WDM, deference should be given to the WDM.

h. Page 20, paragraph 2 comment. These geochemical 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 natural timing, frequency, and duration of flooding in the area's riverine backwater wetland systems.

Response. These geochemical processes are modeled as wetland functions by HGM. The model incorporates both frequency and duration as variables. There are no studies that document the importance of natural timing to the performance of these functions by wetlands, and natural timing is based upon climatology and nothing else.

i. Page 22, paragraph 1 comment. The effective performance of many of the most critical biogeochemical processes depends on the maintenance of the natural hydrologic cycle of flooding in riverine backwater wetlands and the anoxic/reducing environment created by periodic cycles of inundation and saturation

Response. The effective performance of these biogeochemical processes is dependent upon periodic cycles of inundation and saturation which can come from riverine flooding or precipitation. There are no studies which compared the effectiveness of riverine wetlands to depressional wetlands in the performance of these functions.

j. Comment Page 22, paragraph continued from previous page. "… For example, denitrification will not occur unless the soil is anoxic and the redox potential falls below a certain level. Flooding 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 (NO2) is removed by denitrification and released as nitrogen gas to the atmosphere. In addition, sulfate is reduced to sulfide, which 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 he water column and are retained by the wetland sediments."

Response to Comment Page 22, paragraph continued from previous page. Fourteen days is a conservative estimate that should ensure anoxia in most soil types and most flood depths. Soils high in organic matter (leaf litter) have an established microbial community. Once soil pore space becomes saturated, available oxygen is rapidly utilized. The shallower the overlying water, the quicker the process will proceed. Based on the period of record, the Vicksburg District estimates that the average pumping period will be 31 days. Given that the 1-year flood plain will be inundated before pumping begins, there should be ample time for these processes to occur during seasonal periods of riverine flooding. In addition, microbial studies of Little Sunflower River sediments have shown that sulfate-reducing bacterial are the most prevalent bacterial type.

k. Page 23, paragraph 2 comment. 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 natural hydrologic regime of riverine backwater wetlands.

Response. Although 90 species of fish have been documented in the Yazoo Basin, fewer species have been found in the backwater area. The higher number of species occurs when you include the bluff hills tributaries, which are comprised of different fish assemblages compared to the backwater area. Simply stating the number of species as evidence of biotic condition is misleading. Numerically-dominant species in the project area are considered habitat generalists with the ability to tolerate degraded habitat conditions. Widespread agricultural lands in the delta are one of the main reasons for degradation of habitat. The Backwater project will reforest thousands of acres, thus in the Vicksburg District opinion, will actually improve the ecosystem.

l. Page 25, paragraph 1, comment. Finally, the stream habitat that remains in the Upper Gulf 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.

Response. The Upper Gulf Plain Drainage Area includes the loess bluffs which contain the headwater regions of the Yazoo Basin. The Yazoo Backwater Area is downstream of that ecoregion and does not supply any hydrologic input into it. Without the Recommended Plan, however, the public will continue to be exposed to floodwaters containing sediment, nutrient, and pesticide runoff from agricultural areas within the backwater project area. Egress and emergency services become restricted as roads go under water. Sewerage systems malfunction in saturated soils resulting in dangerous levels of pathogens in floodwaters. Elevated structures or structures protected by ring levees become isolated islands in a sea of muddy water (Figures 1 and 2). Utilities (power and water) will fail in prolonged floods. People can lose their homes and their livelihoods while education and other services can be disrupted in floods that have lasted one month or more. Clearly, the without-project scenario is more unsatisfactory from the standpoint of public health or welfare.

m. Page 27, first paragraph comment. Of this total, approximately 26,300 acres would be hydrologically modified (i.e., reduced flood duration) to the extent that they would no longer be defined as wetlands and would lose CWA regulatory protection.

Response. The impacts to the 26,300 acres of wetlands is contingent upon the assumptions that riverine flood water is the sole source of hydrology and that all acres in the FESM modeled area are actually wetlands. The average rainfall for the area is more than 50 inches per year, which is sufficient in itself to sustain wetland functions (Mitsch and Gosselink, 2000; Messina and Conner, 1998). The 26,300 acres contain 5 EMAP sampling sites with the following results: 2 wet, 2 not wet, 1 other waters. Using the EPA proportioning method from the EMAP analysis, only 40% of the area would be determined as wetland. Thus 15,800 acres of the 26,300 acres are

non wetlands to which there would be no impact. The EMAP analysis determined that 67 percent of the forested areas above the 5 percent duration flood were wetlands, and therefore it would be reasonable to assume that precipitation would continue to sustain 67 percent of the forested areas in the remaining 10,500 acres. Using the above information, the overall wetland impacts are likely to be less than 4,000 acres.

n. Page 27 first paragraph comment. As a point of reference, the impacts estimated by the Corps for this single project are more extensive than the total impacts (on an annual average basis) associated with the 86,000 projects authorized by the Corps permit program nationwide each year.

Response. The 1990 Memorandum of Agreement between the EPA and USACE and the USACE Regulatory Guidance Letter 2-02 both state that mitigation for wetlands should be based on wetland functions and values and not on acres. The EPA is basing all of the impacts on acres and is totally ignoring the proposed mitigation and nonstructural feature of reforestation. The EPA is comparing acres of the permitted actions to the acres impacted by the Yazoo Backwater Project. The 86,000 projects are for 404 permitted actions primarily involve the filling or total loss of wetlands, while the Yazoo Backwater Project will only slightly reduce the wetland functions of the impacted acres (<2.0% loss of wetland functions). The Yazoo Backwater Project will provide a net increase to both wetland acres and functional values. The 26,300 acres of wetlands potentially impacted by the project will lose 10 percent of their base functional value. Consequently, mitigation for the wetland losses has been calculated to require the reforestation of 3,800 acres of frequently flooded agricultural lands.

o. Page 28, paragraph 2 comment. The ecological effect of this project will be to dampen the natural variability in flood regime (the flood pulse) which currently contributes to the biodiversity of the project area's wetlands.

Response. The Yazoo Backwater Project will not alter the natural flood pulse. The current flood regime has already been altered by actions taken outside of the basin, such that it has unnatural variability, and it is this unnatural variability that makes this project necessary. Some project features, such as the Steele Bayou Structure, keep area streams from going dry by holding a conservation pool during low flow.

p. Page 28, paragraph 3 continuing onto page 29, comment: The reduction or elimination of the floodwater detention 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, and exacerbate flooding problems downstream at a time when communities in the lower Mississippi River Valley are still struggling to recover from the effects of recent catastrophic flooding.

Response.

Based on the HGM-Yazoo Basin Regional Guidebook, the project will not alter the floodwater detention function of the wetlands (this will be discussed in more detail later in this response). The operation of the pump station could increase peak discharges in the Mississippi

River, but it is unlikely that it would exacerbate flooding problems downstream for the following reasons: 1) the peak discharge in the Mississippi River at Vicksburg would be increased by approximately 0.5% (this would increase stages by approximately 1 inch), 2) the pump station will generally be used during frequent flood events (2 to 5-year), and the downstream levees would not be threatened by these flood events, and 3) for a Mississippi River project design flood, the operation of the pump station would actually provide increased protection to downstream areas by providing more storage within the Backwater Area.

The Vicksburg District is not aware of any communities in the Lower Mississippi River Valley that are still trying to recover. If EPA is referring to New Orleans, no Mississippi River mainline levee was breached during Hurricane Katrina. The Bonnie Carrie floodway system is designed to reduce the flow past New Orleans to a maximum of 1.2 million cfs.

q. Page 29, first paragraph comment. 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.

Response. The pump station size would not hold water levels at a flat 87.0 feet, NGVD. Water levels will rise and fall as before, but the peak elevations will be reduced for flood events greater than 87.0 feet at the Steele Bayou gauge. The duration of flood events will also be reduced, but not eliminated. It would take approximately 25 days to pump water from elevation 91.0 down to elevation 87.0 (elevation 91.0 is the 2-year flood). It would take 58 days to pump a 5-year flood down to elevation 87.0, and at elevation 87.0 there would still be approximately 200,000 acres flooded. On average, the pump station would operate for approximately 31 days, which means that for those days more than 200,000 acres would be flooded and these would remain flooded when pump ceases and the Steele Bayou gates are eventually allowed to reopen.

r. Page 29, first paragraph comment. Reducing or eliminating the flood water detention function of project area wetlands will also decrease the amount of water delivered to plants and allowed to infiltrate in the alluvial aquifer. Not allowing adequate time for flood water to infiltrate into the alluvial aquifer in the Yazoo Backwater Area will also reduce the amount of water that returns to area streams as base flow.

Response. Although many wetlands do supplement groundwater resources, the basic requirement is that those wetlands have well drained soils. Soils in the Yazoo Backwater Area are not well drained. Clay content can be as high as 90 percent. Infiltration rates are approximately 1 inch per day. All water absorbed into the soil is lost as evapotranspiration by plants. The alluvial groundwater table is more than 200 feet below the ground surface and does not supplement base flow in area streams. The lack of connectivity of surface waters with the ground water is documented in two reports by the USGS and the citations are provided in the FSEIS.

s. Comment Page 29, paragraph 2. Reducing the spatial extent, frequency, and duration of time project area wetlands flood will significantly reduce the amount of dissolved and particulate organic carbon available for wetlands 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, 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, flood waters, and the invertebrate community and subsequent transport downstream – circumstances that would be dramatically altered by the proposed project.

Response. The Water Quality Appendix (Appendix 16) evaluated water quality impacts from the Recommended Plan both qualitatively and quantitatively. In 2005, EPA stated that "With regard to the Water Quality Appendix, the Corps has addressed our most significant concerns at this time." Contrary to the views expressed by EPA, the changes in frequency and duration proposed by the Yazoo Backwater Project will not dramatically alter or significantly reduce the amount of dissolved and particulate organic carbon available for wetlands and aquatic food webs or the biogeochemical processes in downstream habitats. While the EPA disputes the conclusions of the wetland HGM analysis, the export of organic carbon functional analysis shows that reforestation (which EPA ignores) would actually increase the export of organic carbon function by up to 9 percent by providing more plentiful, permanent carbon mass to reforested agriculture lands. The EPA also ignores the role that precipitation plays in maintaining isolated ephemeral wetlands within forested areas. These ephemeral wetlands were not assessed by HGM, however, they will continue to sustain the microbial and invertebrate community as they do now. Because of the project area's characteristic ridge and swale land forms and fine grained soil types, many isolated forested wetlands retain water for more than 14 days, cited by the EPA as the minimum time required for wetland microbial processes to begin. The Yazoo Backwater Project will not eliminate flood pulses within the project area as claimed by the EPA. Under the Recommended Plan, 20,000 acres will continue to be flooded between 14 and 20 days; 27,000 acres will continue to be flooded between 20 and 27 days; 20,000 acres will continue to be flooded between 28 and 34 days; and 41,000 acres will continue to be flooded more than 35 days.

t. Comment – Page 30, paragraph 2. Reducing the spatial extent, frequency, and duration of time project area wetlands flood will reduce the capacity of area wetlands to remove water pollutants this 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 floodwater 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.

Response. Contrary to the views expressed by the EPA, the proposed Yazoo Backwater Project will not produce significant reductions in the project area's wetland ability to remove and process elements and compounds from floodwaters. Nor will the project eliminate flood pulses within the project area as claimed by the EPA. As discussed in the previous response, more than 108,000 acres will continue to flood 14 days or more. Based on the period of record, the average annual pumping period will be 31 days, which is ample time for microbial populations to switch from aerobic to anaerobic in order for wetland microbial degradation functions to occur. While the EPA disputes the conclusions of the wetland HGM functional analysis, the analysis shows that reforestation (which the EPA ignores) will actually improve the project area's wetland ability to physically and biologically process elements and compounds. Reforestation of frequently flooded agricultural land would improve the functional capacity of both the physical removal of elements and compounds function (associated with removal of TSS and sorbed materials such as phosphorus, legacy pesticides, and heavy metals) and the biological removal of elements and compounds function (associated with removal of nitrogen and other compounds that undergo microbial degradation). Direct and indirect project impacts would cause these wetland functions to lose approximately 5 percent of their current value. However, the HGM analysis also shows that this loss in functional value will be offset by the increased value of wetland function achieved when currently farmed lands in the 1- and 2-year flood plain are reforested. Reforestation of the minimum 15,029 acres would replace the lost wetland functional values that are associated with water quality and would remove these reforested acres from agricultural production such that erosion would be reduced as would the use of fertilizers and pesticides that have caused water quality problems in area streams. Reforestation of additional cleared lands up to the recommended 55,600 acres would reduce levels of suspended sediment from project area streams by 15 percent; reduce the concentration of legacy pesticides by 6 percent; and reduce the concentration of nutrients by 16 percent. In addition, reforestation of up to 55,600 acres would reduce sediment and nitrogen loading in the Mississippi River each year by up to 4 and 9 percent, respectively. The Yazoo Backwater Project will not disturb sediment in project area streams away from the construction site. As a result, the project will not directly impact the existing fish consumption advisory for DDT and toxaphene. Reforestation, however, will reduce the amount of runoff of these pesticides (sorbed to agricultural soil) and will indirectly reduce instream sediment concentrations. Studies have shown that reduction of loose, contaminated sediment will also reduce fish tissue concentrations.

u. Comment – Page 30, paragraph 3. Although the FSEIS concludes otherwise, we believe there is potential for conversion of those 26,300 acres that, as a result of the project, would no longer be defined as wetlands and would lose CWA regulatory protection. These conversions of wetlands to other uses could result in additional adverse environmental effects. For example, agricultural conversion could change a forested wetland habitat to an agricultural use, destroying or significantly degrading all wetland functions. Agricultural intensification could have water quality implication by promoting faster and increased surface water runoff from agricultural fields. Given that the Yazoo Backwater Area already contains CWA section 303(d)-listed impaired water bodies, additional runoff impacts would likely exacerbate the elevated concentrations of the pollutants of concern, potentially causing or contributing to violation of applicable state water quality standards.

Response.

The 303d list was based on region-wide assumptions not actual data collected at these sites. The EPA's comments are contradictory. EPA states that nationally significant wetlands and fisheries exist in the same areas that are designated as impaired waterbodies under the CWA. Pesticide levels have actually decreased, and reforestation under with project conditions will reduce drainage of agricultural lands into the streams. These are indisputable facts showing that this project will benefit the ecosystem.

The Vicksburg District determined that the probability for additional clearing of forested acres potentially losing CWA regulatory protection was low based on three factors: (a) 10,900 acres would remain under some form of public protection; (b) regulatory provisions of Swampbuster provide disincentives for additional clearing for agricultural practices; and (c) Geographic Information System analysis of the 1970s, 1980s, 1990s, and 1999 land use indicate that the number of forested acres has remained stable since the early 1980s. Of the 251,780 acres of forest in the early 1970s, approximately 200,000 of the same forested acres remained in the early 1980s (199,776 acres), early 1990's (200,505 acres), and 2001 (198,001 acres). There is a maximum difference of approximately 2,504 acres between these dates (1.2 percent). In addition, of the 200,000 acres of forest in the project area, approximately 73,000 acres are privately owned nonwetland forest. These acres have never been converted (since the early 1970s), despite lacking jurisdictional protection. In addition, the NRCS has indicated that clearing of bottom-land hardwoods in the entire Mississippi Delta area over the last 20 years has totaled only 1,105 acres. A complete discussion is included in the wetland appendix (Appendix 10). This is substantiated by USDA statistical data showing market prices and land in crop production for the State of Mississippi in 2000 and 2006. The data in Table 3 show that even though commodity prices increased, the number of farmed acres remained the same. It is likely that the same trend occurred in the Yazoo Backwater Project Area. Because the CRP program does not have perpetual easements, however, there is a possibility that these CRP lands could be converted back to a more profitable crop when the existing contracts expire. It is likely that this conversion will happen with or without flood protection. In fact, cleared lands in the Tensas-Cocodrie Project Area decreased from 1989 to 1999 due to USDA programs despite the pump station being operated since 1986.

TABLE 3

Market Prices and Land in Production for the State of Mississippi (USDA)						
	2000		2006		Change	
Crop	Acres (x 1000)	Market Prices ($)	Acres (x 1000)	Market Prices ($)	(1000 acres)	% change
Corn	390	1.91	960	2.84	+570	+ 48.7
Cotton	1,300	.505	660	.45	-640	- 10.9
Rice	220	5.68	190	9.15	-30	+ 61.1
Soybeans	1,700	4.71	1,450	6.23	-250	+ 32.3
TOTALS	3,610	-	3,230	-	-350	-

Land use analysis of the 26,300 acres shows approximately 3,600 acres of forest and approximately 6,600 acres of cropland that belong to private land owners and could be used in any manner they choose within the regulatory framework of farming in the Delta. In addition, there are approximately 3,300 acres of young WRP lands that cannot be converted back to cropland. There are also approximately 2,600 acres of CRP land that could be converted when their existing contracts expire. While these lands may no longer be technically defined as Federal Wetlands, they will remain in the postproject 2-year frequency flood plain and will continue to be flooded up to 13 days every 2 years. According to the NRCS, the 3,600 acres of forest are still protected under the Swampbuster Act, regardless of flood duration. In a letter, the NRCS stated that it was the cutting of woody vegetation that triggered Swampbuster, not changes in drainage (Appendix 1, Attachment 2). These lands are in relatively small tracts that would not be condusive to large-scale farm operations. The 6,600 acres of remaining agricultural land are the only lands that are currently available for row crop production. According to the 2005 land use analysis, these 6,600 acres are already being farmed. In 2005, the predominant crops were soybeans (5,050 acres), cotton (818 acres), corn (424 acres), and rice (320 acres). Unless landowners choose to sell these lands either in fee title or as permanent easements, it is likely that they will continue to be farmed post-project. However, because they remain in the 2-year frequency flood plain, the risk of flood damage to crops still remains.

The Stormwater Runoff Analysis described in Appendix 16 calculated reductions in estimated runoff of sediment, legacy pesticides, total nitrogen, and total phosphorus from reforesting up to 55,600 acres of cleared agricultural land in the 1-year and 2-year frequency flood plains. This analysis used the 2005 land use analysis and assumed that the lands were being farmed for cotton, rice, corn or soybeans. The analysis showed percent reductions of these water quality parameters expected in project area streams once the acres were reforested and no longer being tilled and treated with fertilizers and chemicals. Using the same analysis and making the assumption that the 6,600 acres of available agricultural land are not currently being farmed (which is a false assumption), sediment and total phosphorus runoff could increase by 1.3 percent, legacy pesticide runoff could increase by 0.2 percent, and total nitrogen runoff could increase by 0.82 percent. If, on the other hand, we use the individual nitrogen export coefficient for each crop (Ashby, et al., 2000 and Beaulac and Reckhow, 1982), we can show differences in nitrogen export from these fields based upon the actual acres of each crop planted. These data are presented in the following table. For the 2005 mix, total nitrogen export would increase by 0.90 percent of the average concentration estimated for the Yazoo Backwater study area base nitrogen load. Monoculture plantings of all the acres in each of the four major crops are also presented in the table. Soybeans and rice would produce the most nitrogen (0.92 percent of base), corn would produce 0.82 percent of the base, and cotton would produce the least, 0.74 percent of the base. Although the differences are measured in hundredths of a percent, planting the available acres in corn would actually produce less nitrogen export than would the 2005 planting mix. This is because soybeans produce large quantities of nitrogen through the nitrogen fixing bacteria associated with their roots. The table includes a third analysis, which makes the assumption that the 2,600 acres of CRP forests are converted back to row crops for a total of 9,200 acres of cropped land. Monoculture plantings of the four crops show that nitrogen export from soybeans and rice would increase by 1.29 percent, nitrogen export from cotton would increase by 1.03 percent and nitrogen export from corn would increase by 1.14 percent. Clearing

and planting 2,600 acres of CRP forests could potentially increase sediment and phosphorus runoff by 1.8 percent and legacy pesticide runoff by 0.3 percent.

TABLE 4

Nitrogen Export from 6,600 Acres of Agricultural Land Moving Out of the 5% Duration						
	Acres	Coefficient	tons/yr	Nitrogen Export	Total Export	Increased (mg/L)
				(% of Base Load)		(% of avg. conc.)
2005 Land Use using Individual Export Coefficients						
Soybeans	5,050	1.25	26	0.71%		
Rice	320	1.25	2	0.04%		
Cotton	818	1.00	3	0.09%		
Corn	424	1.11	2	0.05%	0.90%	0.020 (5%)
Intensification to One Crop using Individual Export Coefficients						
Soybeans	6,600	1.25	33	0.92%	0.92%	0.020 (5%)
Rice	6,600	1.25	33	0.92%	0.92%	0.020 (5%)
Cotton	6,600	1.00	27	0.74%	0.74%	0.016 (5%)
Corn	6,600	1.11	30	0.82%	0.82%	0.018 (5%)
Cumulative Impact of Conversion of CRP Land and Existing Cropland to One Crop						
Soybeans	9,200	1.25	47	1.29%	1.29%	0.029 (7%)
Rice	9,200	1.25	47	1.29%	1.29%	0.029 (7%)
Cotton	9,200	1.00	37	1.03%	1.03%	0.022 (6%)
Corn	9,200	1.11	41	1.14%	1.14%	0.025 (6%)

Average stream nitrate concentration = 0.4 mg/L

Table 4 also indicates the mass of nitrogen exported from the fields each year and converts those numbers into stream increases in nitrate (assuming, erroneously, that all of the nitrogen is in the nitrate form). Based upon these data, the average nitrate concentration in study area streams would increase between 5 and 7 percent. Average nitrate concentrations would increase from 0.40 mg/L to between 0.42 and 0.43 mg/L. In reality the USGS has shown that, because of instream processing, the Yazoo Backwater Area actually exports less nitrate into the Mississippi River than was originally thought. Runner and others (2002) found that while nitrate made up 68 percent of the total nitrogen concentration in the Mississippi River at Vicksburg, nitrate was only 28 percent of the total nitrogen concentration in the Yazoo River downstream of the Steele Bayou Structure. These data suggest that potential project increases to average nitrate concentrations in the Yazoo Backwater Project Area and ultimately to the Yazoo and Mississippi Rivers would be significantly less, approximately 2 percent of base rather than 5 to 7 percent of base.

These data show that agricultural conversion on the scale implied by EPA and other project opponents is unlikely. Because of existing land ownership and legal constraints, existing forested land is unlikely to be converted to large tracts of farmed agricultural land. The nitrogen export analysis puts the subject of intensification into perspective. The available agricultural land is currently being farmed. If the 6,600 acres were all converted to corn production, the total amount of nitrogen exported (0.82 percent of current base load) would 0.08 percent less than the

nitrogen export from the 2005 crop mix (0.90 percent of base load). Conversion of the 2,600 acres of CRP land would increase nitrogen by another 0.32 percent to 0.36 percent of base load. Given that more than half of these lands are already in production, it is likely that they will continue to be farmed unless they are enrolled into some type of reforestation program. Sediment, phosphorus and legacy pesticide export rates are likely to very similar to those estimated for the 2005 land use crop mix. Nitrogen export rates will vary slightly depending upon the crop allocation. This slight variation in nitrogen export cannot be mistaken for adverse environmental effects to "CWA Section 303(d)-listed impacted water bodies" nor would it "exacerbate the elevated concentrations of the pollutants of concern, potentially causing or contributing to violations of water quality standards (40 CFR 230.10(b))." Reforestation of up to 55,600 acres would reduce sediment and total phosphorus runoff by 11 percent, reduce legacy pesticide runoff by 2 percent, and reduce total nitrogen runoff by 7 percent.

v. Current Use Pesticides for Corn.

(a) While the Corn budgets for the state of Mississippi incorporate the use of several herbicides including glyphosate (Roundup) and atrazine, the corn budget developed for the Yazoo Backwater Area only included data for glyphosate, the main ingredient in Roundup (MSU, 2005). The Roundup Ready Corn Production System has replaced conventional herbicides as the most popular system in the lower Mississippi Delta. It offers protection from off-target movement of glyphosate applied to adjacent Roundup Ready soybean and/or cotton fields or unplanted fields. This is important because Roundup Ready crops are planted on over 95% of the soybean and cotton acreage in the lower Delta. Furthermore, when glyphosate is applied exclusively, this herbicide system does not restrict replanting options if flooding destroys a planted crop. If corn planting is delayed beyond April 10 or a corn stand is destroyed, alternative crops of cotton or soybeans may be planted.

(b) The USDA National Agricultural Statistics Service (NASS) data of farm chemical use for Mississippi between 1990 and 2006 do not report herbicide use for glyphosate in corn (USDA, 2007). However, the site does report glyphosate use for soybeans. The 2005 Yazoo Backwater Corn Budget shows that a total of 3 quarts of glyphosate 4L are recommended to be applied to corn between February and May. This is also the application rate of glyphosate recommended for soybeans in the 2005 Soybean Budget (MSU, 2005). Using the Mississippi soybean NASS data, on average 1.07 pounds of glyphosate active ingredient are applied per acre of corn and soybeans in the lower Delta. The NASS data also list glyphosate application rates for upland cotton and rice, where on average 1.05 and 0.95 pounds of glyphosate active ingredient are applied per acre. Based upon these data the Yazoo Backwater FSEIS determined that glyphosate would be the major herbicide impacting the lower Delta, not atrazine. Based on current and historic cropping patterns, there should not be any dramatic increases in glyphosate use.

(c) Glyphosate (Roundup) is a broad-spectrum, nonselective systemic herbicide used for control of annual and perennial plants, including grasses, sedges, broad-leaved weeds, and woody plants. It is used extensively in agriculture and in the home gardens. Most of the cotton, soybean, and corn planted in the lower delta are engineered to be Roundup-ready. This trend has

led to a significant reduction in types and quantities of herbicide usage (Dr. Robert Williams, Mississippi State University, personal communication). Glyphosate is a General Use Pesticide that is described as slightly toxic to wild birds, practically nontoxic to fish, but may be slightly toxic to aquatic invertebrates (Kamrin, 1997). Glyphosate is strongly adsorbed to most soil, even those with lower organic and clay content. The estimated average half-life in soil is 47 days. Field and laboratory studies show that it does not leach appreciably and has low potential for runoff. One estimate indicated that less than 2 percent of the applied chemical is lost to runoff. In water, glyphosate is strongly sorbed to suspended organic and mineral particles and is broken down by microbes. Its half-life in pond water ranges from 12 days to 10 weeks. A modeling study conducted by the Commonwealth of Massachusetts (Massachusetts DEP, 2003) to determine potential impacts to surface and ground water showed that glyphosate sprayed on rights of way migrated less than 1 meter from point of application. The model predicted significant natural attenuation by microbes at less than ½ meter and predicted no migration to ground water. In addition, the EPA states that "Glyphosate is strongly sorbed to soil, with little potential for leaching to ground water. Microbes in the soil readily and completely degrade it even under low temperature conditions. It tends to adhere to sediments when released to water. Glyphosate does not tend to accumulate in aquatic life" (EPA, 2008).

(d) While atrazine is listed as an herbicide for use with corn, there are no data on usage in the 1990 through 2006 NASS Mississippi database (USDA, 2008). In addition, Dr. Eric Larson, an agronomist specializing in grain crops at Mississippi State University, did not include atrazine as a major herbicide used in the Yazoo Backwater Area (MSU, 2005), although it was listed as a corn herbicide for the state. Based on these data, the Vicksburg District did not determine that increases in corn production in the Yazoo Backwater Area would result in the substantial increases in atrazine use and the degree of runoff into streams that has been observed in the corn-belt states. In areas with heavy atrazine use, stream concentrations can approximate 1 percent of the active ingredient applied to crops (Gilliom et al., 2007). That being said, the USGS NAWQA data collected on the Bogue Phalia near Leland, MS (above the Yazoo Backwater Project area) and on the Yazoo River below Steele Bayou and above Long Lake, MS (below the project area) both report increases in atrazine concentrations during the growing season. Observed data from the Bogue Phalia for 2007 show an increase in stream atrazine concentrations in 2007 for drainage coming out of Bolivar County, MS. There are no current data for the Yazoo Backwater Project Area. Atrazine is moderately to highly mobile in soils with low clay or organic matter content. Because it does not adsorb strongly to soil particles and has a lengthy half-life (60 to >100 days), it has a high potential for groundwater contamination despite its moderate water solubility (Kamrin, 1997). Based upon data from the MDEQ Office of Pollution Control - Agricultural Chemical Ground-Water Monitoring (AgChem) Program (MDEQ, 2003), of 1,085 wells sampled throughout the state between 1989 and 2003, none of the wells sampled in the Yazoo Backwater Project area have had detectable concentrations of atrazine.

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w. Page 31, paragraph 2 comment. Reducing the spatial extent, frequency, and duration of time project area wetlands will dramatically alter the structure and species composition of the plant community in the Yazoo Backwater Area. Wetland plant communities will shift over time to communities composed of species adapted to drier environments. For example, large areas 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. As discussed below, this large shift in plant communities will also have adverse effects on area fish and wildlife which depend on these wetland plant species, and the hydrologic regimes they represent, to meet specific life history requirements.

Response. There are no scientific studies which support the subjective conclusions in the previous paragraph. A table showing the general relationship between vegetation associations and floodplain topography, flood frequency, and flood duration of a southeastern U.S. bottomland hardwood forest is provided in both Messina and Conner (1998) and Mitsch and Gosselink (2000). There are slight differences in the two tables and the one that appears in "Southern Forested Wetlands, Ecology and Management" Messina and Conner, 1998) will be referenced in this discussion. The table lists two floodplain zones (medium hardwood wetlands-seasonally flooded and higher hardwood wetlands-temporarily flooded) which have the frequency and duration of flooding associated with the wetlands in the Yazoo Backwater Area. The Yazoo Backwater Area has approximately 80,000 acres of wetlands that experience more than 12.5 percent duration of flooding in most years (more than 34 days). The forest association found in this flood regime contains overcup oak, water hickory and green ash. Approximately 4,000 of the 67,000 (~6%) acres of wetlands that may experience a change in flood duration are in this flood regime. The FESM modeling predicts that these wetlands will lose up to 7 days of annual flooding. Most of the wetlands experiencing a change in duration due to the project (63,000 acres) are in the temporarily flooded (2 to 12.5% duration, 5 to 34 days) association and will remain within this association post-project. Because the change in duration is relatively small (7-14 days) and the wetlands will remain in the same associations post-project that they were in pre-project, it is not expected that any significant change in species composition will be noted. No scientific studies have been found which measured the effect of a seven to fourteen day change in duration on any forested wetland. With regard to the endangered plant, pondberry, the Vicksburg District has agreed to establish two new colonies in cooperation with the FWS. Ninety percent of the existing pondberry colonies are found in forested areas above the 2-year frequency floodplain, and available habitat area will therefore increase. The EPA's claim, that the presumed "large shift" in plant communities will have adverse effects on area fish, is unsupported. There have never been any scientific studies which have shown that warm water fish are dependent upon any association of plants.

x. Page 31, paragraph 3 comment. Reducing the spatial extent, frequency, and duration of time project area wetlands flood will significantly degrade their capacity to provide habitat for an extensive list of fish and wildlife species. … 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.

Response. This is a subjective comment. The results from the wetland functional analysis do not suggest that the predicted changes in hydrology will result in significant change in flora or fauna. The HGM support wildlife function indicates a 4 percent loss in that function for the 26,300 acres of wetlands adversely effected, and a 0.6 percent loss to the base wildlife function for the project area. The proposed project does not include a feature to drain any wetlands, and the 7 to 14 day change in flood duration will not dry up any wetlands. EPA's subjective evaluation exaggerates the reported impacts. It is hard to understand how the EPA can describe the project as desiccating floodplain habitats in an area that receives more than 50 inches of rainfall per year on average. In fact, nearly 1/3 of the entire Yazoo Backwater Project Area will

be inundated before and after the pump station operates in a high water event. At the planned pumping elevation, 200,000 acres will be flooded and will continue to flood.

y. Page 33 comment. Project impact to fisheries.

Response. Fifty-five (55) of the 140 fish species that inhabit the Mississippi River are dependent upon backwater areas for reproduction. The Mississippi River extends from Lake Itasca in northwestern Minnesota to the Gulf of Mexico and it may contain 140 fish species, but it is doubtful that not all of them inhabit the Mississippi River near Vicksburg. Both FWS and EPA are aware that the connection between the Yazoo Backwater Area and the Mississippi River was severed in 1978 with the completion of the Yazoo Backwater Levee, Steele Bayou Structure, and the Little Sunflower Structure. The origin of the 112,600 acre impact to fisheries is unclear. It does not agree with the assessment in the Aquatic Appendix.

z. Comment – Page 33, paragraph 1. The proposed project will reduce extensive areas of flooded wetlands which provide critical habitat for fish spawning, rearing, foraging, and cover. As 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. According to the FWS, the proposed action would reduce the areal extent of wetlands subject to flooding in the Yazoo Backwater Area that are 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 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 outside the steam 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.

Response. The proposed project will reduce flooding, but approximately half of those acres will be on agricultural lands, which are not “critical” habitat for fish reproduction. The "critical" parameters for successful spawning and rearing are access to preferred floodplain habitat near the mainstem river (in this case, Steele Bayou and Big Sunflower River) when suitable temperatures occur. The project will not reduce flooding near the river, and most fish do not travel miles in the floodplain to spawn in agricultural lands that quickly dewater as floods recede. It is important to differentiate the type of lands that will be impacted by the project, and for the most part, they will be cleared lands. EPA states that backwater flooding will not occur with project and impact 39% of the resident fish species, but in fact, floodplain habitat will persist even with the pumps in operation. Higher stages will still occur but with less hardwoods and more agricultural fields flooded. The Vicksburg District agrees with the discussion on the

importance of flooding to fishes, and has taken all of these facts and assumptions into consideration when determining impacts and mitigation requirements. The depth and duration of flooding is central to the models used in these calculations. In particular, you mention the importance of prolonged inundation to "allow temperatures to rise, providing suitable spawning habitat, and allowing for optimum growth." The project's recommended plan is to stop pumping at a sump elevation of 87 feet. Approximately 40% of the land use flooded at an elevation of 87 ft is bottomland hardwoods, and recent sampling by the Vicksburg District has confirmed high abundances of larval fish in the backwater area at this stage. At this level, ample floodplain habitat (200,000 acres) will remain inundated for prolonged periods allowing temperatures to rise and providing excellent habitat for spawning and larval fish growth. Reforestation will convert much of the marginal farmland to bottomland hardwoods, further increasing the value of frequently flooded areas in the Yazoo Backwater. When mitigation occurs, EPA points that bottomland hardwood areas provide "…cover from predators, as well as organic nutrients and invertebrates needed for larval and juvenile fish growth" will become a realistic expectation with more extensive forested areas.

aa. Pages 33 and 34 comment. Impact to migratory birds.

Response.

The bottomland hardwood forest ecosystem that once dominated the Lower Mississippi Alluvial Valley is only a portion of the foraging grounds for hemispherically important migratory birds. While several shorebirds are present at times in the Yazoo Backwater area, some use aquatic areas, margins of aquatic areas, mudflats, and swamps. The Main Report, FSEIS, mitigation report, and aquatic appendix describe, in detail, the enhancement the Recommended Plan will provide to wetlands. The margins of aquatic areas should not be affected by the recommended plan. There should be ample mudflats in the study area since the 1-year flood event (200,000 acres) would not be affected by the recommended plan. Wading birds should not be significantly affected for the same reasons given for shorebirds.

Waterfowl that use the project area are migrants during the winter in the Mississippi Flyway which covers an extensive portion of the United States. Effects to migratory waterfowl that feed in the study area during the winter are discussed in the Main Report, SEIS, Waterfowl appendix, and Mitigation Appendix. The waterfowl evaluation was developed by the U.S. Fish and Wildlife Service and assesses impacts to habitat that supported waterfowl during the time period of 1 November through 28 February. With installation of structures to flood lands for waterfowl on 5 percent of lands that perpetual easements will be taken on, there will be a 53 percent net gain in waterfowl foraging habitat value in the study area by implementing the recommended plan. The reforestation of up to 55,600 acres of agricultural lands in the two year floodplain would provide very significant additional acreage that could be used for nesting and feeding purposes by most breeding birds that use the area. FWS has stated that the overall benefits to waterfowl from reforestation exceed any loss of foraging habitat.

The 1-year flood plain would still be flooded just the same as under existing conditions. In addition, there would still be considerable acres of wetlands and other periodically flooded areas

in the study area that shorebirds and other wading birds could forage in near potential nesting sites.

The Waterfowl evaluation this study was conducted to determine the impacts of alternatives to foraging habitat for migratory waterfowl (including the Mallard). This evaluation was developed by the U.S. Fish and Wildlife Service. The evaluation is given in the Waterfowl Appendix. The effects to waterfowl foraging habitat from 1 Nov through 28 February was determined for each alternative. The recommended plan would produce a 53 percent net gain in waterfowl foraging values and would significantly benefit Mallards and other species of migratory waterfowl in the study area.

The nonstructural feature of the recommended plan would result in up to 55,600 acres of additional bottomland forest habitat that could be used for nesting by night herons. These reforested lands would be on lands that were previously agricultural lands within the two year floodplain. Nesting habitat for the hooded mergansers that are known to breed very locally in the study area would also be increased by the increase in bottomland hardwood forests.

bb. Page 34, paragraph 2 comment. The hydrologic regime of backwater riverine wetlands creates pulses of nutrient flow and food resources. The timing of these seasonal pulses of energy is important to many wetland dependent birds and mammals inhabiting the Yazoo Backwater Area. Etc.

Response. The Vicksburg District has no control over the timing of flood events, and the project will not alter the timing of flood events. As most floods events start as headwater floods, which are unaffected by the project, area wetlands will continue to experience periodic pulses of food and nutrients. The project will reduce, but not eliminate the duration and extent of flood events. The historical hydrograph of the Mississippi River shows that flooding normally occurs in April, May and June. The period of flooding corresponds with the melting of winter snow and the onset of spring rains in the Upper Mississippi and Ohio River Basins.

cc. Page 35, paragraph 2 comment. The proposed project would degrade critical ecological functions provided by wetlands in the Yazoo Backwater Area including floodwater detention, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. We believe 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.

Response.

The Vicksburg District used the Hydrogeomorphic Method (HGM) to analyze the changes is wetland functions due to the project. HGM measured the projects impacts to eight wetland functions which were: detain floodwater, detain precipitation, cycle nutrients, export organic carbon, physical removal and elements and carbon, biological removal of elements and carbon, maintain plant communities, and provide wildlife habitat. The HGM analysis showed that the

project would reduce overall wetland functional values by less than 2.0 percent. The 26,300 acres of wetlands that would be most affected by the project would lose 10 percent of their base wetland functional values. A loss of less than 2.0 percent of the functional values of wetlands that constitute less than 0.03 percent (26,000 of 95 million acres) of the nation's freshwater wetlands is not a significant degrade the nation's waters.

dd. Comment. Section "Underestimation of the Spatial Extent of Adverse Effects." EPA believes the spatial extent of wetlands potentially impacted by the proposed project is much greater than that estimated in the FEIS. EPA's analysis identified 81,000 acres of jurisdictional wetlands located outside of the wetland impact assessment area established in the FEIS and believes a significant portion of these wetlands are connected to backwater flooding and will be adversely impacted by the project. However, the FSEIS did not evaluate impacts to these wetlands.

Response.

The EPA's claim that the FSEIS underestimates impacts to wetlands because it does not consider the entire 2-year floodplain is incorrect and misleading. In a letter dated 6 Dec. 2005, EPA Region 4 estimated the base and with project wetlands in the 2-year floodplain. Using the EMAP field data and the Vicksburg District 2-year floodplain, the EPA estimated that there were 176,742 acres of wetlands in the 2-year floodplain (Note: The table attached the letter contained several computational errors. Those errors have been corrected in Table 2. The corrected values are shown in red.). The Corp's estimate of 189,000 acres of wetlands within the 5% duration flood zone is 13,000 acres (7%) greater than the EPA's estimate of wetland extent in the 2-year floodplain, and the Corp's estimate of 26,300 acres of impacts is also greater (14%) than the EPA's estimate of 22,800 acres. Further examination of Table 2 shows that only 219 acres of the 22,800 acres of impacts are to high quality wetlands within the 5% duration floodplain, while 16,989 acres are to forested wetlands outside of the 5 percent floodplain and an additional 5624 acres of impacts are to cleared lands outside of the 5% percent floodplain. Wetlands outside of the 5 percent floodplain will have lower functional values than wetlands inside that area. Thus the EPA is claiming that the Vicksburg District is underestimating wetland impacts by calculating wetland losses on a larger area and using higher quality wetlands. Using the FCI values from the functional assessment, the total loss of FCU for the 22,800 impacted acres would be 11,100.

One of the major differences, between the wetland delineation used by the Vicksburg District and the one used by the EPA, is that the Corp's method attempts to determine the hydrologic source sustaining the wetlands. Forested wetlands are distinguished by three conditions, which are: the presence of water at or near the soil surface, unique soil conditions, and vegetation adopted to wet conditions (Mitsch and Gosselink, 1993). "This normal abundance of water can result from three different environmental conditions. One is location in a floodplain where river water is frequently available either by flooding or as near-surface groundwater. A second possibility is locally poor or impeded drainage so that rainwater remains stored at or very near the surface for extended periods instead of draining away. A third possibility is a very wet climate where precipitation regularly exceeds evapotranspiration. Across the southern states

from east Texas and Oklahoma to the Atlantic Coast, the climate is humid, and average annual precipitation far exceeds evapotranspiration," (Messina and Conner 1998). Because all of the forested acres in the project area meet the third criteria, and many areas fulfill the second criteria, the problem is separating those wetland acres sustained by riverine backwater flooding from those sustained by ponding or precipitation. To further complicate the problem, there are two types of riverine flooding, headwater and backwater, which can sustain wetlands. Mississippi's Comprehensive Wildlife Conservation Strategy (2005) describes the hydrology of the bottomland hardwood ecosystem as follows: "The bottomland hardwood forest is by far the dominant natural plant component of the Mississippi River Alluvial Plain (MSRAP). It is maintained by regular back- and headwater flood events and localized ponding on poorly drained soils. Headwater or mainstem flooding results from rainstorms over the watersheds of the Mississippi's tributaries, and produces the great spring floods characteristic of MSRAP. Backwater flooding is a phenomenon in which high water stages on the Mississippi River create a damning effect, preventing tributary drainage into the mainstem and at times reversing tributary flow upstream."

In order to separate the wetlands into two groups based on the dominant source of water, riverine or precipitation, the Vicksburg District applied the hydrology definition in the Wetland Delineation Manual (ERDC Technical Report Y-87-1, 1987). The WDM states that, "an area may have wetland hydrology if it is inundated or saturated to the surface for at least 5 percent of the growing season in most years." To isolate impacts form riverine flooding, the Vicksburg District determined the 2-year frequency (50^{th} percentile) 5 percent duration elevation at all gauges in the project area. Using a GIS flood hydrology model, the Vicksburg District predicted the extent of a flood of this magnitude and assumed that all areas within this polygon would meet all three conditions for wetlands, hydric soils, hydrophytic vegetation and hydrology. Because the 5 percent duration is the minimum possible flood duration for a wetland (WDM), wetlands outside of this polygon were assumed to be maintained by precipitation. The EPA's EMAP field verification of wetland extent determined that 41 of 52 (78.8%) sampling sites within the 5 percent duration floodplain were wetlands thus only 149,000 of the 189,000 delineated acres were actually wetlands. To maximize impacts to wetlands, the Vicksburg District evaluated the impacts on all of the 189,000 acres as if they were wetlands. In fact, only 2 of the 5 EMAP sampling sites within the 26,300 acres identified by the Vicksburg District as potentially losing wetland hydrology were determined to be wetlands.

When the Vicksburg District elected to use all gauge data in the project area, it created a sloped 2-year frequency 5 percent duration water surface. This sloped 5 percent duration water surface describes all riverine flooded wetlands, both headwater and backwater. Because backwater floods are created by a downstream blockage, they generally have a flat or nearly flat water surface. The Vicksburg District defines a backwater flood as one in which there is less than a 1 foot difference in elevation between the upper and lower ends of the flood surface. The hydrograph for 1997 is provided in Figure 5 below.

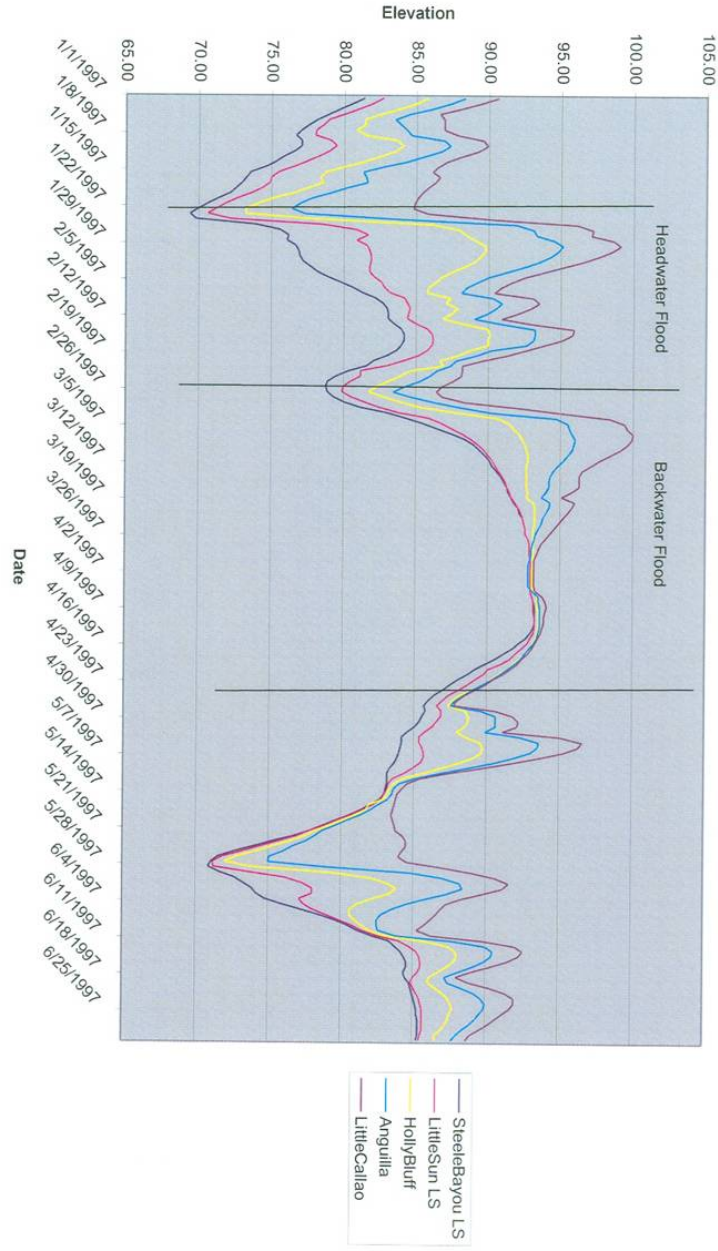


Figure 5
1997 Stages

During February, Figure 5, the basin experience a headwater flood, while backwater flood conditions prevailed for much of March and April. Strict backwater flood conditions were observed during the first weeks of April, when there was less than one foot of slope between the Steele Bayou (backwater) and Little Callao (headwater) gauges. At the beginning of March the Steele Bayou gauge was less than 80 feet NVGD (Steele Bayou Structure), but a storm event caused the water surface to rise at all gauge locations. The outlet for the basin was blocked by high stages on the Mississippi River and the runoff accumulated within the basin. Eventually, all the gauges in the basin had a water surface elevation of approximately 93 feet, NGVD. Plate 10-4 in the Wetland Appendix illustrated the difference between the extents of a headwater and a backwater 2-year frequency flood. The 189,000 acres of wetlands delineated by the Vicksburg District in the FSEIS represent the extent of all riverine wetlands in the basin based on a sloped 2-year, 5 percent duration flood. There is 5.8 feet of slope in the water surface between the Steele Bayou and Little Callao gauges (85 miles). A strict backwater 5 percent duration flood would encompass only 108,000 acres. The Vicksburg District submits that its' delineation of the extent of riverine wetlands is reasonable. The use of the minimum possible flood duration and the use of a sloped water surface greatly increased the extent of riverine wetlands in the project area. The EPA's EMAP wetland estimate does not provide a map of wetland extent and does not differentiate between wetlands sustained by riverine flooding and precipitation. Because all forested areas in the basin meet the third hydrologic condition for wetlands (precipitation > evapotranspiration), the Corp's assumption that 87.5 percent (189,000 of 216,000) of the wetlands in the basin are riverine is reasonable.

ee. Page 36, paragraph 2, comment: In our November 2000, comment letter on the DSEIS, we recommended that the Vicksburg District expand its scope of wetland impact assessment to include jurisdictional wetlands in the 2-year floodplain (i.e., 91.0 foot, NGVD elevation). While the FSEIS implies that there are more jurisdictional wetlands in the 100-year floodplain than previously estimated in the DSEIS, the FSEIS concludes that only those wetlands flooded for 5 percent of the growing season and which occur at or below the 88.6 foot, NGVD elevation (i.e., the wetland impact assessment area established in the FSEIS using the Flood Event Assessment Tool (FEAT)/ Flood Event Simulation Model (FESM)) will be affected by this project. The FSEIS also concludes that any wetlands occurring outside the FEAT/FESM modeled boundary are not connected to the backwater ecosystem and thus would not be impacted by the pumping project. We disagree and, as discussed further below, note that data included in the FSEIS supports our position that a significant amount of jurisdictional wetlands outside the FEAT/FESM modeled boundary is indeed connected to the backwater ecosystem, and thus will likely be adversely impacted by the project.

Response. Because the basin contains wetlands sustained by two different sources of water, the Vicksburg District applied a GIS based flood simulation model to identify those areas that contained riverine wetlands. The following assumptions were made to simplify the modeling process: 1. if an area meets the hydrologic conditions of a wetland, then it also meets the vegetative and soils conditions as well, 2. the 2-year frequency 2-year frequency 5% duration flood describes the extent of riverine wetlands in the project area, 3. wetlands above the 2-year frequency 5% duration flood elevation are disconnected depressions and will not be affected by

the project, 4. backwater flooding is the sole source of water that sustains riverine wetlands in the project area, 5. all areas flooded by the 2-year frequency 5% duration flood, flood instantly. The first assumption is protective of wetlands, as not all sites which meet the hydrology conditions will actually meet the other two conditions. With regard to the second assumption, if an area is flooded for 14 days every two years, it meets the minimum hydrology criterion and does not require another source of moisture to sustain the wetland status. Again, the WDM states that only some of the areas with this hydrology are wetlands and this assumption likely overestimates wetland extent. It does provide a dividing line between riverine and precipitation driven wetlands. The third assumption suggests that wetlands above the 5% duration elevation do not receive riverine flooding with a frequency and duration sufficient to sustain their wetland status. Thus precipitation is the major source of moisture that sustains those wetlands. It was not meant to suggest that these wetlands are totally isolated from riverine influence. Streams are normally one-way conduits of flow. Water generally only flows down slope, but in backwater areas streams can be two-way conduits of flow. The Vicksburg District assumed that the limit of two-way exchange (backwater hydrology) was the 5% duration elevation. Assumption four is quite important and is best explained with a water budget equation as is found in "Wetlands" (2000). The basic water budget for wetlands is as follows:

$dV/dt = P_n + S_i + G_i - ET - S_o - G_o +/- T$

where V = volume of water storage in wetlands
dV/dt = change in volume of water storage in wetland per unit time, t
P_n = net precipitation
S_i = surface inflows, including flooding streams
G_i = groundwater inflows
ET = evapotranspiration
S_o= surface outflows
G_o= groundwater outflows
T = tidal inflow (+) or outflow (-)

For the Yazoo Backwater Area: T and $G_o = 0$, G_i = ET, P_n and ET are constant across the basin and P_n>ET. According to Messina and Conner in "Southern Forested Wetlands" (1998) the minimum hydrology for a forested wetland is that $P_n > ET$. Thus all forested areas in the basin meet that basic requirement, which makes it difficult to isolate those areas which are wetlands solely due to riverine flooding. By assuming $P_n = 0$, the equation simplifies to $dV/dt = S_i - S_o$, and all areas with a 2-year flood duration greater than 14 days are wetlands. During any flood event the change in water volume within the wetland will be $S_i - S_o - G_i - ET$, and during the winter ET will be zero. Here G_i refers to flood water lost to infiltration. (With regard to the groundwater terms G_i and G_o, basin soils have a high clay content and very low infiltration rates. Infiltration rates are as low as 1 inch/day. All the water that infiltrates into the soil during the winter when P > ET, is removed during the summer when ET > P (Mitsch and Gosselink, 2000 and Messina and Conner, 1998). Studies by the USGS have shown that only a small part of the backwater area with non-hydric soils show any movement of surface water into the groundwater. The major area where this occurs is the Deer Creek ridge, which is an elevated area that

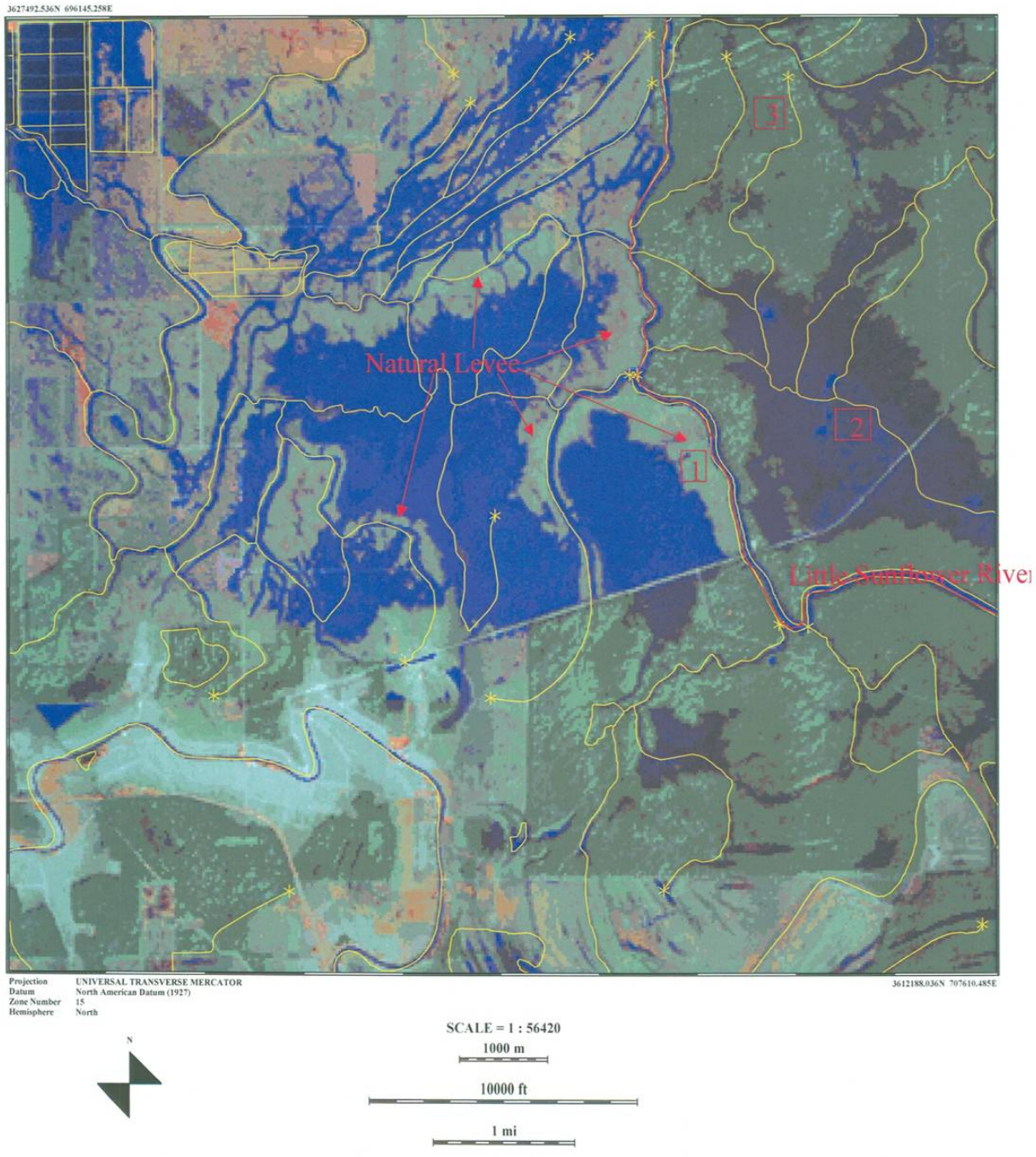
separates the Steele Bayou sub-basin from the Big Sunflower sub-basin. Most of the Deer Creek ridge is above the 100-year flood elevation.)

The final assumption, that all flooding occurs instantly, again is conservative of wetlands. Flooding does not occur instantly due to friction. Backwater flooding is generally a slow process where the flood surface elevation only increases by a few inches per day. The lateral spread of the flood is also slow. The two flood models (FEAT and FESM) both over estimated the flood extent in Tier 1, because the models did not consider friction. Although FESM model can incorporate a friction factor to reduce flood extent, this feature was not used in the flood modeling. By not using this feature flood extents were increased. This feature is very useful when calibrating the FESM model flood extents to observed flood extents in satellite images. The study area is large enough that a flood can be receding in the upper part of the basin while increasing in the lower part of the basin. Figure 6 below shows a typical backwater flood event (1990). The water surface at the Steele Bayou Structure slowly rises from less than 80 feet on May 1, to nearly 90 feet by mid June. There are three small storm events during the period. Followed by intervals where there was little difference between the downstream and the upstream water surface elevations (backwater flooding). The event ends in mid June with a week of classic backwater flooding, where there is less than 1 foot of elevation difference between all of the gages.

ff. Page 37, paragraph 1, comment. During the course of this project several attempts have been made to estimate the spatial extent of wetlands based upon remote sources of data (i.e., Geographic Information Systems (GIS), satellite images, hydrologic models). These remote based estimates of jurisdictional wetland extent ranged from approximately 60,000 to over 200,000 acres. Since these landscape level estimates were based on remote data with un-estimated error, EPA determined a field based, statistical survey would provide a more precise and scientifically defensible basis for establishing the extent and spatial distribution of wetlands in the study area.

Response. The Vicksburg District accepted the EPA offer to devise a field sampling effort to verify the results of its wetland delineation. The Vicksburg District does not agree that the EMAP sampling is more precise and scientifically defensible for establishing the extent and spatial distribution of wetlands in the study area. Contrary to the EPA's claim that the Corp's estimate has an un-estimated error, the wetland analysis provided by the Vicksburg District used a 90 percent confidence range to estimate error. The Corp's 90 percent confidence range was based on daily stages at 6 gauge locations for a 55 year period-of-record. The error in the FESM model results was estimated by comparison of the model results to observed flood events in satellite images. Although the EPA did provide an estimate of total wetlands in the project area, they did not provide any maps to spatially identify where the wetlands were located. The claim that their method is more precise is not substantiated with data. During the EMAP sampling, 170 sites were visited, but only the results from 169 were used. The single site that was eliminated was the only site visited by two teams independently. The two teams made different wetland determinations; this suggests that the actual field determinations were somewhat subjective. It further suggests that the field determinations needed some repetitive sampling for quality assurance. The field sampling was performed in late May and early June of 2003. During this

Figure 6 - 21 Jan 1989 Flood



period the leaf canopy on the trees is at its maximum density. Due to the dense canopy, the GPS devices used to locate the computer select sampling locations often lost their lock on the satellites. The teams would then circle around until they got a new lock on the satellites. In spite of the difficulties in maintaining the lock on the satellites in forested areas (two-thirds of the sites were forested), no attempt was made to determine the precision of the location of the sampling sites. The Vicksburg District thought that a sub-sample of the sampling sites should have been flagged and the locations determined by conventional surveying techniques to estimate the error associated with locating the sampling sites. In a ridge and swale environment such as found in the Yazoo Backwater Area, moving the location of a site a few feet could mean the difference of whether a site is a wetland or not. The Vicksburg District also questions the EPA's use of a single 4 inch hole to estimate the wetland status for 2000 to 6000 acres. The Vicksburg District concludes that the EPA results would be more scientifically defensible if five or more sites were sampled within a 100 foot radius of the sampling coordinates.

gg. Page 37, paragraph 2, comment. The spatial extent and distribution of wetlands in the Yazoo Backwater Area was determined with known confidence using EPA's EMAP survey design and analysis. Based on this design, the total wetland extent for the 100-year floodplain is 212,000 acres. Most of the wetlands were found in the FEAT/FESM predicted area. However, EMAP also found approximately 81,000 acres of jurisdictional wetlands occurring outside the wetland boundary predicted by the Corps' FEAT/FESM model. It is the potential impacts to these wetlands that EPA believes were not analyzed in the FSEIS.

Response. The Vicksburg District acknowledges that there are wetlands in the project area outside of the FESM modeled 2-year frequency 5 percent duration floodplain, but they consider that these wetlands are sustained by precipitation and not be riverine backwater flooding. The EMAP field sampling study divided the 100-year floodplain into three sampling strata. One stratum was the FESM modeled 2-year frequency 5 percent duration floodplain. The second stratum was forested (and WRP) lands outside the 2-year frequency 5 percent duration floodplain. The final stratum was cleared lands outside the 2-year frequency 5 percent duration floodplain. Because there is a large difference in the percentage of cleared and forested sites that are wetlands, the EMAP results have been redistributed into four categories. Those are: cleared and forested sites within the FESM modeled area and cleared and forested sites outside of the FESM modeled area. The EMAP results are tabulated below in Table 3. Eighty-six percent of the forested sites within the 2-year frequency 5 percent duration floodplain were wetlands, while sixty percent of the forested sites outside the 2-year frequency 5 percent duration floodplain were wetlands. Two-thirds of the cleared sites within the 2-year frequency 5 percent floodplain were wet, but only one of fifty sites were wet outside of the 2-year frequency 5 percent duration floodplain. The Vicksburg District concludes that the large difference in the percent of the sites which are wetlands inside and outside the 2-year frequency 5 percent duration floodplain supports the conclusion that those sites within the 2-year frequency 5 percent floodplain are influenced by riverine flooding, while those outside the 2-year frequency 5 percent duration floodplain are not. Although the percent of sites that are wetlands is lower for cleared lands, the difference inside and outside the 2-year frequency 5 percent duration floodplain is even greater. The difference in the percentage of wetland sites between the forested and cleared sites is not unexpected. The Universal Soil Loss Equation, which was developed in the 1930's, shows that

vegetative cover has a large impact on the rate of runoff. Forested areas retain the more precipitation than any other vegetative cover and hence are wetter. HGM also acknowledges that forested areas act to slow the movement of water through wetlands and thus store the water. Because forested areas retain more precipitation than cleared lands, they are not a good indicator of riverine influence on wetland status.

Table 5
EMAP Results

	Forested			Cleared			
	# Wet	# Sites	% Wet	# Wet	# Sites	% Wet	% Difference by Landuse
Within 5% Duration	38	44	86.4%	4	6	66.7%	19.7%
Outside 5%Duration	27	45	60.0%	1	50	2.0%	58.0%
% Difference by Duration			26.4%			64.7%	

Because the EPA's EMAP field sampling lumped all of the sites outside of the 2-year frequency 5 percent duration floodplain into two groups, Table 5 above could mask potential differences by flood frequency. Table 4 groups the EMAP sampling sites by flood frequency both inside and outside the 2-year frequency 5 percent duration floodplain. (Note: the EMAP sampling areas were derived from preliminary FEAT modeled zones, which were subsequently modified by the FESM model. The two models gave very similar results, but there were some spatial differences. Some of the sampling points shifted to a different sampling strata as a result of the final modeled area. Table 6 below presents the location of the points with respect to the final FESM modeled 2-year frequency 5 percent duration zone.)

Table 6

	Forested			Cleared			Total		
Flood Frequency	Wet	Total	% Wet	Wet	Total	%Wet	Wet	total	% Wet
1-Year[1]	37	41	90.2%	3	7	42.9%	40	48	83.3%
2-Year[2]	17	25	68.0%	2	10	20.0%	19	35	54.3%
5-Year	3	9	33.3%	0	15	0.0%	3	24	12.5%
10-Year	2	5	40.0%	0	8	0.0%	2	13	15.4%
25-Year	2	3	66.7%	0	2	0.0%	2	5	40.0%
50-Year	4	5	80.0%	0	7	0.0%	4	12	33.3%
100-Year	0	1	0.0%	0	7	0.0%	0	8	0.0%
Total	65	89	73.0%	5	56	8.9%	70	145	48.3%
2 to 100-Year	28	48	58.3%	2	49	4.1%	30	97	30.9%

[1] All but three of these sites are inside the 5 percent duration floodplain.
[2] Five of these sites are inside the 5 percent duration floodplain.

If one were to examine only the percentage of wetland sites within the 1-, 2-, and 5-year frequency floodplains, it would appear that riverine influence on wetlands diminishes as flood frequency decreases. However, the results are confounded by the percentage of forested wetlands in the 10-, 25-, and 50-year floodplains. The 50-year floodplain has the second highest percentage of wetlands among all the flood groups. Clearly, a riverine flood once every fifty years is not sufficient to sustain those wetlands, and they must be precipitation driven. The results for the cleared lands shows the same results as the forested sites for the 1 through 5-year flood frequency zones. These results are misleading because one of the two EMAP wet sites in the 2-year floodplain is inside the 5 percent duration area. Thus only 11 percent (1/9) of cleared EMAP wet sites in the 2-year floodplain outside of the 5 percent duration zone are wetlands. Using the results from the cleared lands, there is a clear distinction between the percentage of wetland sites within the 1-year frequency flood zone and all other flood frequency zones. There is only one cleared EMAP site outside of the 1-year flood zone that is a wetland, and that site is in the 2-year flood zone. Only one cleared site, out of the 11 that were in the 1- and 2-year flood zones outside of the 5 percent flood area was a wetland. While 4 of 6 cleared sites inside the 5 percent flood area were wet. The Vicksburg District contends that this analysis of the EMAP field data supports the decision that the 5 percent floodplain is the likely upper limit of the riverine wetlands.

hh. Page 38, paragraph 2, comment. Data included in the FSEIS indicates that hydrologic connections exist amongst wetlands beyond those depicted by FEAT/FESM. Table 10-7, in the Wetlands Appendix of the FSEIS indicates that the March 10, 1989; March 21, 1987; and the January 9 and 13, 1983 satellite scenes show between 18,000 and 71,000 acres flooded in the

area between 91.0 and 100 feet, NGVD (i.e., 2-100 year band). Hence, it is likely that the jurisdictional wetlands between the 2-year and 100-year flood elevations currently experience flooding. This conclusion is further supported by the statement that the FESM model overestimates flooding close to the channels utilized by the model, but does "less well" when flooded areas are away from the channels (FSEIS, paragraph 43). EPA interprets this to mean that areas away from FESM channels could flood, but the model is unable to depict those flooded areas.

Response. The EPA's interpretation of the FESM models capabilities is incorrect. The extents for all of the flood frequency events 1 through 100 were generated with the FESM model. Therefore, the FESM model is capable of flooding those areas. The flood events listed in the previous paragraph have between 3 and 7 feet of slope between the Steele Bayou Structure and the Anguilla gage (a distance of 55 miles), and thus represent headwater not backwater flood events. One of the objectives of the wetland analysis has been to isolate wetlands sustained by riverine backwater flooding from those sustained by riverine headwater flooding or precipitation. The question never has been whether all lands in the 5-year or higher floodplains flood, but rather whether the frequency and duration of those riverine flood events is sufficient to meet the WDM criteria for hydrology. The user note on page 30 of the WDM states: "Based on Table 5 and on paragraph 55, Step 8.i., an area has wetland hydrology if it is inundated or saturated to the surface continuously for at least 5% of the growing season in most years (50% probability of recurrence)." A 5-year frequency flood has a 20% probability of recurrence, and therefore lands in the 5-year floodplain above the 2-year floodplain do not meet the hydrology criteria based on the frequency of riverine flooding. They may however pond precipitation with a duration and frequency to meet the hydrology criteria, and the EMAP field sampling indicates that some do.

The 2-year floodplain is a special case, because it clearly meets the frequency criterium for hydrology. The Vicksburg District sub-divided the 2-year floodplain into six zones based on the duration of inundation. The six zones are <2.5, 2.5 to <5.0, 5.0 to <7.5, 7.5 to <10.0, 10.0 to <12.5, and >12.5 percent duration. The four zones with durations equal to or greater than 5 percent obviously meet both the frequency and the duration criteria for hydrology. The other two zones, which are inundated for 1 to 6 days and 7 to 13 days, are not inundated by floodwaters for 5 percent of the growing season but with the addition of direct capture of precipitation or saturation may also meet both the hydrology criteria. Table 7 below presents the EMAP field results by duration band within the 2-year floodplain.

Table 7
EMAP Sites Within 2-Year Floodplain
By Duration Interval

All Sites						**Interval**
Duration	**Days**					**Percent**
Interval	**Duration**	**Wet**	**NW**	**OW**	**Total**	**Wet**
>12.5	>34	18	4	4	26	81.8%
10 to <12.5	27 to <34	9	0		9	100.0%
7.5 to <10.0	20 to <27	11	1		12	91.7%
5.0 to <7.5	14 to <20	5	3	1	9	62.5%
2.5 to <5.0	7 to <14	6	5		11	54.5%
<2.5	1 to <7	10	24	8	42	29.4%
Total		59	37	13	109	61.5%
Forested Sites						**Interval**
Duration	**Days**					**Percent**
Interval	**Duration**	**Wet**	**NW**	**OW**	**Total**	**Wet**
>12.5	>34	15	3	4	22	83.3%
10 to <12.5	27 to <34	9	0		9	100.0%
7.5 to <10.0	20 to <27	11	1		12	91.7%
5.0 to <7.5	14 to <20	4	2	1	7	66.7%
2.5 to <5.0	7 to <14	5	3		8	62.5%
<2.5	1 to <7	9	4	8	21	69.2%
Total		53	13	13	79	80.3%

Wet = wetland
NW = non wetland
OW = other waters of U.S.

Eighty-nine percent of the forested EMAP sites within the three longest duration intervals were wetlands, while only 66.7 percent of the forested sites in the three shorter duration intervals were wetlands. The percent forested sites within the three shorter duration intervals (66.7%) is almost the same as the percentage of wetlands within all the forested sites above the 5% duration interval (60%). The Vicksburg District concludes that the above EMAP data establishes a clear line between those sites which get both riverine and precipitation from those which only receive precipitation (or infrequent riverine).

The above results are open to scientific review. However, because saturation could extend the wetland area beyond the 5 percent duration area, the Vicksburg District provides the following analysis of wetland impacts within the 2-year frequency floodplain. The 2-year flood plain encompasses 337,000 acres. Using a similar proportioning method as was used by the EPA (EPA's letter from Dec. 6, 2005 which includes an estimate of the base and with project wetland extent within the 2-year floodplain), Table 6 below provides an estimate of wetland extent within the six duration zones. Permanent water bodies were removed from the floodplain and the final

total area is 311,155. The percent wetlands within the forested and cleared areas of the 6 duration intervals were used to estimate wetland extent in the 2-year floodplain. The final 181,752 acres compares well with the 176,742 acres in the Dec. 6, 2005 letter (the corrected estimate). The FESM model was used to create flood zones for the six duration intervals for pre- and post-project and HGM was applied as before. HGM coefficients were calculated for the two new duration intervals.

Table 8
2-Year Floodplain Land-use by Duration Interval

Duration	Crop	Non-crop	Forest	Water	CF Pond	Total	Other	Total - Other
Outside 2yr	417700.7	44059.1	109092.1	3008.6	14106.6	587967.2	17115.2	570852.0
<2.5	54211.5	8363.2	37805.0	521.8	8091.1	108992.7	8612.9	100379.7
2.5 to <5	15372.7	3838.7	18489.0	356.6	1131.1	39188.2	1487.7	37700.5
5 to <7.5	9979.6	3872.5	20477.2	408.5	667.5	35405.3	1076.0	34329.3
7.5 to <10	5402.1	3766.8	35033.9	313.0	147.8	44663.7	460.9	44202.8
10 to <12.5	3032.2	4863.1	21233.0	669.6	19.2	29817.1	688.8	29128.3
>12.5	8956.9	10124.2	46333.0	14048.6	166.2	79629.0	14214.8	65414.2
2-Yr Total	96955.2	34828.5	179371.1	16318.3	10222.9	337695.9	26541.2	311154.7

Duration	% Wet	% Wet	% Wet	Base Adjusted Wetland Acres				Cumulative
Outside 2yr	**Crop**	**Non-crop**	**Forest**	**Crop**	**Non-crop**	**Forest**	**Total**	**Total**
<2.5	0.0909	0.0909	0.6923	4927.8	760.2	26172.4	31860.4	181752.5
2.5 to <5	0.333	0.333	0.625	5119.1	1278.3	11555.7	17953.1	149892.0
5 to <7.5	0.42	0.42	0.6	4191.4	1626.4	12286.3	18104.2	**131939.0**
7.5 to <10	0.5	0.5	0.9167	2701.1	1883.4	32115.6	36700.0	113834.8
10 to <12.5	0.58	0.58	1	1758.7	2820.6	21233.0	25812.3	77134.8
>12.5	0.667	0.667	0.833	5974.3	6752.9	38595.4	51322.5	51322.5
2-Yr Total				24672.4	15121.8	141958.3	181752.5	

Using the acreage from Table 8 above, an HGM analysis determined that there would be a loss of 16,506 FCU from a base of 1,159,647 FCU, which is a 1.4% loss of base functional values. It should be noted that both the EPA estimate and this estimate of wetlands within the 2-year floodplain are less than the Vicksburg estimate of 189,000 acres. These estimates have approximately 130,000 acres of wetlands within the 5% duration zone, and 50,000 above the 5% zone. Wetlands above the 5% duration zone have lower FCI values. The only way wetland losses increase significantly, is if all lands with in the floodplain are treated as wetlands. The EMAP sampling study established that only 60 percent if the sites within the floodplain were wetlands (The EPA letter dated 6 Dec. 2005 showed that 55 of 91 (60.4%) EMAP sites within the 2-year floodplain were wetlands.).

ii. Page 39, paragraph 1 and the document in footnote 22, comment. A stage duration analysis of these data indicates that, over the entire period of record, flooding sufficient for wetland hydrology occurs in areas between 89.0 feet and 92.0 feet, NGVD at Steele Bayou under

base conditions.

Response. The EPA's cumulative duration analysis is inappropriate since the WDM clearly states that duration must be based continuous days flooded in the growing season not cumulative duration from the period-of-record. One of the major features of wetlands is that the vegetation is adapted to prolonged inundation which causes anaerobic conditions in the soil. It has been determined that the anaerobic conditions can be created by a continuous period of inundation (or saturation) that lasts for 5 percent of the growing season. The growing season in the Yazoo Backwater Area is 270 days, and the 5 percent duration interval is 13.5 days rounded to 14 days. The Backwater Study determined the peak 14 day period in each year of the POR, and the median value was used in the wetlands analysis. The standard deviation and the 90 percent confidence interval were calculated about the median 5 percent duration elevation.

jj. Page 40, paragraph 1, comment. Corps' stage-frequency data indicates flooding will become much less frequent in the 2- and 5-year floodplains, increasing from a 2-year return interval to a 10-year return interval and a 5-year interval to a 50-year return interval (FSEIS, Appendix 6, Table 6-14 and 6-15). This would result in significant impacts to, among other functions, the hydrologic functions of wetlands in the 2-year floodplain. However, by restricting the impact assessment area to only the FEAT/FESM modeled areas, the Corps is ignoring changes in flood duration and frequency that will result in major impacts to wetlands outside the FSEIS's assessment area.

Response. The potential impacts to the 2- and 5-year floodplains are quite different, and will be addressed separately. Impacts to the 5-year floodplain will be addressed first. The WDM clearly establishes the hydrology requirements of a wetland. Those requirements are a minimum of 14 days of flooding in most years (50% probability of recurrence). Assume a wetland in the 5-year floodplain is inundated regularly for 14 days. It would therefore be inundated twice in a 10-year period. In order to meet the WDM requirements it must be inundated an additional 3 time in the 10 year period to meet the WDM requirements. Because it doesn't receive riverine flooding, the additional 3 events must be due to precipitation. Therefore 3 of the 5 events are from precipitation and precipitation is the dominant source of water sustaining the wetland. It may actually be inundated or saturated by precipitation in three to ten of the years. The point is that the dominant source of moisture is from precipitation, which will not be affected by the project. It is difficult to conceive of a wetland in the 5-year floodplain that is sustained by 2 flood events and 3 and only 3 precipitation events. If this wetland is trapping sufficient moisture in 3 of 10 years, then, considering the average precipitation received in the project area in most years, it is likely trapping sufficient moisture in most years and will remain a wetland regardless of the project.

The issue of wetlands within the 2-year floodplain was addressed previously in this document (response to comment from page 38).

kk. Page 40, paragraph 2, comment. Existing information regarding the extensive hydrologic network in the Yazoo Backwater Area offers further support that wetlands outside the Corp's assessment area would be affected by the proposed project. The National Hydrography

Dataset (NHD) is a comprehensive set of digital spatial data that encodes information about naturally occurring and constructed bodies of water and paths through which water flows. The NHD is mapped at a 1:100,000 scale. When the NHD for the Yazoo Basin is overlain with the wetland points surveyed in EMAP, the density of stream channels at this scale strongly indicates that backwater has a great many conduits and that many wetlands on the 2-year floodplain represented by EMAP data points are connected or adjacent to channels.

Response. The EPA's analysis of potential wetland sites based on their proximity to stream channels is overly simplistic and ignores many well excepted features of alluvial streams. It is well understood that the process of stream meandering within an alluvial floodplain creates several geomorphological features such as natural levees, point bars, ridges and swales. When alluvial streams flood, the flood waters lose sediment as the water moves away from the channel. The course material is lost first and grades to finer material as the distance from the channel increases. This process builds natural levees adjacent to the channel, such that the land closest to the channel is often the highest ground. Thus the closer a site is to a channel, the less likely the site will flood frequently. Figure 6 illustrates this phenomenon. The Little Sunflower River starts at the upper edge of the figure and moves due south. Approximately three-quarters of the distance down the figure, the Little Sunflower River turns to the east. Tributaries of the Little Sunflower move away from the river into Delta National Forest. The southern tributary shows flooding adjacent to the channel, but the northern fork does not. The flood waters which inundate site 1, which is approximately 220 meters to the west of the Little Sunflower, must travel approximately 4400 meters to reach the site. Site 2, which is in a flooded areas east of the Little Sunflower River, is near a tributary which is flooded. Site 3, also adjacent to a tributary is not flooded. The simple rule that governs flooding is that land floods when its surface elevation is less than the water surface in the nearest stream. The reason the forested areas in Tier 2 are not flooded by the 5 percent duration flood, is that their elevation is greater than the 5 percent flood elevation. Most of the areas do flood during the 2- or the 5-year frequency flood events.

ll. Page 41, paragraph 2, comment. The Summation of Assessment units (i.e., Functional Capacity Units) in the FSEIS obscures significant wetland, fish, and wildlife impacts. For example, the HGM assessment evaluated eight functions performed by affected wetlands and estimated how these functions would decrease at wetlands adversely impacted by the proposed pumping and increase at reforestation/mitigation sites.

Response. The FSEIS was consistent in the treatment of the functional values for all resource categories. For example, the functional values of all eight wetland functions were calculated for every acre of wetlands for both the base and with project conditions. The eight separate functions each provided from 10 to 15 percent of the base wetland functional values. Their distribution for the reforested/mitigation lands is somewhat different. The difference is because the post project duration was unknown and was assumed to be less than 2.5 percent. The range of duration for the available lands in the 2-year flood plain ranges from less than 2.5 percent to greater than 12.5 percent. The average is approximately 8 percent. If the FSEIS had assumed the duration would be the average instead of the minimum, the distribution of the values of the eight functions would be nearly the same as it is for the base condition.

Figure 6

mm. Page 42, Comment. Impacts to key functions are omitted. In the HGM assessment, no effect is shown in the *detain floodwater* function as a result of this project despite the fact that this is one of the functions which the proposed pumping project is designed to most dramatically impact. In its discussion of the *detain floodwater* function, the Yazoo Basin HGM Guidebook clearly states the importance of duration of flooding on the performance of this function. However, despite this recognition, the duration information which was incorporated into several other functions in the FSEIS's HGM assessment (which did indicate project related impacts) was not incorporated into the *detain floodwater* function.

Response. The Vicksburg District has been working with Region 4 since 2003 to resolve differences in the wetland evaluation, and no mention of this issue was made at any joint agency meetings or in any of the previous correspondence. HGM riverine wetland functions are discussed in detail in a 1995 ERDC publication (A Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands, M.M. Brinson, et al., TRWRP-DE-11, 1995). The guidebook lists five hydrologic functions, which are: dynamic surface water storage, long-term surface water storage, energy dissipation, subsurface storage of water, and moderation of groundwater flow or discharge. The last two apply only to groundwater interactions, which do not exist in the project area. The other three functions are defined as:
Dynamic Surface Water Storage: Capacity of a wetland to detain moving water from overbank flow for a short duration when flow is out of the channel; associated with moving water from overbank flow and/or upland surface water inputs by overland flow or tributaries.
Long-term Surface Water Storage: Capacity of a wetland to temporarily store (detain) surface water for long durations; associated with standing water not moving over the surface. Sources of water may be overbank flow, direct precipitation, or upland sources such as overland flow, channel flow, and subsurface flow. (Long-term storage may be considered to begin when overbank flow retreats into the channel and is present in the wetland for more than 7 days.)
Energy Dissipation: Allocation of the energy of water to other forms as it moves through, into or out of the wetland as a result of roughness associated with large woody debris, vegetation structure, micro- and macrotopography, and other obstructions.

Neither of the first two functions fit backwater flooding. *Dynamic Surface Water Storage* is a function of riverine overbank flooding resulting from headwater flood events. *Long-term Surface Water Storage* considers floodwater storage in off-channel depressions after the floodwaters have receded to the channel. Only *Energy Dissipation* fits riverine backwater flooding. It is essentially a roughness coefficient for wetlands. The natural features of the wetland slow the velocity of the floodwater as it enters and leaves the wetland. The HGM variables associated with *Energy Dissipation* are: flood frequency, macrotopography, microtopography, tree density and coarse woody debris. Because the original HGM Guidebook (Brinson, et al., 1995) for riverine wetlands did not consider backwater wetlands, the Yazoo Basin Guidebook had to create hydrologic variables for them. The *Detain Floodwater* function is similar to the *Energy Dissipation* function in the earlier report. Because the function relates to frictional losses to the velocity of water as it enters and leaves the wetland, the frequency of flooding is more important than duration. The function implies there will be an increase in duration due to slowing the velocity of the floodwater.

The decision to include a duration variable into the eight Yazoo Basin wetland functions was left to the professional judgment of Dr. Dan Smith. Dr. Smith has been involved in the development of the HGM model from the very beginning. If the EPA had requested that the Vicksburg District test the sensitivity of the HGM model to the addition of the duration variable to the *Detain Floodwater* function at any time prior to the publishing of the final report, the results could have been added to the final report. The EPA should also be aware that adding the duration variable to the *Detain Floodwater* function will have little effect on the functional values for the project, because you are multiplying all values by a constant. Adding the duration variable to the *Detain Floodwater* function will increase the loss of functional values to 16,898, which is 2.0 percent of the base (859,980). This is an increase of 0.4 percent over the wetland impacts stated in the FSEIS.

nn. Page 42, comment. The flood frequency variable shows no change in HGM assessment. Despite information in the FSEIS Engineering Appendix (Table 10-6 (6-6)) which indicates that the proposed project will result in less frequent flooding in areas above the 1-year floodplain, the frequency of flooding variable in the HGM assessment models reflects no change, for any function.

Response. All of the base riverine wetlands (189,600 acres) are inside the post-project 2-year floodplain, and thus there is no change in duration for riverine wetlands in the project area. Non-riverine wetlands may experience a change in the frequency of riverine flooding, but that flooding is not the dominant source of water that sustains those wetlands.

oo. Page 43, comment. Despite the pumping project, the HGM assessment assumes that vegetative species composition remains approximately static over time. Over the course of the 50-year project and beyond, the vegetation structure of the Yazoo Backwater Area would change as significant areas at higher elevations shift to drier species composition.

Response. EPA's assumption that the project will induce major changes in species composition is scientifically unfounded. In Wetlands (Mitsch and Gosselink, 2000) Table 15-14 provides a list of forest species by flood duration. The seasonally, temporarily flooded class has a duration range of 2 to 25 percent, which encompasses the entire range of wetlands in the study area. Furthermore, the EPA is ignoring the role of precipitation in sustaining wetlands. The average annual precipitation total for the Yazoo Backwater Area is greater than 50 inches, and includes the following number of 1, 2 and 3 inch storm events per year: 18, 5, 1.5. Based on the multiple precipitation events per year which will saturate the forest soils, precipitation may be the dominant form of moisture that sustains all wetlands in the study area.

pp. Page 43, comment. The HEP assessment underestimates the amount of aquatic spawning habitat adversely affected. 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. Based on these requirements the hydrologic data provide by the Corps, 3300 acres of habitat would be lost as a result of the project. However, this amount of lost habitat is inconsistent with the values reported in the Wetland Appendix (Table 10-10). The Wetland Appendix indicates that

approximately 39,000 acres which currently flood for 14 days or less (but greater than 7 days) would, as a result of the proposed project, only flood for less than 7 days (i.e., shift to the <2.5 percent duration band).

Response. The EPA's comparison is inappropriate since the HEP analysis is based on the daily flooding during the 120 day spawning season for the 55 years of the period-of-record (POR). The wetland analysis is based on the peak 14 days of flooding in the median year of the POR. Wetlands require 14 days of continuous flooding or saturation sometime during the growing season. The parameters, assumptions, and analysis of the aquatic HEP was clearly defined and accepted by the interagency team that reviewed the initial approach of calculating impacts and mitigation. The 3300 acres were quantitatively determined based on known requirements of fish spawning. Although impacts may "appear" far greater to some, they were scientifically derived using the latest understanding of fish ecology in floodplain environments. Basing the fisheries analysis on the peak 14 day duration flood, would mean that the conditions required for spawning by all species present in the basin would be correct during the same 14 day period. This assumption would be false. The FWS specified the hydrologic parameters for the HEP analysis of fisheries.

qq. Page 43, comment. The HEP and HGM assessments assume that land-use will not change over the 50-year life of the project. For example, the assessment assumes that mature wetland forest that is hydrologically modified to the extent that it is no longer defined as a wetland would stay mature forest despite no longer being provided CWA regulatory protection. We believe this assumption is not supported by a more careful evaluation of land-use trends.

Response. The NRCS provided the following information regarding land-use trends: 1105 acres of forested lands were cleared for agriculture in all the Delta counties over the last 20 years (<4 acres/county/year), 200,000 acres of agricultural lands were converted to WRP or CRP in the same period. The only land-use trend that is apparent is the conversion of agricultural land into forest. NASS data for the last 10 years shows that the number of acres of land in agricultural production is declining. The EPA is also assuming that all lands that no longer receive frequent backwater flooding will lose CWA jurisdictional status. The results of the EPA's EMAP study show that sixty-seven percent of forested lands above the 5 percent duration flood zone are wetlands. The Vicksburg District concluded that lands that fall outside the 5 percent duration zone may potentially lose wetland status because the District assumed precipitation did not play a role in sustaining wetlands. The District acknowledges that precipitation actually plays a major role in sustaining wetlands, and that many areas that fall outside the 5 percent flood zone will likely remain wetlands. This assumption preserved wetland values. It is not possible to determine if an area would lose jurisdictional status without a site specific wetland determination, and that it would likely take many years before any changes would be detectable.

rr. Page 44, comment. Inappropriate selection of fish species for the HEP assessment results in an underestimation of the proposed project's adverse effects on fisheries. The nine fish species selected for the FSEIS's HEP assessment do not represent fish species whose life cycles would be affected by the proposed project's hydrological modifications within riverine

backwater wetlands.

Response.

The Final Supplement Environmental Impact Statement (FSEIS) addressed impacts to fish and wildlife in its Environmental Resource appendixes. Multiagency teams of biologists from the Vicksburg District, ERDC, Mississippi Department of Wildlife, Fisheries and Parks (MDWFP), and U.S. Fish and Wildlife Service (FWS) participated in Habitat Evaluation Procedure (HEP) teams to evaluate these resources based on species and models selected and agreed to by the team members. The EPA was invited, but chose not to participate on any of these teams, and these issues have never been raised in previous comments to the Draft 2000 Report and the 2005 Draft Technical Appendices.

Selecting evaluation species is a critical step in the HEP process of calculating impacts and mitigation. The Vicksburg District funded field studies to characterize the fish community, organized a team of biologists to review this information, and selected the most suitable fish species to use in the evaluation. Therefore, the Vicksburg District disagrees with EPA's statement that the nine evaluation fish species are not representative of floodplain fishes, at least for this project. First, we documented from field studies that 57 species occur in the Backwater area. Second, we placed these species into a reproductive and habitat guild to account for both individual species and community-level assessment. Third, the HEP Team selected six evaluation species (mostly recreational and commercial fishes), and the Vicksburg District added three additional species because they were characteristic of the project area. Although some of the species (drum, blacktail shiner, speckled chub) spawn in moving water, the backwater flood creates a myriad of conditions including lateral expansion of floodwater and reverse flows as interior water levels increase. Sampling in the floodplain and small streams clearly demonstrated that all of the evaluation species utilize flooded lands, both in the floodplain and small creeks that serve as conduits of dispersal. In fact, the evaluation species represented greater than 80% of the taxa documented in the project area. Substituting species that are not characteristic of the project area would not be an accurate portrayal of the biological impacts. The Vicksburg District' selection of evaluation species was not "inappropriate," but rather realistic and agreed upon by biologists who have worked and studied the actual Yazoo Backwater area for years.

ss. Page 45, comment. HEP does not evaluate the impacts of the proposed project on amphibians and reptiles. The FSEIS's HEP assessment excludes entirely any assessment of the proposed project's adverse impacts on amphibians and reptiles. Species in both of these classes of animals depend upon wetland habitat to meet numerous life history requirements and would experience extensive adverse effects from the proposed project.

Response. The EPA's comment is scientifically invalid. The EPA was invited to participate on the HEP team but declined. FWS models that were available for reptiles and amphibians were examined, but were rejected because they were insensitive to changes in hydrology. Although both reptiles and amphibians are dependent on wetlands, the EPA's claim that they would be harmed by the project is scientifically invalid. Reptiles require unsaturated soil for their eggs. Flooding reduces this habitat, and can kill eggs that were laid prior to flooding.

Amphibians prefer shallow, isolated pools for their eggs. Flooding connects these pools and allows predators (fish) to feed on their eggs, thus reducing their hatching success. Impacts of flooding on these two classes of animals are discussed in "Herpetofauna Communities in Temperate River Floodplain Ecosystems of the Southeastern United States," by J.C. Jones and J.D. Taylor, in Ecology and Management of Bottomland Hardwood Systems: The State of Our Understanding, University of Missouri-Columbia, Gaylord Memorial Special Publication No. 10, Puxico, L.H. Frederickson, S.A. King, and R.M. Kaminski eds. 2005.

tt. Page 45, paragraph 1, comment. The FSEIS's exclusion from analysis of wetlands above the 2-year, 5 percent flood duration, and in particular wetlands above the 2-year, 5 percent flood elevation and within the 5-year flood elevation, does not acknowledge the influence and importance of shorter duration and less frequent flooding on establishing and maintaining the diversity of wetlands and the functions they provide. Nor does it recognize the impacts of the reduction in flooding resulting from the project on the maintenance of that diversity of wetlands and the biodiversity they support. The importance of wetland functions within and above the 2-year, 5 percent flood elevation is noted in the Yazoo Basin HGM Guidebook which states "one of the primary criteria used to identify wetland subclasses in the Yazoo Basin is flood return interval."

Response. There are no studies which establish the value of infrequent flooding on the maintenance of diversity within wetlands above the 2- or 5-year floodplain. Although this is an aspect of the Flood Pulse Concept, it has not been proven within levied areas of the Mississippi River Alluvial Valley. Nor are there any studies which have established differences in diversity based on flood frequency within the Mississippi River Alluvial Valley. The Yazoo Basin HGM Guidebook uses the 5-year frequency floodplain to distinguish between connected and disconnected Fringe wetland subclasses. This study was concerned only with the Riverine Backwater wetland subclass. The HGM analysis did measure the potential changes in 8 wetland functions, which included: detain floodwater, detain precipitation, cycle nutrients, export organic carbon, physical removal of elements and compounds, biological removal of elements and compounds, maintenance of plant communities, and provide fish and wildlife habitat.

uu. Page 46, Overestimation of Environmental Benefits, comment. Both the HGM and HEP analyses assume extensive yet unsubstantiated and improbable environmental benefits from the project's proposed reforestation. These analyses assume that the entire proposed 55,600 acres of reforestation and mitigation will be obtained, and that every acre will be ideally situated in the target area (i.e., areas currently in agricultural production within the two-year floodplain that will flood for a sufficient period to yield equivalent wetland functions) to produce maximum environmental benefits for all affected resources. However, EPA's EMAP assessment and the Corps' land-use assessment (FSEIS, Table 10-9) indicate that there are not enough acres of cleared wetlands with the proper hydrology and soils in the target area to satisfy this goal.

Response. The Corps stated that its goal was to obtain up to 55,600 acres for the non-structural component. The minimum acres required to offset all environmental losses was calculated, and the Corps guaranteed that 15,029 acres would be obtained before the pump station would be operated. Each acre of habitat that would be lost was assessed for fisheries,

waterfowl, terrestrial and wetland losses. Thus it is reasonable to assign values for each category for mitigation lands also. The optimum value was not assumed for each mitigation acre. Existing cleared lands within the 2-year floodplain experience between 2 and 12.5 percent flood duration, but it was assumed mitigation lands would receive less than 2 percent flood duration. The resource value of mitigation lands were calculated for base and ten year intervals up to 50 years, and the average not the maximum was used to calculate the benefits. Table 10-9 indicates the land available within the 5 percent duration floodplain, not the 2-year floodplain. There are approximately 90,000 acres of cleared lands available within the 2-year floodplain. The lands are generally located near existing forested tracts and would not created a patch work of forested lands. In general, the NRCS WRP lands are located in large blocks around Delta National Forest, and have helped to decrease the forest fragmentation. Available lands within the 2-year floodplain are decreasing, and thus the mitigation lands will be selected from a smaller field and will be close together. A map of cleared lands within the 2-year floodplain was provided in the FSEIS.

5. Response to February 23, 2008, EPA's Synopsis of Yazoo Backwater Area Hydrology.

a. Response to EPA's Stage-Frequency Curve Analysis. The stage-frequency analysis developed by the Vicksburg District was performed in accordance to EM 1110-2-1415, Engineering and Design – Hydrologic Frequency Analysis, dated 5 March 1993. The Vicksburg District concurs with the EPA's conclusion that the stage-frequency curves are very similar having been developed from two separate analyses.

b. Response to EPA's Cumulative Duration Analysis.

(1) Although the EPA has correctly computed the cumulative durations, the analysis is inappropriate to determine flood duration for jurisdictional wetlands. The WDM states, "an area has wetland hydrology if it is inundated or saturated to the surface continuously for at least 5% of the growing season in most years (50% probability of recurrence)(user notes on page 30)." Thus the duration is a continuous period that occurs in most years, not the average duration calculated over the period-of-record. The EPA's analysis has erred by assuming the distribution of the duration will be equally distributed in all years. Table 9 below gives the number of years with flood elevations greater than 89, 90, 91 and 92 feet NGVD, and the number of years with flood elevations greater than those elevations for 14 or more days.

Table 9
Years with flood elevation greater than 89 feet NVGD

	Years with flood elevations >92	Years with flood elevations >91	Years with flood elevations >90	Years with flood elevations >89
Total years	17	22	30	34
Years with more than 13 days	14	18	23	28

(2) The period-of-record contains 55 years, so flooding of 14 days or more must occur in 28 years to comply with the 50% frequency requirement. Only elevation 89 has at least 28 years during the POR with 14 or more days with flood waters at 89 or greater. The Vicksburg District determined that the median 5% duration elevation was 88.6 feet NGVD, which is close to 89. This analysis of the cumulative duration data is also invalid, because it assumes that all flooding in each year is part of a single flood event. At least 5 years have multiple floods during the growing season with elevations greater than 89, which would decrease the number of consecutive days flooded in those years. Figure 7 plots the annual days of flooding for each year of the POR with elevations greater than or equal to 89 to 92 feet, NGVD.

Figure 7

6. Conclusions.

The Proposed Determination is based on what EPA believes are unacceptable adverse effects to the Yazoo Backwater Project Area. Instead of analyzing wetland losses in acres, the Vicksburg District followed the functional approach consistent with Regulatory Guidance Letter No. 02-2 and the 1990 Memorandum of Agreement between the Vicksburg District and EPA. Since 1982, the Vicksburg District has worked to reduce the functional losses to wetlands and the overall project impacts. The original 1982 plan proposed a larger pump station and had FCU losses over 70,000. However, the Recommended Plan has a smaller pump station and has reduced by 80% these impacts to wetland function, and aquatic impacts have been reduced by 86%.

The Vicksburg District has fully considered nonstructural components for the study. In the original 1982 report, 42 alternatives were examined. Thirty seven of these alternatives were structural. From 1993 to the release of the Yazoo Backwater's Final Report and FSEIS, 42 alternatives were analyzed. Of these, 18 were exclusively nonstructural and another 18 were a combination of structural and nonstructural. None of these nonstructural plans were economically justified or locally supported. The Recommended Plan is the best possible plan that takes into consideration project cost, existing technology, and logistics in light of overall project purpose.

The Recommended Plan will not convert the 26,300 acres currently defined as wetlands and protected under the Clean Water Act. The analysis is based solely on backwater flooding and with over 50 inches of annual rainfall, it is very likely that many of these acres will remain protected under the CWA. In addition, the actual number of acres that could be potentially converted are 3,623 – not 26,300. The Final Report and FSEIS provide a scientific analysis that demonstrates a low probability for potential clearing of any wetlands.

Reforestation of cleared agricultural lands is a major project feature. Previous Yazoo Basin mitigation plans have been less detailed and EPA raised no objections to those plans. The Vicksburg District has extensive mitigation experience having reforested over 27,000 acres in the Yazoo Basin and implemented a successful wetland monitoring program on mitigation properties. The Recommended Plan's reforestation feature is not an undefined plan, but a robust one based on the successful WRP program in the area.

The study team has relied on opinion and work from experts that understand how the Recommended Plan affects all resources within the lower Mississippi Delta. These experts have vast project and area knowledge and have produced sound, scientific data and analysis to support their conclusions. The Yazoo Backwater Reformulation Study's Recommended Plan is an environmentally sustainable plan that provides a practical balance between flood damage reduction and the area's environmental needs.

In conclusion, the Vicksburg District has serious concerns over the Proposed Determination and the threshold for which a veto can be issued. There remain EPA errors about the actual

impacts and subjective criticisms, without supporting scientific data, towards the Vicksburg District's Recommended Plan, which is a feasible solution to backwater flooding in the Lower Delta. As this response demonstrates, the Proposed Determination against the Recommended Plan is based on inaccurate and inappropriate analysis, which results in a flawed conclusion, and therefore is unjustified.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 25 2003

OFFICE OF
WATER

Honorable R.L. Brownlee
Acting Assistant Secretary of the Army (Civil Works)
Department of the Army
108 Pentagon
Washington, D.C. 20310-0130

Dear Mr. Brownlee:

The Administrator and others from the Environmental Protection Agency (EPA) have engaged in a number of recent discussions concerning the proposed Yazoo Backwater Reformulation Project and the adequacy of the project's environmental documentation. In the enclosed March 3, 2003, memorandum to Regional Administrator Jimmy Palmer, I outline my understanding of the Agency's key directions on this proposed project, as well as my thoughts as to how we should proceed. I wanted you to be aware of our strong interest.

On March 14, 2003, the Regional Administrator met with representatives of the Vicksburg Corps of Engineers District and the Corps' Waterways Experiment Station to discuss concerns regarding this project and shared the attached memorandum. To provide additional insight into concerns regarding the wetland acreage and projected wetland impacts associated with this project, it was agreed that EPA and the Corps would visit the Yazoo Project site the week of March 24th. EPA will be sending representatives from Region IV and Headquarters.

It is our intent that the Region will continue to work with the Corps District toward an environmentally acceptable flood control project, while meeting our responsibilities under NEPA and the Clean Water Act. Should you have any questions concerning this matter, please feel free to call me.

Sincerely,

G. Tracy Mehan, III
Assistant Administrator

Enclosure

CS 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR - 3 2003

OFFICE OF WATER

MEMORANDUM

SUBJECT: Yazoo Basin Backwater Pump Project

FROM: G. Tracy Mehan
Assistant Administrator

TO: James I. Palmer
Regional Administrator
EPA Region IV

I want to share with you my understanding of directions for EPA from our recent discussions of the Yazoo project, and some thoughts on how we may proceed in accordance with those directions. I welcome your feedback on whether you think I have accurately characterized the outcomes and my thoughts regarding follow-up by Region 4. The three principal directions are:

1) EPA should provide an objective critique of the adequacy of the science underlying the assessment of wetland acreage, values and environmental impacts;
2) EPA should continue to ensure that serious consideration is given to a non-pump alternative; and
3) EPA should keep the full range of our possible responses open, including Section 404(c).

Below are some thoughts about how Region 4 can help us pursue these directions.

1) EPA should provide an objective critique of the adequacy of the science underlying the assessment of wetland acreage, values and environmental impacts. Region 4 should continue on the track of getting the Corps to improve the characterization of the aquatic resources that will be affected, including acres of wetlands (forested, farmed, other) and the functions and values of wetlands in the impact zone. The Region should also work with the Corps to ensure sound evaluation of the impacts to aquatic resources from project alternatives (acreage loss of wetlands, acreage gain of wetlands, changes in hydrology to wetlands (e.g., less or more frequent and prolonged inundation), and changes in functions and values of impacted wetlands. EPA should emphasize the need for scientifically defensible data and methodologies. There must be sufficient data to evaluate the impacts at a scale of sufficient refinement to understand the impacts throughout the 630,000 acre project area. The methods applied must be rigorous and detailed; broad brush approaches are not sufficient when we're dealing with potential adverse impacts of such magnitude. As has been discussed, the DEIS was very deficient in its characterization of the resources and assessment of the impacts and the Corps conclusions cannot be justified on such a poor foundation.

2) EPA should continue to ensure that serious consideration is given to a non-pump alternative. Region 4 is correct that the DEIS included a non-pump alternative. However, it was not considered in detail as a practicable alternative. The Shabman study, commissioned and funded by Region 4, concluded that a comprehensive, non-structural alternative for the Lower Yazoo River Basin is economically justifiable. Region 4 will have to communicate to the Corps that we seek full consideration of a non-pump alternative, whether it is the one described in the Shabman report or another variation. If the Corps refuses, the Region and HQ should consult on next steps.

3) EPA should keep the full range of our possible responses to the FEIS open, including Section 404(c). Consistent with the November 3, 2000 comment letter, the Region should continue to work with the Corps towards an environmentally acceptable flood control project, without foreclosing the use of any of EPA's authorities under NEPA and the Clean Water Act before the FEIS and completion of EPA review, unless that is done in conjunction with HQ.

cc: Linda Fisher

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

January 22, 2008

Colonel Michael C. Wehr
District Engineer
Department of the Army
Vicksburg District, Corps of Engineers
4155 Clay Street
Vicksburg, Mississippi 39183-3435

Subject: U.S. Army Corps of Engineer's (Corps) Final Yazoo Backwater Area Reformulation Report (FRR) and Final Supplement No. 1 to the 1982 Yazoo Area Pump Project Final Environmental Impact Statement; Washington, Humphries, Sharkey, Issaquena, Warren and Yazoo Counties, MS and Madison Parish, LA; CEQ# 20070486; ERP# COE-E36074-00

Dear Colonel Wehr:

EPA has completed an initial review of the referenced Corps Yazoo Backwater Area FRR and Final Supplemental Environmental Impact Statement (FSEIS) in accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, as well as Section 404 of the Clean Water Act (CWA).[1] We note that the Corps has established January 22, 2008, as the close of the NEPA comment period for the FSEIS and has extended the time period in which a federal agency may make a pre-decisional referral to the Council on Environmental Quality (CEQ). EPA may provide additional project comments within this extended time period.

The FSEIS for the Yazoo Backwater Project reflects years of study, evaluation, coordination and hard work. The staff at the Corps Vicksburg District deserves recognition for the years of commitment and effort that have been necessary to prepare this analysis. I want to emphasize that EPA respects and appreciates the Corps' ongoing cooperation with us on this important project and, in that spirit of coordination, it is our intent to provide these comments in a constructive and helpful manner.

EPA supports the goal of providing improved flood protection for the residents of the Mississippi Delta, and we believe that accomplishment of this vital objective can be fully consistent with ensuring effective protection for the area's valuable natural resources. Although the Corps responded to many of our November 2000 comments on the DSEIS, EPA continues to have significant concerns regarding the nature and extent of

[1] EPA Region 4 provided NEPA and CWA comments on the Draft SEIS (DSEIS) in a letter dated November 3, 2000. The Region 4 Water Management Division subsequently provided comments on the draft wetland, water quality and mitigation appendices of the pre-FSEIS in a letter dated December 6, 2005. Over the years, EPA has also participated in extensive wetland field reviews of the project area.

potential adverse impacts to wetlands and other aquatic resources. Further, EPA is concerned that the project, as proposed, may not be consistent with the requirements of the CWA. EPA believes that alternatives to the proposed project may be available that would provide necessary flood protection while reducing the severity of anticipated adverse environmental impacts.

Project Description

The primary purpose of the Yazoo Backwater Project is to reduce flood damages in the Yazoo Backwater Area. To achieve this objective, the Corps and the Board of Mississippi Levee Commissioners (sponsor) have proposed a Recommended Plan (Alternative 5) with "structural" and "non-structural" components. The structural component entails the construction of a14,000 cubic feet per second (cfs) pumping station at Steele Bayou with a pump-on operation elevation of 87.0 feet, NGVD.[2] The non-structural component includes reforestation of up to 40,751 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.

Extensive studies of the project area (Yazoo Backwater Area), demonstrate that it includes some of the richest wetland and aquatic resources in the nation including: a highly productive floodplain fishery, a highly productive but increasingly rare bottomland hardwood forest ecosystem that once dominated the Lower Mississippi Alluvial Valley, hemispherically important migratory bird foraging grounds and one of only four remaining backwater ecosystems with a hydrologic connection to the Mississippi River. These wetlands provide critical habitat for a variety of wetland-dependent animal and plant species including the federally-protected Louisiana black bear and pondberry. 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, reduce flood damages by storing floodwaters, recharge groundwater and maintain stream flows, and sequester significant sources of elemental carbon.

The FSEIS provides information regarding the extent of wetlands on the project site and anticipated project-related impacts. Since a number of these acreages are referenced in this letter, they are summarized in the enclosed *Wetlands Table*.

Relevant Statutory & Regulatory Authorities

NEPA Authority – Section 102(2)(C) of NEPA and CEQ's implementing regulations provide, in part, that the agency preparing any detailed statement "...shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved," and shall

[2] In the FSEIS (pg. SEIS-72), the Corps noted that the pumps would be operated when "...stages were predicted to exceed elevation 87.0, NGVD."

explore and evaluate all reasonable alternatives to the proposed action. In addition, under Section 309 of the Clean Air Act, EPA is responsible for reviewing and commenting on major federal actions significantly affecting the quality of the human environment. Section 309(b) of the Clean Air Act and the CEQ regulations at 40 CFR Part 1504 provide for referrals to CEQ if, after the review, the Administrator determines the matter is "unsatisfactory from the standpoint of public health or welfare or environmental quality...."

CWA Authority – Under CWA Section 404, authorization from the Corps is needed for the discharge of dredged or fill material into waters of the United States, including wetlands. The CWA requires that proposed discharges be evaluated for consistency with the environmental standards established under the Section 404(b)(1) Guidelines (the Guidelines), published at 40 CFR Part 230. Although the Corps does not issue itself a CWA permit for civil works projects such as the Yazoo Backwater Project, CWA review and authorization, including a demonstration of compliance with the Guidelines, is still required. Additionally, under CWA Section 404(c), EPA may prohibit or restrict the use of waters of the United States for any activity involving the discharge of dredged or fill material where, after public notice and opportunity for hearing, the Agency determines that such activity will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife or recreation areas. Under 40 CFR Part 231, the Section 404(c) procedures, the Administrator will take into account all information available, including any written determination of compliance with the Guidelines and any public comments, and will consult with the Chief of Engineers.

EPA's Primary Concerns

Based on our review of the FSEIS and the technical appendices, EPA appreciates that the Corps has provided responses to many of the November 2000 EPA comments. It appears, however, that no substantive modifications have been made to the structural components of the Recommended Plan since November 2000 and that the nature and extent of anticipated adverse environmental impacts continue to be highly significant. We continue to have significant concerns with the proposed project including: 1) magnitude of anticipated wetland impacts, 2) compliance with the CWA's substantive environmental criteria (the Guidelines), 3) uncertainties with the proposed reforestation/mitigation 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. These concerns are discussed below.

Magnitude of Wetland Impacts: EPA remains fundamentally concerned that the Recommended Plan will result in significant adverse environmental impacts to extensive areas of ecologically significant and important forested wetlands. The significance of these impacts is heightened by the fact that alternatives appear to be available that make the wetland losses largely avoidable. The FSEIS concludes that the proposed pumping project would degrade the critical functions and values of approximately 67,000 acres of nationally significant wetland resources. Of this total, the FSEIS demonstrates that

approximately 26,300 acres of wetlands would be hydrologically modified to the extent that they would no longer be subject to CWA regulation. The natural timing and frequency of water reaching the remaining approximately 40,700 acres of wetlands would be impacted by the proposed pumping altering their ecological characteristics and reducing their functions. Moreover, we are concerned that the FSEIS may underestimate the extent of wetlands that may be impacted by the project (e.g., those wetlands located within the 2-year floodplain). EPA believes that both wetland assessment approaches, the Flood Event Simulation Model (FESM) (used by the Corps) and the Environmental Monitoring and Assessment Program (EMAP) (used by the EPA), support this concern. As a point of reference, the impacts reported by the FSEIS for this single project are more extensive than the total impacts (on an annual average basis) associated with the 86,000 projects authorized by the Corps permit program nationwide each year.[3] The magnitude of anticipated impacts to waters of the United States identified in the FSEIS raises serious questions about the project's consistency with the requirements of the CWA.

Compliance with the CWA Guidelines: Discharges of dredged or fill material into the nation's waters such as those associated with the proposed pumping project must comply with the substantive environmental criteria established in regulation at 40 CFR Part 230 (Guidelines). The Guidelines prohibit any discharge of dredged or fill material where: (1) there is a less damaging alternative available to meet the project purpose, (2) the proposed project would significantly degrade the nation's waters, (3) the proposed project would violate other environmental standards, including applicable water quality standards, or (4) the proposed project fails to adequately minimize and compensate for wetland and other aquatic resource losses.

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 and fuels the fundamental processes essential to fish and wildlife productivity. This annual water cycle not only makes the diverse project area habitats accessible to fish and wildlife but also provides the primary linkage that transfers energy and organisms between the project area wetlands and the rest of the lower Mississippi River ecosystem. The proposed project would significantly alter the hydrologic cycle and degrade or eliminate many of the valuable habitat functions provided by the area's wetland resources, including those associated with fish spawning and rearing.

In addition to these potentially unacceptable adverse effects on fish and wildlife, and given our concerns with the reforestation component of the project described below, the proposed project would degrade the water quality enhancement, floodwater storage, groundwater recharge and carbon sequestration functions provided by project area wetlands. We are concerned that impacts to these kinds of functions at the scale associated with this project may result in significant degradation of the nation's waters (40 CFR 230.10(c)), particularly in light of the extensive historic wetland losses in the lower Mississippi Valley and specifically the Yazoo Backwater Area.

[3] Based on data from Fiscal Years 1999 to 2003. Source: Corps Regulatory Program, Headquarters, 2008. http://www.usace.army.mil/cw/cecwo/reg/2003webcharts.pdf.

Although the FSEIS concludes otherwise, we remain concerned that there is potential for conversion of those 26,300 acres that would no longer be subject to CWA regulation as a result of the project. The indirect/secondary impacts associated with a new use could have adverse environmental effects. For example, agricultural conversion or intensification could have water quality implications by promoting faster and increased surface water runoff from agricultural fields. Given that the Yazoo Backwater Area already contains CWA Section 303(d)-listed impaired waterbodies, additional runoff impacts would likely exacerbate the elevated concentrations of the pollutants of concern, potentially causing or contributing to violations of water quality standards (40 CFR 230.10(b)).

To offset the extensive adverse environmental impacts of the Recommended Plan, the Corps proposes 10,662 acres of compensatory mitigation. Compensation would consist of reforestation and conservation areas located in previously cleared wetlands to enhance those areas into bottomland hardwood forests. Overall, the Corps proposes to acquire a minimum of 15,029 acres for reforestation prior to project pumping (i.e., 10,662 acres plus 4,367 acres of back-logged compensation for already implemented aspects of related projects). However, compensation sites have not been specifically identified for the proposed mitigation. Rather, the FSEIS states that conservation easements will be purchased only from "willing sellers" to conduct the reforestation and conservation required by the Recommended Plan.

EPA has significant concerns regarding the adequacy of the proposed compensatory mitigation. EPA encouraged the use of the Hydrogeomorphic Method (HGM) and the Habitat Evaluation Procedure (HEP) as tools to help evaluate wetland functions, and we still support the use of those tools; however, we believe that certain assumptions used in the application of these assessment tools may be flawed, leading to a significant underestimation of project impacts on the aquatic ecosystem (e.g., assumptions used in the calculation of "functional capacity units"). The Guidelines require a clear accounting of the direct and secondary impacts this project will have on the nation's waters. In light of the scope and magnitude of the project impacts, such an evaluation is all the more critical. Based on our preliminary review of the HGM and HEP analyses, it is likely that compensation requirements for impacts of this type and on this scale may be much greater than that estimated in the FSEIS. 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 the mitigation goals of the Recommended Plan. Even if sufficient compensation acreage were available, it is unclear that impacts of this scale and concentration could be effectively compensated for (40 CFR 230.10(c)), given that reliance on willing sellers may result in a non-contiguous patchwork of fragmented compensation sites that cannot deliver the kinds of ecological benefits predicted by the FSEIS. Therefore, the Recommended Plan appears to inadequately minimize and compensate for the project's adverse impacts on the aquatic ecosystem pursuant to 40 CFR 230.10(d). Moreover, the extent of potential adverse environmental impacts is magnified because these impacts could be largely avoided (40 CFR 230.10(a)) through the selection of a less damaging alternative (see "Project Alternatives" discussion below).

Uncertainty of the Proposed Reforestation: Consistent with our comments regarding the proposed compensatory mitigation, EPA is concerned that the FSEIS does not provide effective assurances regarding the project's primary non-structural component – the proposed reforestation of up to 40,571 acres of cleared wetlands (i.e., up to 55,600 acres less the 15,029 acres the Corps proposes to use as compensation) 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 success of replanting efforts, providing long-term stewardship), 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.

Changes in Land Use: We are concerned that the FSEIS does not adequately consider the secondary environmental impacts associated with potential changes in land use. For example, the FSEIS does not consider the environmental impacts associated with potential agricultural intensification. Given the rise in prices for agricultural products in the Delta, and the strong increase in domestic production of corn nationwide, agricultural intensification is a serious possibility that could affect water quality in the Yazoo Backwater Area.

Environmental Justice Considerations: EPA recognizes the importance of improved flood protection for the people living and working in the project area, which includes low-income and minority populations, and we appreciate that the Corps responded to post-2000 comments by preparing an EJ analysis. Like the Corps, EPA has also met with local community residents and listened to their hope and belief that the Yazoo Backwater Project will protect their homes against major floods, like the one in 1973. It is unclear, however, which communities with potential EJ concerns will remain subject to flooding after the project is completed, and whether they will be protected against 1-year, 2-year, or 100-year floods. Flood risk maps that show the location of communities with potential EJ concerns have not been provided in the FSEIS, and therefore it is not possible to fully assess the extent and the degree of flood risk to the residents in those communities; we believe that such an analysis is needed. The community residents also expressed a strong hope and belief that by making the area less prone to flooding, the project will bring economic development, jobs, and a return of residents to the area. We do not believe that the Corps has fully analyzed the potential

impact of this project on economic development, and some additional information on this point might be beneficial to the community. Finally, the FSEIS does not address whether there are any populations that depend on subsistence fishing or hunting that would be affected by this project; such an analysis would also be a valuable addition.

Economic Analysis: EPA has also reviewed the Economic Analysis Appendix 7 of the FRR. EPA staff met with Corps staff in May 2005, to discuss an earlier draft of this Appendix, and it is clear that a great deal of work has been done since then to improve the economic analysis. However, the EPA continues to have concerns about some methodological issues, including the possible double-counting of some significant categories of benefits. We also note that many of the project benefit calculations are contingent upon outcomes – such as the extent of reforestation – about which we have already raised questions above.

Project Alternatives: EPA believes that practicable, less environmentally damaging alternatives exist that provide improved flood protection; consequently, the approximately 67,000 acres of wetlands impacts identified in the FSEIS may be largely avoidable. Selection of a less-damaging alternative would avoid or reduce the wetland impacts to a nationally significant resource, and could begin to address compensation issues and non-compliance with the Guidelines.

EPA requested consideration of non-structural alternatives as less-damaging alternatives in our November 2000 comment letter. We acknowledge that the FSEIS has carried forward the evaluation of a range of alternatives. However, EPA continues to be concerned over the absence of both an in-depth consideration of the full range of alternatives and a complete evaluation of the effects of the structural and non-structural alternatives. This concern is based on the reliance in the FSEIS on assumptions that may not be fully substantiated. These alternatives should be further considered and coordinated with the leaders of the affected communities to ensure the relevance of the options to local conditions, needs and preferences.

Conclusion

As stated, we remain concerned that the Recommended Plan may result in significant degradation of extremely valuable wetlands resources that have been, and continue to be, vulnerable to conversion and loss throughout the Mississippi Delta. The FSEIS recognizes that the project will result in removal of over 26,000 acres of wetlands from CWA regulation, and impacts an additional estimated 40,700 acres of this highly productive aquatic resource. Uncertainties regarding the efficacy of the compensatory mitigation plan and the potential availability of practicable, less environmentally damaging alternatives to provide needed flood protection improvements, magnify EPA's concerns regarding the nature and extent of the wetlands impacts. EPA considers the proposal a candidate for referral to CEQ. EPA is also considering whether to proceed with an additional review of the project pursuant to our authorities under the CWA.

We recognize and appreciate the extensive work done by the Corps on this project, and hope that we can continue to work together as we move forward. EPA remains available for additional discussion.

Thank you for the opportunity to provide these initial comments on the FSEIS. If you have any questions, please feel free to contact me at 214/665-2100 (starfield.lawrence@epa.gov) or Jim Giattina, EPA Region 4 Director of the Water Management Division, at 404/562-9470 (giattina.jim@epa.gov).

Sincerely,

Lawrence E. Starfield
Deputy Regional Administrator
EPA Region 6 [4]

Enclosure: *Wetlands Table*

cc: Trudy D. Fisher – Executive Director: Mississippi Department of Environmental Quality
Sam Hamilton – SE Regional Director: U.S. Fish and Wildlife Service
Peter Nimrod – Chief Engineer: Board of Mississippi Levee Commissioners

Benjamin Grumbles – EPA
Roger R. Martella, Jr. – EPA
Granta Y. Nakayama – EPA

[4] Pursuant to a special delegation from the EPA Administrator per the November 19, 2007, memorandum, I have been delegated the authority to manage this review on behalf of EPA Region 4.

WETLANDS TABLE

The FSEIS provides information regarding the extent of wetlands on the project site and anticipated project-related impacts. Since a number of these acreages are referenced in this letter, they are summarized below.

ACRES	DESCRIPTION
189,600	Wetland acreage for the Yazoo Backwater Study area, as reported in the FSEIS, using the Flood Event Simulation Model (FESM)
212,000	Wetland acreage for the Yazoo Backwater Study Area using Environmental Monitoring and Assessment Program (EMAP) (216,000 acres was reported in Appendix 10, however, this was an interim result)
26,300	Wetland acreage, reported in the FSEIS, that would be modified to the degree that they would no longer be subject to CWA regulation
40,700	Wetland acreage, reported in the FSEIS, that would be modified to various degrees but remain subject to CWA regulation
67,000	Total wetland impacts reported in the FSEIS (26,300 + 40,700 = 67,000 acres) (Also reported as 66,945 acres on Table 10-18)
3,794	Wetland mitigation (compensation) acreage reported in the FSEIS (Also shown as 3,800 acres in Table SEIS-50; unclear why 5,900 acres was reported in Appendix 10)
10,662	Aquatic spawning habitat compensation reported in the FSEIS (this acreage also includes the 3,794 acres of compensation that, according to the FSEIS, is necessary to offset all adverse impacts to wetlands)
4,367	Back-log compensation for project-related construction already in place as reported in the FSEIS
15,029	Minimum compensation acreage to be obtained prior to initial pump operations as reported in the FSEIS (i.e., 10,662 + 4,367 = 15,029)
40,571	Maximum additional acreage associated with nonstructural component of Recommended Plan as reported in the FSEIS (i.e., reforestation)
55,600	Maximum compensation and reforestation acreage as reported in the FSEIS (i.e., 15,029 + 40,571 = up to 55,600)

Billing Code 6560-50

ENVIRONMENTAL PROTECTION AGENCY

[EPA-R04-OW-2008-0179; FRL_XXXX-X]

Proposed Determination To Prohibit, Restrict, or Deny the Specification, or the Use for Specification, of an Area as a Disposal Site; Yazoo River Basin, Issaquena County, MS

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: Section 404(c) of the Clean Water Act (CWA) authorizes the Environmental Protection Agency (EPA) to prohibit, restrict, or deny the discharge of dredged or fill material at defined sites in waters of the United States (including wetlands) whenever it determines, after notice and opportunity for public hearing, that use of such sites for disposal would have an unacceptable adverse impact on various resources, including fisheries, wildlife, municipal water supplies, and recreational areas. Pursuant to section 404(c), EPA Region 4 is today requesting public comments on its proposal to prohibit or restrict the use of certain waters in the Yazoo River Basin in Issaquena County, Mississippi as disposal sites for dredged or fill material in connection with the construction of the proposed Yazoo Backwater Area Project (the project). As the primary component of this project, the U.S. Army Corps of Engineers, Vicksburg District (the Corps) and the Board of Mississippi Levee Commissioners (project sponsor) propose to construct a 14,000 cubic feet per second (cfs) pumping station at Steele Bayou

with a pump-on operation elevation of 87.0 feet, National Geodetic Vertical Datum (NGVD). The construction and operation of the proposed pumps would degrade the critical functions and values of approximately 67,000 acres of wetland resources in the Yazoo River Basin. Of this total, approximately 26,300 acres would be hydrologically modified to the extent that they would no longer be defined as wetlands and would lose CWA regulatory protection. The natural timing, frequency, and duration of water reaching the remaining approximately 40,700 acres of wetlands would be impacted by the proposed pumping, altering the wetlands' ecological characteristics and significantly reducing their functions. EPA Region 4 believes that these extensive hydrological modifications of wetlands in the Yazoo River Basin could have an unacceptable adverse effect on fisheries and wildlife resources.

EPA seeks comment on this proposed 404(c) determination to prohibit or restrict the discharge of dredged or fill material in wetlands and other waters in the Yazoo River Basin in connection with the construction of the project or any pumping proposal in the Yazoo Backwater Area that would involve significant adverse impacts on waters of the United States. See Solicitation of Comments, at the end of the public notice, for further details.

DATES: Comments must be received on or before [INSERT DATE 45 DAYS FROM DATE OF PUBLICATION IN FEDERAL REGISTER].

ADDRESSES: Submit your comments, identified by Docket ID No. EPA-R04-OW-2008-0179, by one of the following methods:

1. Federal eRulemaking Portal (recommended method of comment submission): http://www.regulations.gov. Follow the online instructions for submitting comments.
2. E-mail: ow-docket@epamail.epa.gov. Include the docket number, EPA-R04-OW-2008-0179 in the subject line of the message.
3. Mail: "EPA-R04-OW-2008-0179, Yazoo Pumps," Wetlands, Coastal and Nonpoint Source Branch; Water Management Division; U.S. Environmental Protection Agency, Region 4; 61 Forsyth Street, SW; Atlanta, Georgia 30303-8960.
4. Hand Delivery or Courier: Mr. Ronald J. Mikulak, Wetlands Regulatory Section; Wetlands, Coastal and Nonpoint Source Branch; Water Management Division; U.S. Environmental Protection Agency, Region 4; 61 Forsyth Street, SW; Atlanta, Georgia 30303-8960. Such deliveries are only accepted during the Regional Office's normal hours of operation, which are Monday through Friday, 8:30 a.m. to 4:30 p.m., excluding federal holidays.
5. Submit at Public Hearing: see PUBLIC HEARING section below.

Instructions: Direct your comments to Docket ID No. EPA-R04-OW-2008-0179. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at http://www.regulations.gov, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit through http://www.regulations.gov or e-mail, information that you consider to be CBI or otherwise protected. The

http://www.regulations.gov Web site is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through http://www.regulations.gov, your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit the EPA Docket Center homepage at http://www.epa.gov/epahome/dockets.htm.

Docket: All documents in the electronic docket are listed in the http://www.regulations.gov index. Although listed in the index, some information is not publicly available, i.e., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically in http://www.regulations.gov or in hard copy at the Wetlands Regulatory Section; Wetlands, Coastal and Nonpoint Source Branch; Water Management Division; U.S. Environmental Protection Agency, Region 4; 61 Forsyth Street, SW; Atlanta, Georgia 30303-8960. EPA requests that if at all possible, you contact the person listed in the FOR FURTHER INFORMATION CONTACT section to

schedule your inspection. The Regional Office's official hours of business are Monday through Friday, 8:30 a.m. to 4:30 p.m., excluding federal holidays.

PUBLIC HEARING: In accordance with EPA regulations at 40 CFR 231.4, the Regional Administrator may decide that a public hearing on a proposed 404(c) determination would be in the public interest. Mr. Lawrence E. Starfield, Deputy Regional Administrator for EPA Region 6, has been appointed by the Administrator as the Regional Decision Officer for purposes of any EPA Regional action on the Yazoo Backwater Area Project pursuant to section 404(c); since Mr. Starfield has been designated to exercise all such authority for the Regional Administrator for the Yazoo Backwater Area Project, any reference to authority of the Regional Administrator in this notice are the responsibility of Mr. Starfield for the purposes of this action. In that capacity, Mr. Starfield has decided that a public hearing on this proposed 404(c) determination would be in the public interest.

EPA will hold a public hearing on April 17, 2008, at 7 p.m. at the Vicksburg Convention Center and Auditorium (Exhibit Hall A), located at 1600 Mulberry Street, Vicksburg, MS 39180, seeking comments on its Proposed Determination. See Solicitation of Comments, at the end of this public notice for further details.

The Regional Administrator will designate the official who will preside at the public hearing. Any person may appear at the hearing and submit oral and/or written statements or data and may be represented by counsel or other authorized representatives. The Presiding Officer will establish reasonable limits on the nature and length of time for

oral presentation. There will be no cross examination of any hearing participant, although the Presiding Officer may make appropriate inquiries of any such participant.

FOR FURTHER INFORMATION CONTACT: For information regarding this notice of proposed 404(c) determination contact Mr. Ronald J. Mikulak, Wetlands Regulatory Section; Wetlands, Coastal and Nonpoint Source Branch; Water Management Division; U.S. Environmental Protection Agency, Region 4; 61 Forsyth Street; SW., Atlanta, Georgia 30303-8960. The telephone number is 404-562-9233. Mr. Mikulak can also be reached via electronic mail at mikulak.ronald@epa.gov or Mr. William Ainslie, Wetlands Regulatory Section, at the same address above. The telephone number is (404) 562-9400. Mr. Ainslie can also be reached via electronic mail at ainslie.william@epa.gov.

SUPPLEMENTARY INFORMATION: Throughout this document, references to "EPA," "we," "us," or "our," are intended to mean the Environmental Protection Agency. The supplementary information is arranged as follows:

SUPPLEMENTARY INFORMATION:

I. Section 404(c) Procedure

The Clean Water Act (CWA), 33 U.S.C. 1251 *et seq.*, prohibits the discharge of pollutants, including dredged or fill material, into waters of the United States (including wetlands) except in compliance with, among other provisions, section 404 of the CWA, 33 U.S.C. 1344. Section 404 authorizes the Secretary of the Army (Secretary), acting through the Chief of Engineers, to authorize the discharge of dredged or fill material at specified disposal sites. This authorization is conducted, in part, through the application of environmental guidelines developed by EPA, in conjunction with the Secretary, under

section 404(b) of the CWA, 33 U.S.C. 1344(b). Section 404(c) of the CWA authorizes EPA to prohibit the specification (including the withdrawal of specification) of any defined area as a disposal site and it is authorized to restrict or deny the use of any defined area for specification (including the withdrawal of specification) as a disposal site, whenever it determines, after notice and opportunity for public hearing, that the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas.

The procedures for implementation of section 404(c) are set forth in 40 CFR part 231. Under those procedures, if the Regional Administrator has reason to believe that use of a site for the discharge of dredged or fill material may have an unacceptable adverse effect on one or more of the aforementioned resources, he may initiate the section 404(c) process by notifying the Corps and the applicant (and/or project proponent) that he intends to issue a proposed determination. Each of those parties then has 15 days to demonstrate to the satisfaction of the Regional Administrator that no unacceptable adverse effects will occur, or that corrective action to prevent an unacceptable adverse effect will be taken. If no such information is provided to the Regional Administrator, or if the Regional Administrator is not satisfied that no unacceptable adverse effect will occur, the Regional Administrator will publish a notice in the Federal Register of his proposed determination, soliciting public comment and offering an opportunity for a public hearing. Today's notice represents this step in the process.

Following the public hearing and the close of the comment period, the Regional Administrator will decide whether to withdraw his proposed determination or prepare a

recommended determination. A decision to withdraw may be reviewed at the discretion of the Assistant Administrator for Water at EPA Headquarters. If the Regional Administrator prepares a recommended determination, he then forwards it and the complete administrative record compiled in the Regional Office to the Assistant Administrator for Water. The Assistant Administrator makes the final determination affirming, modifying, or rescinding the recommended determination.

II. Project Description and Background

The Yazoo River Basin's backwater area (Yazoo Backwater Area) is located in west-central Mississippi, just north of Vicksburg, Mississippi. 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 high ground along Deer Creek forms a natural divide between Steele Bayou and the Sunflower River Basins.

The Yazoo Backwater Area has historically been subject to extensive backwater flooding from the Mississippi and Yazoo Rivers. 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 Project, which began in 1928, the Steele Bayou flood gate was installed 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 River Basin. However, when the Steele Bayou flood gate is closed, precipitation in the Yazoo River Basin becomes trapped and backs up behind the gate causing flooding. The primary purpose of the Yazoo Backwater Area Project is to reduce the flood damages in the Yazoo Backwater Area caused by this internal flooding. 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 Board of Mississippi Levee Commissioners (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, NGVD. When floodwaters at the Steele Bayou structure reach (or are 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 effects of the pumping will be to reduce the amount of land within the Yazoo Backwater Area that floods, as well as to remove water faster from those areas that still experience flooding. The nonstructural component includes 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. Construction of the

proposed pumps involves the discharge of dredged or fill material into approximately 52.6 acres of forested wetlands and other waters of the United States in Issaquena County, Mississippi. The estimated Federal cost of the proposed action is $220.1 million, with an annual operational cost of $15.1 million.

This project was authorized by the Flood Control Act of 1941, which envisioned a plan to reduce backwater flooding in the Yazoo River Basin through a combination of levees, drainage structures, and pumping plants fully funded by the Federal government. This act also designated Yazoo Backwater Area lands located below 90 feet in elevation to serve as a sump area for floodwater storage.

Over the next 37 years, the Corps planned and executed key flood control projects in the Yazoo Backwater Area, including: construction of the Will 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.

In April 1982, EPA provided comments on the Draft Environmental Impact Statement (DEIS) for the 1982 version of the proposed project. In our comments on the DEIS we highlighted our concerns regarding the proposed project's potentially extensive impacts on wetlands and associated fish and wildlife habitat and our belief that a less environmentally damaging design would meet the project's objectives. We stressed the importance of the flood water storage and water quality enhancement functions provided by area wetlands and expressed our concerns that the proposed project would degrade these critical functions. We 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. Additionally, we expressed concerns that the proposed mitigation would not adequately minimize and offset the extensive adverse environmental impacts associated with the proposed project.

In our May 1983 comments on the Final Environmental Impact Statement (FEIS), we expressed similar concerns. Our 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 nutrients 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."

The U.S. Fish and Wildlife Service (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 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 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 analyses 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 representatives of the Board of Mississippi Levee Commissioners to discuss concerns regarding the proposed project and potentially less environmentally damaging alternatives.

In 2000, EPA also participated in multiple meetings 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.

In a November 3, 2000, letter to the Corps on the DSEIS, EPA raised significant concerns regarding 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. We also identified, for further consideration, a number of potentially less environmentally damaging alternatives that emphasized nonstructural and nontraditional measures to address flooding issues. We 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 worked with the Corps to improve its 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

extensive site visits and data collection in the Yazoo Backwater Area, meetings, and conference calls. In December 2005, EPA 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. We noted that flaws in these evaluation approaches result 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)[1]. Although the Corps responded to many of our November 2000 comments on the DSEIS, no substantive modifications had been made to the structural component of the proposed project since November 2000. In our January 22, 2008, letter to the Corps on the FSEIS, we concluded that the nature and extent of anticipated adverse environmental impacts continue to be significant and that we continue to have significant concerns with the proposed project including: 1) magnitude of anticipated impacts to wetlands and associated fish and wildlife 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. We again identified the project as a candidate for referral to CEQ and for further action pursuant to our authorities under the CWA.

[1] 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

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 impacts on fish and wildlife resources. The FWS also reiterated its determination that the project is a candidate for referral to CEQ.

On February 1, 2008, EPA's Regional Administrator informed the Corps and the Board of Mississippi Levee Commissioners of his intention to begin a section 404(c) action, 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 met with representatives from the Corps and Board of Mississippi Levee Commissioners. In addition, EPA 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 notice). However, 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, and has published this Proposed Determination in order to solicit public comment.

III. Characteristics and Functions of the Site

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. The extent and duration of seasonal flooding from the Mississippi River fluctuated annually, recharging the LMRAV systems and creating a diversity of dynamic habitats that once supported a vast array of fish and

wildlife resources. Over the past 100 years, the greatest changes to the landscape have been land clearing for both agriculture and flood control projects. These habitat alterations have 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,[2] there have been significant alterations in the region's hydrology due to river channel modification, construction of flood control levees and reservoirs, 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.

These significant cumulative aquatic resource losses across the broader LMRAV are mirrored in the Mississippi Delta region of the LMRAV, in which the Yazoo Backwater Area is situated. Mississippi's 2005 Comprehensive Wildlife Conservation Strategy[3] reports that only fifteen percent of the Mississippi Delta remains forested and the largest segment remaining 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.

Extensive studies of the Yazoo Backwater Area demonstrate that it includes some of the richest wetland and aquatic resources in the Nation. These include a highly productive floodplain fishery, a highly productive but increasingly rare bottomland

[2] Department of the Interior, The Impact of Federal Programs on Wetlands, Volume I: The Lower Mississippi Alluvial Plain and the Prairie Pothole Region, A Report to Congress by the Secretary of the Interior, October 1988 at 60.
[3] Mississippi's Comprehensive Wildlife Conservation Strategy (MCWCS) 2005-2015, October 2005: http://www.wildlifeactionplans.org/pdfs/action_plans/ms_action_plan.pdf

hardwood forest ecosystem that once dominated the LMRAV, hemispherically important migratory bird foraging grounds and one of only four remaining backwater ecosystems with a hydrologic connection to the Mississippi River. These wetlands provide critical habitat for a variety of wetland dependent animal and plant species, including the federally protected Louisiana black bear and pondberry. 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, reduce flood damages by storing floodwaters, recharge groundwater and maintain stream flows, and sequester significant amounts of elemental carbon.

Wetlands in the Yazoo Backwater Area have been described by the Corps as belonging to the hydrogeomorphic (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." As stated in the Yazoo Basin HGM Guidebook, 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 floodwaters largely drain from the site back to the channel as flood stages fall (as opposed to being retained on the site in depressions).[4]

[4] Smith, R. D., and Klimas, C. V. 2002. A regional guidebook for applying the hydrogeomorphic approach to assessing wetland functions of selected regional wetland subclasses, Yazoo Basin, Lower Mississippi River Alluvial Valley. ERDC/EL TR-02-04. U.S. Army Engineer Research and Development Center, Vicksburg, MS. See: http://el.erdc.usace.army.mil/wetlands/pdfs/trel02-4.pdf

The wetlands of the riverine backwater subclass occur on various substrates which developed as a result of Mississippi River meandering. This subclass typically contains 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. However, 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.[5] 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. However, hydrology is considered by most to be the critical determinant of the establishment and maintenance of specific types of wetlands and wetland processes.[6] As thoroughly discussed in the Yazoo Basin HGM Guidebook and outlined below, maintenance of the natural hydrologic regime (i.e., natural 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 floodwater detention, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat.

When riverine backwater wetlands are allowed to temporarily detain and moderate floodwater they provide a number of important benefits. Floodwater

[5] EPA, 2008. Yazoo Backwater Area Plant Species List. Wetlands Regulatory Section, Water Management Division, EPA Region 4, Atlanta, GA.
[6] Mitsch, W.J., and Gosselink, J.G. 2000. Wetlands (3rd edition). John Wiley and Sons, Inc. New York, NY.

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 floodwater volume detained within riverine backwater wetlands is likely to be evaporated or 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 the flood detention function because sediment deposition directly alters the physical characteristics of the wetland (including hydrologic attributes) and positively influences downstream water quality.

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 natural timing, frequency, and duration of flooding in the area's riverine backwater wetlands systems.

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 floodwater to transport dissolved and particulate organic carbon from the floodplain to the stream channel.

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 natural cycle of flooding. 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, 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 natural 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 redox potential falls below a certain level. Flooding 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.

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 floodwaters, a diverse assemblage 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.

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 natural hydrologic regime of riverine backwater wetlands.

The topographic and commensurate hydrologic complexity of these riverine backwater wetlands contribute to the biodiversity for which they are well known. The World Wildlife Fund estimates that there are 372 wildlife species occurring in the Mississippi Lowland Forest ecoregion, which encompasses the Yazoo River Basin and Yazoo Backwater Area.[7] Of these species 35 are amphibian, 52 are reptiles, 223 are birds, and 62 are mammals. According to the Mississippi Museum of Natural History, 40 percent of the amphibians, 60 percent of the reptiles, 82 percent of the birds, and 71 percent of the mammals from the World Wildlife Fund's Mississippi Lowland Forest list occur in the Yazoo River Basin.[8] In addition, 2 amphibian, 4 reptile, 74 bird, and 5 mammalian species were catalogued by the State beyond what World Wildlife Fund reported. Further, the FWS has listed 258 species of birds which use its complex of refuges located in the Yazoo Backwater Area[9] and over 90 species of fish have been documented as utilizing the Yazoo River.[10]

According to the State's Comprehensive Wildlife Conservation Strategy, bottomland hardwood wetlands such as those in the Yazoo Backwater Area provide habitat for 33 *species of greatest conservation need*[11] including 20 birds, 12 mammals, and 1 reptile. Also, all of the standing and running water systems of the Mississippi

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

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

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

[10] Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer, Jr. 1980. Atlas of North American Freshwater Fishes. North Carolina State Museum of Natural History. Publication #1980-12 of the North Carolina Biological Survey. 877 pgs.

[11] 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 (MCWCS, 2005).

Alluvial Plain, including the Yazoo Backwater Area, have been classified 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 critical habitat for 17 *species of greatest conservation need* including 1 amphibian, 12 fish, and 1 reptile.[12]

In its comments in the FSEIS, the FWS reports that the Lower Yazoo Delta 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 926,000 acres located in LMRAV, through which 60 percent of all bird species in the U.S., over 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.

IV. Basis of the Proposed Determination

[12] MCWCS, 2005.

A. Section 404(c) Standards

The CWA requires that exercise of the final section 404(c) authority be based on a determination of "unacceptable adverse effect" to municipal water supplies, shellfish beds, fisheries, 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 less environmentally damaging practicable alternatives, significant degradation of waters of the United States, water quality impacts, and impact minimization are particularly important to evaluating the unacceptability of environmental impacts in this case. 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)).

B. Adverse Impacts of the Proposed Project

EPA believes the proposed project will result in significant adverse environmental impacts to extensive areas of ecologically significant and important forested wetlands and their associated fisheries and wildlife resources. At a minimum, the construction and operation of the proposed pumps would degrade the critical functions and values of approximately 67,000 acres of nationally significant wetland resources in the Yazoo River Basin. Of this total, approximately 26,300 acres would be hydrologically modified (i.e., reduced flood duration) to the extent that they would no longer be defined as wetlands and would lose CWA regulatory protection. The natural timing, frequency, and duration of water reaching the remaining approximately 40,700 acres of wetlands would be impacted by the proposed pumping, altering the wetlands' ecological characteristics and reducing their functions. As a point of reference, the impacts estimated by the Corps for this single project are more extensive than the total impacts (on an annual average basis) associated with the 86,000 projects authorized by the Corps permit program nationwide each year.[13] We do not believe that impacts of this magnitude are consistent with the requirements of the CWA. Our concerns regarding this project are amplified

[13] Based on data from Fiscal Years 1999 to 2003. Source: Corps Regulatory Program, Headquarters, 2008. See: http://www.usace.army.mil/cw/cecwo/reg/2003webcharts.pdf

because we believe the potential adverse impacts to wetlands and associated fish and wildlife resources may be much greater than the Corps has estimated.

1. Significant Degradation and Adverse Effects

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 and fuels the fundamental processes essential to fish and wildlife productivity. This annual water cycle 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 the rest of the lower Mississippi River ecosystem.

The basic objective of the project is to limit the spatial extent, frequency, and length of time the Yazoo Backwater Area floods. The ecological effect of this project will be to dampen the natural variability in flood regime (the flood pulse) which currently contributes to the biodiversity of the project area's wetlands. Operation of the proposed pumps will dramatically alter the hydrologic cycle of this area, and would therefore eliminate or significantly degrade many of the critical ecological functions provided by wetlands in the Yazoo Backwater Area, including floodwater detention, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat.

The reduction or elimination of the floodwater detention 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, and exacerbate flooding problems

downstream at a time when communities in the lower Mississippi River Valley are still struggling to recover from the effects of recent catastrophic flooding. 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 floodwater detention 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 floodwater 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).[14]

Reducing the spatial extent, frequency, and duration of time project area wetlands flood 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, 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

[14] MCWCS, 2005.

export of dissolved and particulate carbon requires prolonged contact between soil organic matter, flood waters, and the invertebrate community and subsequent floodwater transport downstream – circumstances that would be dramatically altered by the proposed project.

Reducing the spatial extent, frequency, and duration of time project area wetlands flood 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 floodwater 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.[15]

Although the FSEIS concludes otherwise, we believe there is potential for conversion of those 26,300 acres that, as a result of the project, would no longer be defined as wetlands and would lose CWA regulatory protection. These conversions of wetlands to other uses could result in additional adverse environmental effects. For example, agricultural conversion could change a forested wetland habitat to an agriculture use, destroying or significantly degrading all wetland functions. Agricultural

[15] MCWCS, 2005.

intensification could have water quality implications by promoting faster and increased surface water runoff from agricultural fields. Given that the Yazoo Backwater Area already contains CWA section 303(d)-listed impaired waterbodies, additional runoff impacts would likely 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)).

Reducing the spatial extent, frequency, and duration of time project area wetlands flood will dramatically alter the structure and species composition of the plant community in the Yazoo Backwater Area. Wetland plant communities will shift over time to communities composed of species adapted to drier environments. For example, large areas 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. As discussed below, this large shift in plant communities will also have adverse effects on area fish and wildlife which depend on these wetland plant species, and the hydrologic regimes they represent, to meet specific life history requirements.

Reducing the spatial extent, frequency, and duration of time project area wetlands flood will significantly degrade their capacity to provide habitat for an extensive list of fish and wildlife species. Insect larvae, midges, oligocheates (worms), scuds (microcrustaceans), crayfish, worms, snails and spiders 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.

Reducing the spatial extent, frequency, and duration of time project area wetlands flood will also adversely impact amphibian and 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.[16] 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. The proposed project would desiccate these floodplain habitats making it difficult for portions of the amphibian population to survive. The proposed project would also adversely affect reptile and amphibian species by modifying river-

[16] Jones, J.C. and J.D. Taylor. 2005. Herptofauna communities in temperate river floodplain ecosystems of the southeastern United States. pages 235-257. *in* L.H. Frederickson, S.A. King, and R.M. Kaminski, eds. Ecology and Management of Bottomland Hardwood Systems: The State of our Understanding. University of Missouri-Columbia, Gaylord Memorial Laboratory Special Publication No.10, Puxico.

wetland connectivity, reducing flood pulses and wetland water recharge, and increasing habitat fragmentation.

The proposed project will reduce extensive areas of flooded wetlands which provide critical habitat for fish spawning, rearing, foraging, and cover. As 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. According to the FWS, the proposed action would reduce the areal extent of wetlands subject to flooding in the Yazoo Backwater Area that are 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 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.

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.[17] Project area wetlands provide migratory bird habitat of hemispheric significance, particularly for waterfowl, shorebirds, over-water nesting waterbirds and wading birds, as well as numerous migratory songbirds. The loss of the productive shallowly flooded wetlands, especially in the spring months when the proposed pumps will 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 wintering and 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 and their chicks and may ultimately lead to higher nest mortality and lower recruitment.

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 dependent birds and mammals inhabiting the Yazoo Backwater Area. The consequences of even modest changes in the timing of events can adversely affect these species. 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

[17] Heitmeyer, M.E., R.J. Cooper, J.G. Dickson, and B.D. Leopold. 2005. Ecological relationships of warmblooded vertebrates in bottomland hardwood ecosystems. Pages 281-306. *in* L.H. Frederickson, S.A. King, and R.M. Kaminski, eds. Ecology and Management of Bottomland Hardwood Systems: The State of our Understanding. University of Missouri-Columbia, Gaylord Memorial Laboratory Special Publication No.10, Puxico.

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.[18]

The proposed project would significantly degrade critical habitat for many of the 258 species of birds (e.g., little blue herons, yellow-crowned night herons, wood storks and prothonotary warblers), many species of waterfowl (e.g., wood ducks, mallards, blue and green-winged teal)[19] and over 90 species of fish (e.g., catfish, sunfish and crappies)[20] which have been documented as utilizing wetlands and other waterbodies in the Yazoo Backwater Area and Yazoo River. The proposed project would also degrade critical habitat for 33 *species of greatest conservation need* which depend on bottomland hardwood wetlands in the Yazoo Backwater Area, including the Louisiana black bear which is listed as Federally *threatened* under the Endangered Species Act and the American black bear, 23 *species of greatest conservation need* which depend on standing and running waterbodies in the Yazoo Backwater Area, and 17 *species of greatest conservation need* which depend on the Yazoo River and its major tributaries.[21]

The proposed project would degrade critical ecological functions provided by wetlands in the Yazoo Backwater Area including floodwater detention, nutrient cycling, organic carbon export, pollutant filtering/removal, and maintenance of biologically diverse plant and animal habitat. We believe that impacts to these functions at the scale associated with this project will result in significant degradation (40 CFR 230.10(c)) of

[18] Heitmeyer et al., 2005.
[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] Lee et al., 1980.
[21] MCWCS, 2005.

the Nation's waters, particularly in light of the extensive historic wetland losses in the lower Mississippi Valley and specifically the Yazoo Backwater Area.

2. Underestimation of Adverse Effects

a. Underestimation of the Spatial Extent of Adverse Effects. EPA believes the spatial extent of wetlands potentially impacted by the proposed project is much greater than that estimated in the FSEIS. EPA's analysis identified 81,000 acres of jurisdictional wetlands located outside of the wetland impact assessment area established in the FSEIS. EPA believes a significant portion of these wetlands are connected to backwater flooding and will be adversely impacted by the project. However, the FSEIS did not evaluate impacts to these wetlands.

In our November 2000, comment letter on the DSEIS, we recommended that the Corps expand its scope of wetland impact assessment to include jurisdictional wetlands in the 2-year floodplain (i.e., 91.0 foot, NGVD elevation). While the FSEIS implies that there are more jurisdictional wetlands in the 100-year floodplain than previously estimated in the DSEIS, the FSEIS concludes that only those wetlands flooded for 5 percent of the growing season and which occur at or below the 88.6 foot, NGVD elevation (i.e., the wetland impact assessment area established in the FSEIS using the Flood Event Assessment Tool (FEAT)/Flood Event Simulation Model (FESM)) will be affected by this project. The FSEIS also concludes that any wetlands occurring outside the FEAT/FESM modeled boundary are not connected to the backwater ecosystem and thus would not be impacted by the pumping project. We disagree and, as discussed

further below, note that data included in the FSEIS supports our position that a significant amount of jurisdictional wetlands outside the FEAT/FESM modeled boundary is indeed connected to the backwater ecosystem, and thus will likely be adversely impacted by the proposed project.

During the course of this project several attempts have been made to estimate the spatial extent of wetlands based upon remote sources of data (i.e., Geographic Information Systems (GIS), satellite images, hydrologic models). These remote based estimates of jurisdictional wetland extent ranged from approximately 60,000 to over 200,000 acres. Since these landscape level estimates were based on remote data with un-estimated error, EPA determined a field based, statistical survey would provide a more precise and scientifically defensible basis for establishing the extent and spatial distribution of wetlands in the study area. Therefore, in 2003, EPA in cooperation with the Corps, the FWS and the Natural Resources Conservation Service (NRCS) implemented a field sampling survey designed by EPA's Environmental Monitoring and Assessment Program (EMAP). EMAP survey designs and methods have been developed and tested within EPA's Office of Research and Development over the past decade with published results. Discussion of the methods and results of the EMAP survey were incorporated into Appendix 10 of the FSEIS.

The spatial extent and distribution of wetlands in the Yazoo Backwater Area was determined with known confidence using EPA's EMAP survey design and analysis. Based on this design, the total wetland extent for the 100-year floodplain is approximately 212,000 acres. Most of the wetlands were found in the FEAT/FESM predicted area. However, EMAP also found approximately 81,000 acres of jurisdictional

wetlands occurring outside the wetland boundary predicted by the Corps' FEAT/FESM model. It is the potential impacts to these wetlands that EPA believes were not analyzed in the FSEIS.

The stated effect of the Yazoo Backwater Area Project is the reduction of the areal extent and duration of floods greater than the 1-year flood (FSEIS, paragraph 31). Paragraphs 194-195 in the Main Report state that the timing, frequency and duration of flooding will be affected by the project. Therefore, areas typically covered/inundated by 2-, 5-, 10-, 25-, 50-, and 100-year flood events will be reduced with the proposed project (i.e., less area will be flooded). These areas contain a substantial acreage of wetlands.

Data included in the FSEIS indicates that hydrologic connections exist amongst wetlands beyond those depicted by FEAT/FESM. Table 10-7, in the Wetlands Appendix of the FSEIS indicates that the March 10, 1989; March 21, 1987; and the January 9 and 13, 1983 satellite scenes show between 18,000 and 71,000 acres flooded in the area between 91.0 feet and 100 feet, NGVD (i.e., 2-100 year band). Hence, it is likely that the jurisdictional wetlands between the 2-year and 100-year flood elevations currently experience flooding. This conclusion is further supported by the statement that the FESM model overestimates flooding close to the channels utilized by the model, but does "less well" when flooded areas are away from the channels (FSEIS, paragraph 43). EPA interprets this to mean that areas away from the FESM channels could flood, but the model is unable to depict those flooded areas. FSEIS Tables 10-10 (Areal extent of wetlands by composite wetland cell value) and 10-11 (Wetland losses by duration interval and duration zone) in the Wetlands Appendix (Appendix 10) and Plate 10-25 indicate there are wetland areas beyond the FEAT boundary that flood and would be

affected by the proposed pump by virtue of having decreased flood durations after the project. These items in Appendix 10 indicate impacts to be approximately 60,000 acres. The Wetland Appendix also indicates that approximately 41,000 acres outside the Corps' assessment area (i.e., "Tier 2" wetlands in Table 10-16) flood during the 2-year return period flood.

Corps' hydrologic data also indicate that flooded wetlands exist in the 2-year floodplain and will be impacted through a change in flood duration as well as a change in flood frequency. In 2004, the Corps provided EPA with a copy of the Period of Record gage data for the years 1943 to 1997. These data contained daily gage records, presumably as outputs from the Period of Record Routing model, for the with- and with-out project scenarios at Steele Bayou and Little Sunflower gages. A frequency analysis of this data indicates the 2-year flood elevation (stage) is 91.0 feet, NGVD in the Lower Ponding area and 91.6 feet, NGVD in the Upper Ponding area (FSEIS, Appendix 6 – Engineering Summary and Appendix 10). A stage duration analysis of these data indicates that, over the entire period of record, flooding sufficient for wetland hydrology occurs in areas between 89.0 feet and 92.0 feet, NGVD at Steele Bayou under base conditions.[22] As a result of the proposed project, durations would be decreased, on an average annual basis, by 4.5 percent or 15 days. Flood frequency would be changed, at this 2-year return interval elevation, approximately 45 percent. This corresponds to the Corps' calculated stage reductions of approximately 4.5 feet (92.9 feet, NGVD reduced to 88.5 feet, NGVD) at Steele Bayou.

[22] EPA, 2008. Synopsis of Yazoo Backwater Area Hydrology. Wetlands Regulatory Section, Water Management Division, EPA Region 4, Atlanta, GA.

Corps' stage-frequency data indicates flooding will become much less frequent in the 2-and 5-year floodplains, increasing from a 2-year return interval to a 10-year return interval and a 5-year return interval to a 50-year return interval (FSEIS, Appendix 6, Table 6-14 and 6-15). This would result in significant impacts to, among other functions, the hydrologic functions of wetlands in the 2-year floodplain. However, by restricting the impact assessment area to only the FEAT/FESM modeled areas, the Corps is ignoring changes in flood duration and frequency that will result in major impacts to wetlands outside the FSEIS's assessment area.

Existing information regarding the extensive hydrologic network in the Yazoo Backwater Area offers further support that wetlands outside the Corp's assessment area would be affected by the proposed project. The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that encodes information about naturally occurring and constructed bodies of water and paths through which water flows. The NHD is mapped at a 1:100,000 scale. When the NHD for the Yazoo River Basin is overlain with the wetland points surveyed in EMAP, the density of stream channels at this scale strongly indicates that backwater has a great many conduits and that many wetlands on the 2-year floodplain represented by EMAP data points are connected or adjacent to channels. This finding is consistent with the detailed characterization of the Yazoo Backwater Area's hydrology found in the Yazoo Basin HGM Guidebook, which states that during periods of backwater flooding the area's extensive drainage networks "function in reverse and deliver water to low areas far from the source stream."

For these reasons, EPA believes that a significant portion of the 81,000 acres of jurisdictional wetlands identified in the EMAP analysis that exist outside of the Corps'

wetland assessment area are connected to backwater flooding and will likely be adversely affected by the project. These wetlands were not evaluated in the FSEIS's impact assessment.

b. Underestimation of the Degree and Nature of Adverse Effects. In addition to significantly underestimating the spatial extent of wetlands potentially impacted by the proposed project, wetland, fish, and wildlife functional assessments in the FSEIS also understate the degree and nature of adverse impacts to the wetlands that were evaluated. EPA encouraged the use of the HGM assessment method and the Habitat Evaluation Procedure (HEP) as tools to help evaluate wetland functions, and we still support the use of those tools; however, we believe that certain factors used in the application of these assessment tools are flawed, leading to a significant underestimation of the proposed pumping station's adverse impacts on the aquatic ecosystem. Our primary concerns include:

- **The summation of assessment units (i.e., Functional Capacity Units and Habitat Units) in the FSEIS obscures significant wetland, fish, and wildlife impacts**. For example, the HGM assessment evaluated eight functions performed by affected wetlands and estimated how these functions would decrease at wetlands adversely impacted by the proposed pumping and increase at reforestation/mitigation sites. These functions are: *detain floodwater, detain precipitation, cycle nutrients, export organic carbon, physical removal of elements and compounds, biological removal of elements and compounds, maintain plant communities, and provide wildlife habitat.* In drawing its conclusion that the proposed project would result in an overall 19.5 percent

increase in wetland functions, not only does the FSEIS factor in unsubstantiated and improbable benefits associated with the proposed restoration as discussed below, it also adds the losses and gains for each of the eight functions. This kind of comparison is of concern because it allows large predicted gains in functions such as maintaining plant communities to obscure losses in other critical water quality related functions.

- **Impacts to key functions are omitted**. In the HGM assessment, no effect is shown in the *detain floodwater* function as a result of this project despite the fact that this is one of the functions which the proposed pumping project is designed to most dramatically impact. In its discussion of the *detain floodwater* function, the Yazoo Basin HGM Guidebook clearly states the importance of duration of flooding on the performance of this function. However, despite this recognition, the duration information which was incorporated into several other functions in the FSEIS's HGM assessment (which did indicate project related impacts) was not incorporated into the *detain floodwater* function.
- **The flood frequency variable shows no change in HGM assessment**. Despite information in the FSEIS Engineering Appendix (Table 10-6) which indicates that the proposed project will result in less frequent flooding in areas above the 1-year floodplain, the frequency of flooding variable in the HGM assessment models reflects no change, for any function. This seems incongruous, since the entire stated objective of the project is to modify the timing, frequency and duration of flooding (FSEIS, paragraph 194).

- **Despite the pumping project, the HGM assessment assumes that vegetative species composition remains approximately static over time**. Over the course of the 50-year project and beyond, the vegetation structure of the Yazoo Backwater Area would change as significant areas at higher elevations shift to drier species composition. The FSEIS's HGM assessment assumes that vegetative species composition remains static through time or that the species shift would still be within the range of reference standards. However, if the hydrologic regime of the area is significantly changed, as proposed, there would be much larger changes in the plant and animal community than was accounted for in the FSEIS's HGM assessment.

- **The HEP and HGM assessments assume that land-use will not change over the 50-year life of the project.** For example, the assessment assumes that mature wetland forest that is hydrologically modified to the extent that it is no longer defined as a wetland would stay mature forest despite no longer being provided CWA regulatory protection. We believe this assumption is not supported by a more careful evaluation of land-use trends. For example, given the rise in prices for agricultural products in the Mississippi Delta, and the strong increase in domestic production of corn nationwide, agricultural intensification is a serious possibility.

- **The HEP assessment underestimates the amount of aquatic spawning habitat adversely affected**. 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. Based on these requirements and hydrologic data provided by the Corps,

3300 acres of habitat would be lost as a result of the project. However, this amount of lost habitat is inconsistent with values reported in the Wetland Appendix (Table 10-10). The Wetland Appendix indicates that approximately 39,000 acres which currently flood for 14 days or less (but greater than 7 days) would, as a result of the proposed project, only flood for less than 7 days (i.e., shift to the <2.5 percent duration band). EPA's interpretation of Table 10-10 is that there is currently at least 39,000 acres of potentially suitable fish spawning habitat that will become unsuitable after project implementation. These impacts appear far greater than the 3300 acres of lost spawning habitat discussed in the FSEIS's Aquatics Appendix and would require far more compensation than what is proposed in the FSEIS.

- **Inappropriate selection of fish species for the HEP assessment results in an underestimation of the proposed project's adverse effects on fisheries.** The nine fish species selected for the FSEIS's HEP assessment do not represent fish species whose life cycles would be affected by the proposed project's hydrological modifications within riverine backwater wetlands. All nine of the fish species evaluated in the HEP are commonly found in larger open water systems and do not require floodplain habitats for their spawning or rearing. Thus, the HEP assessment underestimates how the proposed project would impact the large number of fish species which do require floodplain connections and periodic flooding events for key aspects of their life cycles such as spawning and rearing.

- **HEP does not evaluate the impacts of the proposed project on amphibians and reptiles.** The FSEIS's HEP assessments exclude entirely any assessment of the proposed project's adverse impacts on amphibians and reptiles. Species in both of these classes of animals depend upon wetland habitat to meet numerous life history requirements and would experience extensive adverse effects from the proposed project.

The FSEIS's exclusion from analysis of wetlands above the 2-year, 5 percent flood duration elevation, and in particular wetlands above the 2-year, 5 percent duration flood elevation and within the 5-year flood elevation, does not acknowledge the influence and importance of shorter duration and less frequent flooding on establishing and maintaining the diversity of wetlands and the functions they provide. Nor does it recognize the impacts of the reduction in flooding resulting from the project on the maintenance of that diversity of wetlands and the biodiversity they support. The importance of wetland functions within and above the 2-year, 5 percent flood elevation is noted in the Yazoo Basin HGM Guidebook which states "one of the primary criteria used to identify wetland subclasses in the Yazoo Basin is flood return interval. A 5-year or less flood return interval is regarded as sufficient to support major functions that involve periodic connection to stream systems." Shorter duration and less frequent flooding will significantly and adversely affect the vegetation and aquatic animal communities within these wetlands, nutrient and sediment cycling, and other functions that establish and maintain the diversity of habitats critical for fish and wildlife dependent upon them, including waterfowl, shorebird, and wading bird foraging habitats, fish spawning and

rearing habitats, and amphibian, reptile, and mammal habitats. Reducing the spatial extent, frequency, and duration of time project area wetlands flood will result in the reduction and loss of important wetland functions, according to the criteria outlined in the Yazoo Basin HGM Guidebook. These reductions and losses in wetland functions were not adequately factored into the FSEIS's HGM and HEP assessments.

3. Overestimation of Environmental Benefits

Both the HGM and HEP analyses assume extensive yet unsubstantiated and improbable environmental benefits from the project's proposed reforestation. These analyses assume that the entire proposed 55,600 acres of reforestation and mitigation will be obtained and that every acre will be ideally situated in the target area (i.e., areas currently in agricultural production within the two-year floodplain that will flood for a sufficient period to yield equivalent wetland functions) to produce maximum environmental benefits for all affected resources. However, EPA's EMAP assessment and the Corps' land use assessment (FSEIS, Table 10-9) indicate that there are not enough acres of cleared wetlands with the proper hydrology and soils in the target area to satisfy this goal. Aside from the project's compensatory mitigation (discussed below), there are no commitments to initiate any of the reforestation prior to initiating operation of the pumps. Further, no reforestation (or mitigation) sites have been identified or secured and the FSEIS indicates that these sites may not be located in the target area or even the greater Yazoo – Mississippi Delta (Main Report, paragraph 316). If sites are found, the reliance on willing sellers would likely result in a noncontiguous patchwork of

fragmented sites that cannot deliver the kinds of ecological benefits predicted by the HGM and HEP assessments.

Based on our review of available information, EPA believes the proposed project would result in extensive adverse impacts to wetland functions and fish and wildlife resources; impacts which would be inconsistent with the CWA. As discussed below, we do not believe the proposed compensatory mitigation would reduce these adverse impacts to an acceptable level.

C. 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 only from "willing sellers" to conduct the proposed compensatory mitigation.

EPA has significant concerns regarding the adequacy of the proposed compensatory mitigation. Based on our preliminary review of the HGM and HEP analyses, we believe that compensation requirements for impacts of this type and on this scale would be much greater than that estimated in the FSEIS. 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. 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. We also believe 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 believe 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 very robust and detailed mitigation plan which would inform whether in fact the impacts could reliably be reduced 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 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 that make it impossible to conclude that impacts will be reduced permanently below the threshold of significant degradation.

D. 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.

E. Project Alternatives

EPA believes, based on the record to date, that the Corps has not sufficiently considered potential alternatives that would avoid and minimize the proposed project's significant adverse impacts to aquatic resources pursuant to 40 CFR 230.10(a).

Specifically, we believe that an alternative may be available that would provide a less environmentally damaging and more sustainable approach to floodplain management in the Yazoo Backwater Area. Such an alternative might incorporate, among other actions: reforestation of farmlands in the floodplain, relocation or flood proofing of flood-prone structures, conservation easements, localized flood protection structures including pumps, and expansion of insurance programs to compensate for economic losses from flooding.

While EPA believes that the nature and extent of the environmental impacts associated with the structural proposal are significant, further evaluation of nonstructural actions could produce a cost-effective solution with significantly fewer adverse environmental impacts than the proposed project, consistent with the Guidelines. We acknowledge that such a solution would likely require participation by multiple federal and state agencies, private industry, and non-governmental organizations, and may necessitate additional Congressional authorization. However, a primarily nonstructural approach could ultimately provide a better balance of Federal objectives for addressing the needs of the Yazoo Backwater Area community for flood reduction and wetlands protection.

F. Recreation

As previously noted, a 404(c) determination can be based on unacceptable adverse effects on recreational areas. 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 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). The FSEIS acknowledges these lands as significant resources (FSEIS, page 90) 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, the FWS indicated that the proposed project will have unacceptable adverse effects on recreational areas in the Yazoo Backwater Area, including four National Wildlife Refuges mentioned above and other publicly-owned land in the project area. EPA is soliciting information about these and other recreational areas in the Yazoo Backwater Area, the use of these areas and how these areas would be impacted if the proposed pumping station is built.

V. Proposed Determination

The Regional Administrator proposes to recommend that the discharge of dredged or fill material in wetlands and other waters in Issaquena County, Mississippi be prohibited for the purpose of constructing the Yazoo Backwater Area Project's pumping station or any other pumping proposal in the Yazoo Backwater Area that would involve significant adverse impacts on waters of the United States. Based on current information, the Regional Administrator has reason to believe the Yazoo Backwater Area Project could result in unacceptable adverse impacts. Moreover, these impacts may be partly or entirely avoidable.

This proposed determination is based on unacceptable adverse impacts to wildlife and fisheries pursuant to section 404(c). EPA has reason to believe the project would cause or contribute to significant degradation of waters of the United States and violate the Section 404(b)(1) Guidelines. At a minimum, the construction and operation of the proposed pumps would degrade the critical functions and values of approximately 67,000 acres of nationally significant wetland resources in the Yazoo River Basin. Of this total, approximately 26,300 acres would be hydrologically modified to the extent that they would no longer be defined as wetlands and would lose CWA regulatory protection. The natural timing, frequency, and duration of water reaching the remaining approximately 40,700 acres of wetlands would be impacted by the proposed pumping, altering the wetlands' ecological characteristics and reducing their functions. EPA does not believe that impacts of this magnitude are consistent with the requirements of the CWA. Our concerns regarding this project are amplified because we believe the potential adverse impacts on wetlands (particularly those wetlands located within the 2-year floodplain) and associated fish and wildlife resources may be much greater than is estimated in the FSEIS. These impacts must also 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 remnant bottomland forested wetlands.

EPA does not believe the potential impacts of the project, as currently proposed, can be adequately mitigated to reduce the impacts to an acceptable level. Additionally, we do not believe 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. EPA supports the goal of providing improved flood protection for the residents of the Mississippi Delta; however, we believe that accomplishment of this vital objective can be fully consistent with ensuring effective protection for the area's valuable natural resources. In light of existing information, EPA believes that there are likely to be less environmentally damaging practicable alternatives to building the proposed pumping station.

VI. Other Considerations

Like the Corps, EPA has met with local community residents and listened to their hope and belief that the Yazoo Backwater Area Project will protect their homes against major floods, like the one in 1973. The community residents we met expressed a strong belief that by making the area less prone to flooding, the project will bring economic development, jobs, and a return of residents to the area. EPA recognizes the importance of improved flood protection for the people living and working in the project area, which includes low-income and minority populations, and we appreciate that the Corps responded to DSEIS follow-up discussions on environmental justice (EJ) by preparing an EJ analysis pursuant to Executive Order 12898.

The Corps' EJ analysis generally discusses the potential flood protection and economic development that could accrue from the project within communities with potential EJ concerns. However, it has not demonstrated specifically which surrounding communities will be protected and which will remain subject to flooding after the project is completed, and whether they will be protected against 1-year, 2-year, or 100-year

floods. The FSEIS does not provide flood risk maps that show the location of residences and habitable structures within the potentially affected communities. Furthermore, EPA does not believe the Corps has fully analyzed the impact of this project on potential economic development in the EJ community.

Under Executive Order 12898, the Corps should have also considered the project's potential effects on subsistence fishers and hunters who could be disproportionately impacted by the operation of the pumps. The FSEIS does not address whether the project would adversely impact populations that depend on subsistence fishing or hunting. We are soliciting information about these and other potential impacts on local communities if the proposed pumping station is built.

Although EPA's proposed section 404(c) determination would prohibit the construction of the pumps as proposed, as mentioned previously, EPA continues to believe there are alternatives that could provide flood protection and other benefits to all communities within the Yazoo Backwater Area. We support working with the residents of the Delta and our federal partners to propose and evaluate alternatives that are responsive to local conditions, needs, and preferences.

VII. Solicitation of Comments

EPA is today soliciting comments on all issues discussed in this notice. In particular, we request information on the likely adverse impacts to fish and wildlife values of all of the wetlands, streams, and other waters in all areas which would be affected by the construction and operation of the pumping station proposed in the Yazoo

Backwater Area Project. We also seek information pertaining to flora, fauna, and hydrology of the Yazoo Backwater Area. All relevant data, studies, knowledge of studies, or informal observations are appropriate. Information on species or communities of regional or statewide importance would be especially useful.

While the anticipated unacceptable adverse effects on fisheries and wildlife serves as EPA's main basis for this proposed 404(c) determination, EPA has additional concerns with the proposed project, including water quality impacts, alternatives, mitigation, and impacts on recreation. Therefore, EPA also solicits comments on the following aspects of the project and correction actions that could be taken to reduce the adverse impact of the discharge:

1) The potential for additional violations of State Water Quality Standards to occur in the Yazoo River Basin if the pumping station is built;

2) Additional information about low-income and minority populations in the Yazoo Backwater Area and, in the context of Executive Order 12898, the disproportionately high adverse human health or environmental effects, if any, on these populations if EPA makes a final determination to prohibit or restrict the use of certain waters in the Yazoo River Basin as disposal sites for dredged or fill material in connection with the project;

3) Additional information about fisheries in the Yazoo River Basin and the impacts to fisheries if the pumping station is built and operated;

4) Additional information on the wildlife species which would be affected by changes in the aquatic ecosystem if the pumping station is built and operated;

5) Additional information on municipal and other water supplies in the Yazoo River Basin and how the quantity and quality of those water supplies could be affected by the operation of the proposed pumping station;

6) The potential for impacts to wetlands and their associated functions in the Yazoo River Basin if the pumping station is built and operated;

7) Information about recreational uses of the area and how they would be impacted if the pumping station is built and operated;

8) Additional information on the availability of less environmentally damaging practicable alternatives to satisfy flooding issues, taking into account cost, technology, and logistics and including other nonstructural alternatives;

9) Information on the potential for mitigation to replace the functions and services provided by the 67,000 acres of wetlands that are, at a minimum, at risk in the Yazoo Backwater Area;

10) Whether the discharge should be permanently prohibited, allowed as proposed by the Corps, or restricted in time, size or other manner; and

11) Potential impacts and benefits of alternatives, both structural and nonstructural.

The record will remain open for comments until [INSERT DATE 45 DAYS FROM DATE OF PUBLICATION IN FEDERAL REGISTER]. All comments will be fully considered in reaching a decision to either withdraw the proposed determination or forward to EPA Headquarters a recommended determination to prohibit or restrict the discharge of dredged or fill material in wetlands and other waters in the Yazoo Backwater Area in connection with the construction of the Yazoo Backwater Area Project's pumping station or any other pumping proposal in the Yazoo Backwater Area that would involve significant adverse impacts on waters of the United States.

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Regional Decision Officer