



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
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Lafayette, Louisiana 70506  
August 16, 2018



Mr. Michael E. Goff  
President, Headwaters Inc.  
PO Box 2836  
Ridgeland, MS 39158

Dear Mr. Goff:

The U.S. Fish and Wildlife Service (Service) has reviewed the June 23, 2018, Integrated Draft Feasibility and Environmental Impact Statement (EIS) and appendices. Those documents address the potential effects (beneficial and adverse) of the Pearl River Basin, Mississippi, Federal Flood Risk Management Project, Hinds and Rankin Counties, Mississippi being proposed by the Rankin Hinds Pearl River Flood and Drainage Control District (District). That project is proposed to provide flood control benefits to the Jackson, Mississippi metropolitan area in Rankin and Hinds counties. This letter was prepared under the authority the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.) and the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Based on our review of the Integrated Draft Feasibility and EIS, the Service has identified areas of concern and areas where additional information should be included in the EIS that would aid in the determination of potential effects; specific comments are presented in Appendix A.

The Pearl River Basin and associated oxbow lakes support a diverse fish fauna including largemouth bass, spotted bass, bluegill, redear sunfish, crappie, and catfish with 116 freshwater fish species known to occur in the Pearl River Basin (Service 1981). Striped bass, an important sport fish, have been stocked in Ross Barnett Reservoir by the Mississippi Department of Wildlife, Fisheries and Parks and provide a fishery downstream from the reservoir. Many species of minnows and darters use the varied habitats of the Pearl River and serve as ready food sources for other species. While some species are able to thrive in lake and riverine habitats, some species existence is limited to just one of those habitats.

Wildlife resources within the Pearl River Basin are dependent upon the diverse floral composition of associated forested wetlands. Bottomland hardwoods comprise the largest habitat type in the floodplain and are generally highly productive wildlife areas. Of the 490 vertebrate wildlife species occurring within the Pearl River Basin, a higher percentage use bottomland hardwoods as primary habitat (habitat a species depends upon for reproduction and/or feeding during all or a portion of the year) than any other habitat type. Cypress-tupelo

gum swamps interspersed with bottomland hardwoods add to the diversity and productivity of the floodplain system. The study area is unique in that there is significant acreage of bottomland hardwoods, varying in quality, adjacent to a major urban area.

Within the basin, including the project area, alteration of the floodplain and river has contributed to the decline in the overall function and values of the Pearl River as evidenced by the number of at-risk species (i.e., seven) within the watershed and the loss of species diversity (Bennet et al., 2008, Camack and Piller 2018, Clark et al., 2008, Piller et al., 2004, Tipton et al., 2004). Such long term and basin wide impacts can lead to declines in those at-risk species which could result in their listing under the ESA. The loss of nine miles of riverine and adjacent riparian and sandbar habitat represents lost opportunity for restoration that could aid in the recovery of at-risk species.

The tentatively selected plan (project) consists of excavation of approximately 25 million cubic yards from the floodplain, extending from River Mile (RM) 284.0 to RM 293.5, and ranging in width from 400 to 2,000 feet. Some existing levees will be set back with large amounts of fill areas placed behind them and other new or existing levees. The new land mass created behind the levees will range from 200 to over 1,000 feet in width. To maintain water supply at the J. H. Fewell Water Treatment Plant (WTP) located at RM 290.7, an approximately 1,500-foot-long weir will be constructed at the downstream limits at RM 284, creating a 1,500-acre pool area that provides flood risk management benefits, recreation, and long-term maintenance reduction. The approximately 200-foot-wide existing weir at the J.H. Fewell WTP will be removed. Islands will be created from RM 289.5 to RM 292.0, some of which will be used to maintain and create habitat areas for local species. In addition, excavation depths will be varied to create underwater habitat, spawning, and nesting areas. Final environmental features will be developed during feasibility level design. Location benefits for both Hinds and Rankin counties will be realized and will be further analyzed in the feasibility level design. Additional structural components will include a 12 feet x 12 feet gate within the new weir to maintain minimum low flows as required for the WTP downstream, as well as matching the low flow requirements of the Ross Barnett Reservoir. Design parameters will further be refined during the feasibility level design and analysis, which may result in changes. The project is designed to reduce risk of the 1% flood event (i.e., 100-year flood event).

The Service has identified four primary fish and wildlife concerns related to the proposed project: (1) loss of habitat diversity and concomitant aquatic species diversity resulting from conversion of the Pearl River into a wide excavated channel with an altered flow regime, (2) direct and indirect loss of riparian woodlands and other terrestrial habitats and/or their functions important to fish and wildlife, (3) loss of riverine sandbar habitat due to the increased water levels or to vegetation encroachment resulting from stabilized water levels in the pool, and (4) the potential extent/degree of resulting up and downstream channel re-adjustment or other hydrogeomorphic changes (e.g., bank erosion, channel incision) to the Pearl River as well as tributaries resulting from changes to water surface elevation and sediment transport due to the project. The Service is also concerned about impacts to conservation lands within and downstream of the project area, the reduction in sediments delivered to coastal marshes, loss of flows to maintain the pool elevation, especially during droughts, and potential future water withdraws if the project is constructed.

The overall planning goal for feasibility studies should incorporate the co-equal needs of flood control and fish and wildlife conservation. To ensure that fish and wildlife resources receive equal consideration with other developmental project purposes, the Service advises that the following planning objectives be adopted in the EIS to guide future planning efforts:

- Important riverine habitats and their functions and values (e.g., flows, sediment transport) and fish communities should be conserved, protected, and restored where practicable to provide habitats representative of the natural river (including flowing waters, backwaters, and oxbow lakes).
- Important terrestrial wildlife habitats (bottomland hardwoods, cypress swamps, riparian corridors, and sandbars) should be conserved, protected, and restored.
- Mitigation should be developed on a river basin basis to facilitate conservation of fish and wildlife resources.
- Detailed measures to offset fish and wildlife resource losses should be determined during feasibility studies and included in the EIS.

In addition, alteration of the Pearl River Basins' floodplain has contributed to the decline in the overall function and values of the Pearl River as evidenced by the increase of at-risk species within the watershed and the loss of species diversity. Therefore, an additional planning objective to address this basin-wide concern is presented below.

- A comprehensive assessment of changes of the Pearl River Basin's hydrology and land uses to determine their influence on flooding and the ecosystem response with a goal of identifying and developing ecosystem restoration projects that can reduce flood risk throughout the basin.

The President's Council on Environmental Quality defines the term "mitigation" in the National Environmental Policy Act regulations to include (1) avoiding the impact altogether by not taking a certain action; (2) minimizing the impact by limiting the degree or magnitude of the action; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the project; and (5) compensating for the impact by replacing or providing substitute resources or environments. The Service's 1981 Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981) supports and adopts this definition as the desirable sequence of steps in the mitigation planning process. The Service therefore advises that project plans be designed to avoid, minimize, or reduce negative impacts to fish and wildlife resources as much as possible, and to compensate for remaining, unavoidable resource losses. More detailed mitigation needs and measures to offset losses to fish and wildlife resources should be determined and presented in the EIS; examples are provided below.

The riverine aquatic habitats that would be impacted by the proposed project have varying fisheries resource values but some are becoming relatively scarce on a regional and national

basis (Mississippi Department of Wildlife, Fisheries and Parks [MDWFP] 2016). The Service's mitigation goal for this habitat type is no net loss of in-kind habitat value. In general, impoundments/dams adversely affect riverine fish communities by interrupting migratory movements and the downstream transport of sediments, organic matter, and nutrients; releases of water from dams may also increase downstream bank erosion and loss of sandbar and riparian habitats (Federal Interagency Stream Restoration Working Group 1998). The direct and indirect impacts of an altered river system can be minimized by design modifications to enhance turbulence and water quality, particularly temperature and dissolved oxygen, for flowing water species in the pool, tailwaters, and downstream. Examples include pumps, air diffusers, or air lifts to induce circulation and mixing of stratified waters within the pool, and in tailwaters by re-aeration structures and mixing of discharge waters. Future design work for the project should further develop the design of adequate fish passage, and measures to maintain downstream water quantity, quality, and sediment transport. Potential upstream impacts to mussels and fish should also be determined due to changes in upstream tributaries of the pool (Roghair et al., 2016). Other measures that would avoid or minimize impacts to riverine habitats include manipulating the water levels in the pool. No operational schedule is presented within the EIS, therefore any potential impacts associated with operations is not presented and cannot be assessed; this information should be included in the EIS. Potential mitigative measures include opening and rehabilitating backwater areas (including oxbow lakes), creating and managing islands and sandbars. In addition, river restoration features at the existing weirs on the Pearl River should be examined as a mitigative feature to aid in fully mitigate riverine impacts. More detailed mitigation for riverine impacts should be presented in the EIS.

Bottomland hardwoods and cypress swamps habitat have high values to wildlife and fishery resources and have significantly declined in acreage on a regional and national basis (MDWFP 2016). The Service's mitigation goal for this habitat type is no net loss of in-kind habitat value. Measures that would avoid impacts to forested wetlands should be selected over ones that would require conversion of forested wetlands to project purposes.

The riparian woodlands that would be impacted by the proposed flood control project have high wildlife resource values and are becoming relatively scarce on a regional and national basis. The Service's mitigation goal for this habitat type is no net loss of in-kind habitat value. Measures that would avoid direct construction impacts to forested wetlands should be selected over ones that would require conversion of riparian areas to project purposes. Other mitigation measures which should be considered include acquisition of non-forested riparian areas for reforestation and acquisition of forested areas for preservation and enhancement. Mitigation for riparian habitats could be combined with that of the sandbar habitat. The protective nature of forested areas (e.g., wave breaks) on the floodside of the levees should be incorporated in the overall project design. This would allow the riverine riparian habitat to be re-established as lake riparian habitat, thus restoring some lost functions and values.

The riverine sandbar habitat that would be impacted by the proposed project has high wildlife resource values and is becoming relatively scarce on a regional and national basis (MDWFP 2016). The Service's mitigation goal for this habitat type is no net loss of in-kind habitat value. Measures to avoid and minimize impacts should be developed and implemented. Mitigation measures could also include implementation of some of the recovery criteria for the ringed map

turtle (*Graptemys oculifera*) and should explore the inclusion of measures to help protect and restore habitat for the Pear River map turtle (*Graptemys pearlensis*), a species also endemic to the Pearl River Basin. Increased sedimentation resulting from the geomorphological changes could also impact the threatened inflated heel-splitter. Possible impacts to that species should be addressed in the Biological Assessment and it should also be addressed in the EIS.

The proposed project may result in hydrogeomorphic changes upstream of the proposed impoundment, specifically from RM 293 to 302. The EIS should address what effects the proposed project will have on fish and wildlife resources in this reach of the river. Specifically, how will bank erosion, channel stability, and sandbar and snag formation be affected if the proposed project has reported flood reduction benefits for this reach of the river? In addition, those hydrogeomorphic changes could also reduce the frequency and/or duration of flooding of adjacent swamps and bottomland hardwoods reducing the productivity of those habitats and potentially reducing the extent of jurisdictional wetlands afforded protected under the Clean Water Act, thus necessitating additional mitigation. The EIS should address potential impacts to these wetlands and identify mitigation measures if necessary.

Similar hydrogeomorphic changes could also occur within the project area, as well as downstream. Therefore, the EIS should address resulting changes as described above. In addition, if the water surface elevation changes in the Pearl River and tributary streams induce repairs or relocations of structures such as roads, bridges, or culverts, additional aquatic and terrestrial habitat will be negatively impacted; the EIS should address such potential indirect and cumulative impacts.

Loss of sediment to Louisiana's coastal wetlands has been identified as a contributing factor to coastal wetland loss. The combined loss of sediment from the proposed project within the proposed widened channel could adversely affect those natural wetland building processes. Adequate investigation should determine and be presented if this will occur or if hydrogeomorphic changes within the Pearl River system as a result of the project will increase sediment loads to coastal areas.

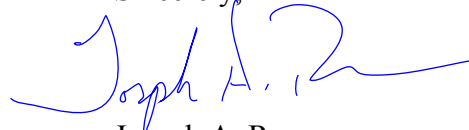
Currently, the EIS does not present information showing how maintenance of the pool elevation would reduce flows through various hydrographs; such information should be presented to better determine downstream impacts. Because of the uncertainty regarding future water needs, the District should implement an enforceable water non-withdrawal (i.e., selling of water to users other than those currently withdrawing water from the project area) condition as part of the overall project to ensure adequate downstream flows can be maintained, especially during droughts. If authorized, withdrawals could further reduce stream flows between the higher and lower river stages as well as impact water quality with the widened river.

Impacts to the public lands, e.g., LeFleur's Bluff State Park, Bogue Chitto National Wildlife Refuge, Old River Wildlife Management Area, and other conservation lands (Fannye Cook Natural Area) should be avoided and minimized; mitigation for such impacts should be located on public lands or property that is placed into the public trust. Service policy requires impacts to the refuges to be mitigated on refuges.

As currently presented in the EIS and planning documents the proposed tentatively selected plan, while containing some environmental features and proposed mitigation, is the most environmental damaging plan. Overall, greater details regarding plan formulation, design, operation, mitigation, and adaptive management should be presented in another draft of the EIS prior to finalizing. The information and data needs identified above and in Appendix A should be included in a revised draft EIS to ensure that all aspects of the human environment are adequately addressed and impacts fully disclosed in that document. Therefore, extensive additional involvement of the Service and other natural resources during ongoing detailed planning, engineering, and design of specific project measures and associated operation plans is encouraged.

If you have any questions or concerns regarding our comments, please feel free to contact David Walther of this office at 337/291-3122 or David\_Walther@fws.gov.

Sincerely,



Joseph A. Ranson  
Field Supervisor  
Louisiana Ecological Services

cc: U.S. Fish and Wildlife Service, Ecological Services, Jackson, MS  
U.S. Fish and Wildlife Service, Fish and Wildlife Conservation Office, Baton Rouge LA  
U.S. Fish and Wildlife Service, National Wildlife Refuges, Bayou Lacomb, LA  
U.S. Army Corps of Engineers, Vicksburg District, Vicksburg, MS

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## APPENDIX A

### Specific Comments on the Draft Integrated Feasibility Study and Environmental Impact Statement and Appendices

To reduce redundancy and the length of this appendix the Service has tried to identify the first occurrence of a statement that we have a comment on but do not continue to identify subsequent occurrences of similar statements however, this does not mean that our comment(s) are restricted to just the statement identified but is applicable to all similar statements within the document. In addition, our comments are primarily focused on the discussions regarding Alternative C as this is currently identified as the local preferred alternative or tentatively selected plan. If needed, general comments on a section of the document are presented first and then followed by specific comments.

#### Draft Integrated Feasibility Study and Environmental Impact Statement

Page xi. “The existing weirs on the lower Pearl River undoubtedly restrict the migration of sturgeon within that river.” The lack of sturgeon reports from the upstream area of the river does not necessarily indicate the degree to which sturgeon are able to access these areas. More recent reports of sturgeon include a sturgeon that was reported from the general area of Interstate 55 in 1994 and another reportedly taken in 2009 at approximately 2 miles below the Ross Barnett spillway; those reports should be mentioned in the EIS. Long-term fishery sampling/monitoring efforts within this area has typically not included gear that would be successful in determining the presence or absence of sturgeon. Recent monitoring efforts by the Service, at the Pools Bluff Sill, examined the ability of the sturgeon to successfully navigate over that sill on the lower Pearl River. A total of 7 attempts were made by adult sturgeon to cross the sill with only 2 being unsuccessful (72% success rate); unfortunately, the monitoring did not determine the extent of upstream migration once the sturgeon crossed the sill. The study did not ascertain whether the sturgeon actually crossed the sill or were able to circumnavigate the structure during high river flows, regardless passage upstream of the sill was documented at a greater rate than one might typically estimate. Similar pre-construction adaptive management monitoring efforts could provide quantifiable information regarding sturgeon usage within the project area. The Service advises the collection of such information during the early planning stages to better inform decisions during ESA consultations and more accurately address sturgeon use in the project area.

Page xii, Threatened and Endangered Species – It does not appear that the most recent survey report for the threatened ringed map turtle completed by Dr. Will Selman (i.e., Diamonds in the Rough: Status of Two Imperiled *Graptemys* Species in the Pearl River of Jackson, MS, Year 2; 2018) was used in writing this section, if not it should be updated with the results of this survey that was conducted within the proposed project area. If a copy is needed, please contact our office. Information presented in that paper indicates that survival of such species in a lake environment may be improbable.

Page 173, lines 22 and 23 – The proposed low flow gate structure is to maintain minimum flows coming from the Ross Barnett Reservoir and the Service is pleased to see the incorporation of this project feature. However, there is no information presented showing the proposed design of



such a structure, proposed operation, or calculations showing how the structure would maintain existing flows for various pool stages (including droughts); such information should be presented within the document or accompanying appendices. In addition, an analysis of stream flow lost to maintenance of a pool elevation should be undertaken and presented to determine downstream impacts.

Page 177, lines 20 and 21 – In the discussion regarding Alternative C it mentions that potential sediment issues would have to be addressed in the project area, however, specifics of such issue, including how they will be addressed, is not disclosed nor is it found discussed elsewhere in the EIS and appendices. Such information should be presented and discussed within the document, as well as alternatives or mitigation features to address this issue.

Page 185, line 1 – It appears that approximately 947 acres of mitigatable habitat behind the levees would be lost; within the documents there is no examination of alternatives that would avoid or minimize the impact of this project feature (e.g., placement in less valuable fish and/or wildlife habitat in close proximity to the project). The Service advises that such alternative features be developed, examined and presented.

Pages 189 - 191, Alternative C, Direct Impacts – While the Service concedes that the proposed alternative would result in an increase in overall aquatic habitat within the project area, that increase is a result of conversion of riverine, stream, slough, and forested wetland habitat to lake habitat. Even though water flow will be maintained through the lake, it will not provide the habitat required for those species needing a riverine environment to survive, thus representing a net loss of approximately 250 acres of this habitat type. The discussion within this section should distinguish between the gains in lake habitat and the net loss of riverine habitat and resulting loss of riverine dependent species via the conversion to a lake. See also our previous comments in the transmittal letter regarding at-risk species.

Pages 189, lines 30 -35 and 1-9, respectively – The Service understands that preliminary design of the weir presented in Engineering Appendix C (Hydrologic and Hydraulic Analysis Sheet 2.0) may change based upon additional engineering studies and is contrary to the description presented in the mitigation section (page 240, lines 3 – 22). The design in the Engineering Appendix (i.e., vertical weir) without modifications is likely to present a greater obstacle to fishery migration than the existing weir at RM 290.7 which has a stepped-ramp design that more closely resembles the design of a fish passage way and more closely resembles the description of the proposed weir in the mitigation section. That stepped design could help explain why, “. . . aquatic studies . . . do not indicate the presence of the existing weir . . . has significantly impacted the aquatic . . . populations within the project area.” (Page 187, lines 7 – 9) Until a more detailed design and operation plan are developed and fully examined the impact of that feature cannot be contrasted against the perceived impacts of the existing structure. Therefore, the discussion regarding the impact of the existing and proposed weir to fishery migration should be revised based upon more detailed design and proposed operation which should be coordinated with the Service and other natural resource agency. The studies that have not found an impact to aquatic populations due to the existing weir should be cited within the report and should be used to ensure consistency with the statement that, “. . . the weir that impedes the upstream and downstream migration for most, if not all, species within the river channel, particularly during

low flows.” (Page 190, lines 5-7). The Service encourages the District to work with the Service and other natural resource agencies to ensure that the design of the new weir would function as intended.

Page 190, lines 10 – 16 – While the Service acknowledges the on-going impact of the existing weir at River Mile (RM) 290.7, we believe that some degree of recovery of the river following the dredging which occurred over approximately 50 years ago should be acknowledged. The Service bases our assertion on information presented in the Preliminary Sediment Impact Analysis (page 13, Appendix C) that indicates no significant change in the river slope and relatively stable banks for this reach and recent Google Earth images showing the formation of relatively stable sand bars in the upstream portion.

Page 190 - 191, lines 33 – 35, and 1- 5, respectively. To fully implement an adaptive management plan, the project should include a pre-construction monitoring phase that would identify the species most likely to undergo changes (adverse) impacts due to the proposed project and develop project features that would avoid or minimize such impacts. Monitoring the success of those features post-construction would then be used to determine the need for any post-construction structural modifications, additional project features, or operational changes necessary to ensure those features success or the need for additional mitigative measures to offset remaining impacts. The Service is willing to assist in the development of an adaptive management plan.

Page 237, Mitigation Plan – Typically, the draft EIS contains a feasibility level design of the project, including mitigation features, to ensure that sufficient design and operation and maintenance plans are developed so that impacts can be fully determined, disclosed, and mitigated as appropriate. The current lack of details within the mitigation plan does not allow a determination to be made if mitigation will be sufficient; the plan also does not include mitigation measures for riparian, riverine and sandbar habitat. The Service advises that as designs and plans undergo further development the District involve the Service and other natural resources agencies to reduce future review times and potential for misconceptions regarding impacts and benefits. Additional specific comments on the Habitat Evaluation Procedure (HEP) application and mitigation planning are provided on the appendices containing those subjects.

#### Appendix A Plan Formulation

The U.S. Army, Corps of Engineers (USACE), Engineering Regulations (ER) 1105-2-100, notes that the Principles and Guidelines for water related studies established four accounts to facilitate the evaluation and display the effects of alternative plans. Those four accounts include the national economic development, environmental quality, regional economic development, and other social effects/aspects. Display of the national economic development and the environmental quality plans are required for a USACE authorization study. While the Service recognizes this study is being undertaken by the local sponsor, we also recognize that the project could become a Federal project constructed by USACE, therefore we advise that these accounts be displayed within this appendix to allow the Service to undertake a full comparative evaluation of the alternatives.

The plan formulation does not appear to indicate that recreational and locational development is a study goal (page 5) or objective (Table A-1) however, those development aspects are part of the economic justification (See Economics Appendix Table B-16) for Alternative C. The feasibility study and Draft EIS also do not appear to capture the need for recreational or locational development. The inclusion of these features into plan formulation should be formally addressed in the Feasibility Study and EIS. For consistency, development and inclusion of recreation features for other alternatives should also be undertaken and presented in the Feasibility Study and EIS.

The levee only alternative includes a cost of 312 million for pumping plants at seven tributaries, however, previous Corp studies found that pumping facilities (i.e., plants) were not economically justified, with costs exceeding benefits by at least an 8 to 1 margin for each of the pump areas (1994 USACE draft Feasibility Study). The current EIS, Appendix A (page 34, line 16) states that an updated interior analysis was conducted which “appeared” to justify the need for pumping stations. The EIS should include a cost-benefit analysis specific for pumping plants as the added cost of pumping stations significantly increases the overall cost of the levee only alternative. Impacts to fish and wildlife resources resulting from those plants should also be included in EIS.

The levee only alternative provides flood protection with fewer impacts to fish and wildlife resources, especially at-risk and listed species. However, the Service believes the levee only alternative should include further modifications that would aid in achieving flood control while avoiding and minimizing impacts, including major modification to the Pearl River and its floodplain. Some of these modifications are part of the Alternative C, the locally preferred alternative. Accordingly, the Service recommends that the levee alternative include the following features:

- 1) Levee setbacks from approximately RM 288 to approximately RM 291, as proposed for the river widening alternative (Alternative C), to widen the floodplain and reduce flood stage elevations in this area.
- 2) Extension of the Jackson Fairgrounds Levee upstream beyond Fortification Street (i.e., Old River Place) to Riverside Drive (J.H. Fewell WTP) to prevent the flooding from the Interstate 55 and Fortification Street interchange as happened during the Flood of 1979.
- 2) Lowering of the abandoned Mobile and Ohio railroad embankment near RM 291 to reduce its impact on upstream flood stages.
- 3) Excavation of the mowed floodplain between RM 284 and RM 290 to a lower elevation would reduce water surface elevations while still allowing maintenance mowing. This should lower flood stages through this area reducing the chance of levee overtopping and reducing the height of proposed levees. Soils removed, if suited, should be used in levee construction. Floodplain excavation could also include removal of the floodplain portion of the Gallatin Street landfill near RM 285, a site identified in the EIS that be leaching chemicals into the groundwater and potentially into the Pearl River. If needed, additional borrow material could be taken from

within the excavated floodplain but in manner that the borrow pits would provide potential recreational fishing locations.

#### Appendix B Economic

Page 1, second paragraph – The economic analysis used a 50-year project life while the HEP analysis used a 100-year project life (see page 18); these analyses should utilize the same project life. Also, the economic base year is 2020; this should coincide with end of the construction period in the HEP analysis.

Page 15, lines 12-14 state that a “small levee segment would be constructed on the west bank from approximately RM 297 to RM 298 to mitigate flood risk in this area”, however, there is no discussion of this in the remainder of the EIS, nor is it depicted in the maps for Alternative C. The Service advises that this design feature be further discussed in the EIS and included in maps.

Amendment 3, page 37 Economic Benefits - In consultation with the natural resource agencies a plan should be developed to identify and designate shoreline usage areas within the project area as well as down and upstream areas influenced by the project. Designations should include; 1) limited development, 2) public recreation, 3) protected shoreline, and 4) prohibited access. This would aid in complying with ER 1110-2-8154 and would aid in better determining project impacts as well as recreational benefits.

#### Appendix C Engineering

Preliminary Sediment Impact Assessment - A monitoring and adaptive management plan addressing up and downstream geomorphology changes should be developed to determine the need to implement grade or other erosion control (e.g., bank stabilization, etc.) features to minimize projects impacts to the Pearl River and its tributaries. That monitoring may result in the determination of additional mitigation needs from such impacts. That plan should include at minimum the use of aerial photographs, geographical information systems, gauge and cross-section data as well as other parameters deemed necessary during development of that plan. That plan should be developed in cooperation with the natural resource agencies with the proposed plan and costs included as a project feature in the EIS.

Environmental Evaluation of Hazardous, Toxic, and Radiological Wastes - Sediment testing for contaminants is recommended in overbank areas, especially those around known contaminated areas and those proposed for use in levees or berms where contact with the public or fish and wildlife is probable. The testing and response plan for any contaminated soil should be developed in cooperation with the natural resource agencies. The results of such testing should be presented within this appendix. Identification of unusable material and proper disposal should be included in project plans and costs.

#### Appendix D Environmental

The absence of a Clean Water Act of 1972 (as amended) 404(b)1 evaluation was noted; the Service advises that evaluation be included in an appendix.

Water Quality sub-section - Long-term water quality and quantity monitoring up and down stream and within the expanded channel should be undertaken pre and post construction. Parameters to be measured should include at minimum temperature, dissolved oxygen, total suspended sediments, nitrogen, pH, fecal coliforms, velocity, discharge, and water levels as well as other physical and chemical parameters necessary to maintain the life cycle of selected aquatic species. This water quality monitoring plan should be developed in cooperation with the natural resource agencies. This would aid in complying with ER 1110-2-8154.

#### Habitat Evaluation Procedures

In order to ascertain the validity of the HEP analysis the Service requests an inter-agency review of the assumptions by target years and suitability indices be undertaken; such reviews can ensure the proper application of models and the calculation of impacts and mitigation.

Page 2, first paragraph, last sentence – Impacts associated with internal collector ditches, gated drainage structures, and pumping plants were not included in the impact analysis. While these features individually may not result in a significant impact the combined impact of those structures may result in the loss of additional habitat. The impacts of those features should be determined and included in the impact and mitigation analysis.

Page 7 and 8, tables displaying cover types and acreages - As displayed in the tables, the upland evergreen forest impacts are less for the Channel Improvement Alternative than the levee only alternative. Maps displaying habitat type impacts of the levee only alternative should be presented along with an explanation regarding how the levee alternative results in greater impacts for this habitat type.

Page 18, last two paragraphs – Following TY 1 there is a 3-year pre-start period of construction followed by the life of the project, thus the period of analysis the HEP would be 103 years. However, please refer to our previous comment regarding the economic base year; the base year should be the start of the HEPs period-of-analysis.

Page 19, second paragraph, last sentence – The Service agrees that HEP guidance requires all habitat types of an evaluation species be combined to obtain a weighted average based on acreage, however, Service mitigation policy also requires impacts to resource Category 2 (e.g., riverine, swamp) be mitigated in-kind to ensure replacement of habitat values, unless in-kind replacement is not physically or biologically attainable. Loss of habitats without in-kind replacement can result in the reduction of species populations that could lead to such species becoming at-risk. Therefore, bottomland hardwood, cypress swamp, riparian, and sandbar losses should be presented individually to ensure adequate in-kind mitigation can be implemented.

Page 21, first paragraph – It is unclear as to exactly how the forested islands were addressed in the HEP analysis, the Service would like to discuss the particulars of this project feature and how it is addressed in the HEP. That information should be presented in the appendix.

Page 23, second paragraph – As previously stated in our letter the Service considers riverine habitat to be in resource Category 2, thus requiring in-kind mitigation. The Service and other natural resource agency should be enlisted to work with the District to identify potential mitigation options.

Page 28, first paragraph – It is unclear as to which of the three different compensation scenarios (in-kind, equal replacement or relative value) was utilized for sizing of the mitigation area; this should be stated and an analysis should be presented in the EIS for review.

Page 31, first paragraph – While the Service is not opposed to the use of perpetual conservation easements on private lands as a possible mitigation option we advise that for impacts to lands in public ownership the mitigation should be in similar type ownership.

Pages 34 – 35, Aquatic Compensation Analysis – It should be noted that the mitigation analysis used by the Engineering Research and Development Center (ERDC) assessed impacts to lacustrine, back water, and riverine species and habitats separately and formulated separate riverine mitigation concepts. The Services endorses and supports this approach to ensure riverine impacts are fully mitigated and recommends it be used in the EIS to determine appropriate mitigation.