August 18, 2025

Via E-Mail

U.S. Army Corps of Engineers
Attention: Mr. Jason Emery
Environmental Branch, RPEDS
CEMVN–PDS
7400 Leake Avenue
New Orleans, LA 70118
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Re: Comments on Pearl River Flood Risk Management Revised Draft Environmental Impact Statement

Dear Mesdames and Messrs.:

The Center for Biological Diversity ("Center") appreciates the opportunity to provide public comments on the Pearl River Flood Risk Management Revised Draft Environmental Impact Statement ("RDEIS") prepared by the U.S. Army Corps of Engineers (the "Corps"). The Center is a national non-profit conservation organization with more than 1.8 million members and supporters, including more than 14,000 members and supporters in Louisiana and Mississippi, who are dedicated to the protection of wild places and endangered species.

I. Introduction

As proposed in the RDEIS, Alternatives D1 and E1 would be catastrophic for threatened and endangered species that depend on the Pearl River, including Pearl River map turtles, ringed map (ringed sawback) turtles, Gulf sturgeon, northern long-eared bats, tricolored bats, alligator snapping turtles, freshwater mussels, monarch butterflies, and bald eagles. Any plan to dredge or dam the Pearl River would destroy the riparian habitat required by aquatic species and put them at risk of extinction. For endemic species like the Pearl River map turtle and the ringed map turtle, this existential threat is especially great. The Center urges the Corps to reject Alternatives D1 and E1.

The Center continues to urge the Corps to select Alternative A1 Nonstructural Plan with the Canton Club Levee, which is the only option that can provide timely, effective flood relief with available funding and that does not cause harmful impacts to the Pearl River. Alternatively, the Center encourages the Corps to conduct a comprehensive watershed study to understand the full effects of any proposed flood management project *prior to* spending hundreds of millions of taxpayer dollars and causing irreversible damage to the Pearl River.

II. The Pearl River

The Pearl River Basin meanders over 400 miles and drains over 8,500 square miles through Mississippi and South Louisiana before emptying its freshwater into the Mississippi Sound on the northern edge of the Gulf of Mexico. The Pearl River and its associated oxbows, tributaries, and forested wetlands support biologically diverse species and their habitats. Considered one of the most biologically diverse rivers in the country, the Pearl River supports 140 species of fish (including bass, bluegill, sunfish, crappie, catfish, topminnows, etc.), 14 species of turtles, 40 species of mussels, and other aquatic species.[1] This area also ranks in the top 10 for endemic species of reptiles, amphibians, butterflies, and mammals.[2] The Pearl River Basin serves as a major travel corridor for deer, squirrel, waterfowl, migratory birds, rabbits, fox, raccoon, and others.[3] Surveys have identified more than 250 known species of birds in the Pearl River Basin.[4] It is one of the most beautiful, intact rivers in the Southeast.

River systems provide vital ecological functions, natural resources, and ecosystem services for human society. Although it is difficult to place a monetary value on freshwater systems, some reports estimate $8.2 trillion in value provided by these ecosystems in the United States.[5] River and riparian corridors provide commercial and recreational value, flood water storage, bank stabilization, erosion protection, and water filtration.[6]

The Pearl River has exceptional value as a free-flowing system. It ranks fourth in freshwater discharge among rivers draining into the Gulf of Mexico, and its flow nourishes estuaries that support fisheries and coastal economies. From central Mississippi to south Louisiana, communities depend on its freshwater flow to support the seafood industry, supply municipal drinking water, and sustain popular tourism activities such as swamp tours, paddling, and other recreation tied to its wild and scenic beauty. Public lands such as the Bogue Chitto National Wildlife Refuge, the Pearl River Wildlife Management Area, and Lefleur's Bluff State Park provide access to the river and its watershed.

III. Alternatives Presented in the Draft Environmental Impact Statement

A. Alternative A1

The Center reiterates its support for Alternative A1 Nonstructural Plan with the Canton Club Levee. Alternative A1 is the only environmentally acceptable alternative because it is the only Alternative that does not cause irreversible harm to the Pearl River or the wildlife and communities that depend on it. It is the only alternative that can be implemented soon and with the funding that is currently available for flood risk management. Alternative A1 is also the only alternative with a positive benefit-to-cost ratio.

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[1] *See* RDEIS Appendix J, U.S. Fish & Wildlife Service, Fish and Wildlife Coordination Act Report, Pearl River Basin, Mississippi Federal Flood Risk Management Project, November 2024 ("USFWS 2024"), p. 15.
[2] USFWS 2024, p. 17.
[3] USFWS 2024, p. 17.
[4] USFWS 2024, p. 17.
[5] USFWS 2024, p. 15.
[6] USFWS 2024, p. 15.

As U.S. Fish and Wildlife Service ("USFWS") concluded in November 2024, Alternative A1 "is anticipated to have very minimal adverse impacts to the natural environment, including fish and wildlife resources."[7] In its November 2024 report, USFWS "strongly supported" Alternative A1 "as the final selected alternative as it would have significantly fewer impacts to fish and wildlife resources when compared to the three alternatives below."[8] In fact, USFWS strongly encouraged the Corps "to give to full consideration to nonstructural solutions that will not impact federal trust resources and structural solutions that reduce impacts to riverine resources and potential mitigation requirements."[9]

This position is in step with public comments made by conservation organizations, state governments, federal agencies, and citizens alike in response to the 2024 DEIS who supported non-structural flood mitigation strategies that would not permanently alter the Pearl River. Given the broad support for a non-structural alternative, as well as the ability to implement non-structural solutions in the short term with the funding available, eliminating Alternative A1 from consideration is unconscionable and arbitrary. The Corps offered no explanation or justification for its conclusory determination that "Alternative A1 is not an effective solution."

The purpose of the project is to evaluate flood risk management alternatives that would protect the economy, infrastructure, and communities in the Jackson metropolitan area from flooding.[10] Alternative A1 is the only alternative that serves this purpose and meets the Corps' project objectives because it (i) reduces the risk of flooding for the city of Jackson, MS and adjacent areas in Hinds and Rankin Counties, MS by removing and flood proofing the most at-risk structures while improving the levee system; (ii) reduces flood risk to human life and well-being by converting the most at-risk areas to public green space; (iii) reduces flood risk to critical infrastructure (e.g., medical centers, schools, transportation, etc.;); (iii) is the most self-sustaining solution that allows for minimal future operation and maintenance cost because removal and flood-proofing of areas within the floodplain will prevent future damage and the resulting green space will be inexpensive to maintain; and (vi) minimizes the potentially reasonably foreseeable impacts to downstream areas, the environment, and cultural resources because it does not alter the Pearl. Alternative A1 could be combined with levee improvements to provide additional flood protection.

B. Alternative D1 (CTO with weir) and Alternative E1 (CTO without weir)

The Center opposes Alternative D1 and Alternative E1 and calls on the Corps to reject these alternatives and any other plan to dredge or dam the Pearl River.

Alternative D1 is the latest iteration of One Lake. It would require excavating 954 acres of riparian forest and wetlands along nine miles of the Pearl River and construction of a dam downstream of Interstate 20 creating a permanent impoundment. Alternative D1 has a negative cost to benefit ratio, with a first cost of roughly $900 million and *net* costs of $11 to 12.8 million dollars *annually*. Alternative E1 would likewise excavate and destroy 954 acres along 9 miles of

[7] USFWS 2024, p. 26.
[8] USFWS 2024, p. 29.
[9] USFWS 2024, p. 28.
[10] RDEIS, p. vii.

the river; however, it does not include the dam. It too has a negative cost to benefit ratio, with a first cost of more than $700 million and a *net* cost of $3.8 to $5.6 million *annually.*

In its comment on the 2024 DEIS, the Center stressed that any proposal to dredge out or dam the Pearl River would cause disastrous, irreversible effects for the wildlife and people that depend on the river as a free-flowing resource. This has not changed with the RDEIS, which carries forward Alternatives D and E to D1 and E1 with minor changes.

The Corps has repeatedly conceded that the weir/dam included in Alternative D1 **does not provide any flood control benefits** while simultaneously being the most ecologically destructive feature of the project.[11] USFWS concluded that impounding the Pearl River did not meet resource planning goals and was **not environmentally acceptable.**[12] In its November 2024 Report, USFWS cautioned the Corps to avoid the dam in this scenario: "Avoid impounding rivers when such actions do not address the primary mission of flood risk management."[13] The Corps should heed this advice.

While impounding the Pearl River is the most damaging feature of any alternative proposed, excavating the banks along nine miles would also cause severe ecological harm because it would impair the river's flow and destroy riparian habitat for wildlife. Placement of the excavated material would cause further loss and degradation of habitat. As USFWS observed, "**The most important measure to assure the continued existence and recovery of federally listed species is through the maintenance of preferred habitat type and quality.** The Pearl River and associated riparian and wetland habitats in the Project area contain suitable habitat for several threatened and endangered species including Gulf sturgeon, northern long-eared bat, ringed map turtle, and Pearl River map turtle."[14] These impacts are discussed in more detail below.

Alternatives D1 and E1 do not meet the stated purpose of the project to flood risk management measures to protect the region's economy, infrastructure, and communities because they would encourage more development in the flood plain while inflicting severe ecological damage to the area and burdening the public with enormous construction, maintenance, monitoring and mitigation costs. In its 2024 Report, USFWS warned the Corps, "mitigating function and habitat loss of the southeast region's fourth largest river system may be challenging, particularly for permanent adverse impacts related to construction of a large weir and impoundment."[15] Neither these impacts nor the plan to mitigate them are sufficiently fleshed out in the 2025 RDEIS to provide for meaningful public involvement.

The Corps has not identified sources of funding for Alternatives D1 or E1 let alone identified who will implement and pay for the extensive monitoring, investigation, reporting, and restoration that would need to occur over the ensuing decades to even begin to address the environmental harms that dredging and damming the river would cause. By contrast, Alternative

[11] *See* USFWS 2024, pp. 6-7: "In previous assessments of flood control alternatives, the Service concluded that Alternative C (channel improvements, widening, and construction of a large weir) was the **most ecologically damaging** of those presented (USACE, 2020), and our position has not changed."
[12] USFWS Letter to Col. Gipson, November 13, 2024.
[13] USFWS 2024, p. 24.
[14] USFWS 2024, p. 18.
[15] USFWS 2024, p. 7.

A1 could be implemented now, within budget, without harming the Pearl or the rare species that depend on it.

C. The importance of the Pearl River's natural function should inform the Corps' selection of alternatives.

In weighing the alternatives, the Corps must adequately consider the Pearl River's value as a functioning freshwater ecosystem and the likely impairment of those functions with further excavation or impoundment. The versions of the DEIS provided to date fail to address how the Pearl's natural functions support the communities and economy of the Jackson metropolitan area or, more broadly, the states of Louisiana and Mississippi – despite numerous non-governmental organizations and government officials urging the Corps to do so.

Altered river systems generally reduce their natural capacity to retard flood flows, absorb pollutants, anchor soils, reduce sediment loads, and support natural resources.[16] This is an outcome that the greater Jackson area has already witnessed with the construction of the Ross Barnett Reservoir in the 1960s, which resulted in a 33,000-acre impoundment that inundated 16 miles of the former river and floodplain. Studies show that this impoundment dramatically altered the natural function of the river and floodplain, with impacts far downstream.[17] This cycle of altering natural flows to "alleviate" flood issues, while simultaneously opening the floodplain to more development, has likely exacerbated the region's flood control issues.[18]

Conserving important riverine functions and habitats is central to ensuring that any alternative selected meets the project's stated Objectives and Opportunities.[19] Maintaining wildlife habitat adjacent to urban areas adds to the overall quality of life for local residents.[20] In addition, forested wetlands function as a natural area to store floodwaters and to filter and purify the water before it returns to the Pearl River system; therefore, there is need to limit non-flood compatible development from flood-prone areas.[21]

Moreover, the river in its natural state already supports the outdoor recreation industry, including hiking, paddling, shooting, and swamp tours. Even USFWS noted that the non-federal interests had been shortsighted in seeing the potential for recreational opportunities associated with a free-flowing, unobstructed river.[22]

These values must be considered by the Corps in selecting a flood risk management plan, and they require understanding how the Pearl River functions as a system. The Center and other commenters have repeatedly requested a comprehensive watershed assessment and stressed that such an assessment is a necessary *first step* in creating a strategy for addressing flood risks while simultaneously protecting the Pearl River and the communities and industries that depend on it. Without such a study, and without evaluating the Pearl's natural functions and value, the Corps

[16] USFWS 2024, p. 7.
[17] USFWS 2024, pp. 7-8.
[18] *See* USFWS 2024, p. 7.
[19] RDEIS, p. vii.
[20] USFWS 2024, p. 24.
[21] USFWS 2024, p. 24.
[22] USFWS 2024, p. 29.

has not given the project alternatives the "hard look" mandated by the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321 *et seq.*[23]

IV. Impacts on Threatened and Endangered Species

Alternatives D1 and E1 would have harmful impacts on several species protected under the Endangered Species Act ("ESA"), 16 U.S.C. § 1531 *et seq.* and the habitat on which they depend. This is especially true for the species that need riverine habitat to spawn, nest, forage, and find shelter, as well as those that require flowing freshwater to survive.

Wildlife in the Pearl River Basin is vulnerable to the adverse effects of altering the river ecosystem. Trends reveal a decline in species diversity and abundance within this basin.[24] Among those species found, several are considered intolerant or moderately intolerant of habitat changes.[25] Unmodified riverine ecosystems are important for many aquatic species requiring moving currents and habitat diversity.[26] Thus, other needs of the basin should be considered including the protection of remaining fish and wildlife habitat values, such as existing habitat for federally listed species and the conservation of at-risk species and their habitats.[27]

The RDEIS makes clear that Alternative D1 "would likely eliminate riverine habitat that many aquatic species depend on."[28] Riverine habitat would be converted to a lake habitat, and the impacts to species dependent on riverine equality would be significant and long-term.[29] Approximately 998 acres of wildlife habitat would be directly impacted by excavation, fill activities, and the construction of levees, while indirect impacts to wildlife would be displacement due to loss of habitat and potential fatalities due to vehicular/boat strikes and human interaction.[30] The Corps concedes that Alternative E1 would have similar direct and indirect impacts, resulting in permanent loss of habitat in the excavated and fill areas.[31] Cumulative, long-term impacts include the continued degradation of ecosystem structure and function expected from ongoing urban growth and development adjacent to the Project Area as well as maintenance of the Project Area.[32]

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[23] NEPA is widely recognized as the foundational "national charter" for environmental protection, establishing a national policy designed to safeguard the environment and requiring that federal agencies integrate environmental considerations rigorously into their decision-making processes. 42 U.S.C. § 4321; *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 348–49 (1989). NEPA's procedural mandate, while not dictating a particular substantive outcome, is critical: it requires agencies to take a comprehensive "hard look" at the environmental consequences of their actions and ensures public transparency about environmental trade-offs before decisions are finalized. *Methow Valley*, 490 U.S. at 350; *Baltimore Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 97 (1983). The Supreme Court has consistently underscored that NEPA's disclosure and analytical requirements are mandatory, emphasizing informed decision-making and public accountability as essential components of environmental governance. *Methow Valley*, 490 U.S. at 348–50.

[24] USFWS 2024, p. 24.

[25] USFWS 2024, p. 15.

[26] USFWS 2024, p. 15.

[27] USFWS 2024, p. 24.

[28] RDEIS, p. 4-10.

[29] RDEIS, p. 4-10.

[30] RDEIS, p. 4-10.

[31] RDEIS, p. 4-10.

[32] RDEIS, pp. 4-10- 4.11.

Only Alternative A1 avoids detrimental impacts to protected species and their habitats, and only Alternative A1 maintains the freshwater flow of the Pearl River for the wildlife, communities, and industries that depend on it downstream. The Corps should consider combining Alternative A1 with improvements at existing levees as its flood risk management strategy.

A. Gulf Sturgeon

Gulf sturgeon (*Acipenser oxyrinchus desotoi*) are ancient fish, reaching up to 9 feet and 385 pounds, that have survived since the time of dinosaurs. They have declined primarily due to habitat loss from dams and water control structures that block historic migration routes and spawning areas.[33] For this reason, the Pearl River and other natal rivers were designated critical habitat in 2003.[34] The Pearl River is considered a spawning and natal river for Gulf sturgeon.[35] Gulf sturgeon born in the Pearl River migrate east and overwinter with Gulf sturgeon across the Gulf Coast, and they contribute to the genetic diversity of this imperiled species.[36] Gulf sturgeon live in the Pearl River and have been captured and detected in the proposed project area, including detections above Lefleur's Bluff State Park and near the Ross Barnett Reservoir in 2021–2022. While USFWS characterizes the status of the species range wide as stable, the status of the subpopulations in the Pearl and Pascagoula rivers is uncertain.[37] These rivers do not have current population estimates and have recently been threatened by hurricanes, the Deepwater Horizon oil spill, and a pot liquor spill in the Pearl River.

Spawning occurs in the upper reaches of rivers on hard bottom substrates such as limestone bluffs, cobble, and gravel, which provide egg adherence and larval shelter.[38] Each year, adult sturgeon enter river systems in early summer and remain until November, but juveniles less than two years old can remain in riverine habitats year-round.

The Pools Bluff and Bogue Chitto sills are part of the Pearl River Navigation Project completed in 1956. It includes three navigation locks, two low head dams (sills), and an overflow structure that facilitated maritime commerce on the Pearl River until 1974. The navigation project includes features in both Louisiana and Mississippi and is currently decommissioned and nonfunctional. These low head dams or sills have limited the Gulf sturgeon's migration access to the reaches of the river north of these sills during low water periods.[39] While sturgeon have made it past the dam during high water, it is uncertain if these fish are navigating over or around the structures.[40] Not only do dams restrict upstream migration, they can cause altered flow, channel morphology changes, and water quality issues well downstream of their construction.[41] Dams or impoundments are thought to be one of the main obstacles to Gulf sturgeon recovery in the Pearl River.

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[33] USFWS 2024, p. 19.
[34] 68 Fed. Reg. 13370.
[35] Greenheck *et al.*, *Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) in the Mobile Bay Estuary, Alabama: Documentation of Use Outside of Designated Critical Habitat*, 39(6) J. Coastal Res. 1021–1043 (2023).
[36] Greenheck *et al.* 2023.
[37] RDEIS, App. D, p. 19.
[38] USFWS 2024, pp. 19–20.
[39] RDEIS, App. D, p. 19.
[40] RDEIS, App. D, p. 19.
[41] RDEIS, App. D, p. 20.

Alternative D1's proposed 1,500-foot-wide weir would alter river velocity and surface elevation and create a migratory barrier, which will likely prevent upstream fish passage except during high water. A conceptual fish passage has been proposed, but such a structure has never been constructed for Gulf sturgeon and is an untested mitigation feature for this species.[42] The Corps cannot count on it to mitigate take without first knowing whether sturgeon can use it. In its Biological Opinion, USFWS made clear that water flow volumes and velocities would both need to be understood before evaluating the effectiveness of a fish passage as a mitigation feature.[43] Adult Gulf sturgeon cannot swim against currents greater than 3 to 6 fps, while juvenile fish cannot swim more than 1 fps.[44] If spawning occurs upstream, the resulting reservoir would present significant survival issues for juvenile fish. Gulf sturgeon larvae go into a drift phase and, if the velocities slow into a lake-like setting, they will likely not survive. Sturgeon are not good swimmers at the larval life stage and, if they end up in a reservoir, they can be exposed to excess predators, among other threats.[45]

Excavation of the riverbanks under Alternatives D1 and E1 would increase sedimentation and turbidity in the river. Increased sediment and turbidity can result in decreased light penetration and decreased photosynthesis. Production of benthic organisms, on which Gulf sturgeon feed, are reduced by high levels of sediment, and can cause sturgeon to lose sources of macroinvertebrate prey. Additionally, sediment can settle on fish spawning areas and smother fish eggs and larvae. Sediments can also settle on respiratory surfaces of fish and aquatic organisms and interfere with respiration. Water quality such as pollution, temperature, and dissolved oxygen levels are additional threats to Gulf sturgeon posed by riverbank excavation and alterations to river flow.

Given its importance as a natal river for Gulf Sturgeon, dredging and impoundment of the Pearl River will adversely affect and are likely to jeopardize the continued existence of the Gulf sturgeon. The Biological Opinion's conclusion otherwise is erroneous: dredging and impoundment of the Pearl River squarely presents this ancient fish with the very threats that have put them on the brink of extinction.

Moreover, the Biological Opinion's Incidental Take Statement only addresses the losses of adult sturgeon,[46] but impacts to juvenile fish are likely to be most significant. Alternatives D1 and E1 would jeopardize the continued existence of the Gulf sturgeon because their impacts to juvenile and larval sturgeon could reduce reproduction, numbers, and distribution to the point that both survival and recovery of the species are appreciably diminished. Construction activities could smother eggs and larvae, degrade benthic habitats, and reduce macroinvertebrate prey abundance and diversity – depriving juvenile fish of food. Elevated turbidity would also impair visual feeding success in juveniles, compounding food scarcity. Such conditions could cause widespread mortality of eggs, larvae, and juveniles, especially in the early months after spawning. In extreme cases, this could mean the loss of an entire year class in the Pearl River population.

[42] RDEIS, App. D., p. 23.
[43] RDEIS, App. D., p. 24.
[44] RDEIS, App. D., p. 24.
[45] RDEIS, App. D, pp. 16–17.
[46] RDEIS, App. D, p. v.

The proposed weir would also fragment nursery and feeding habitats, prevent upstream dispersal of young-of-year, and concentrate juveniles into limited downstream areas. Fish passage velocities could exceed the swimming capabilities of juveniles under six inches, making upstream migration impossible. Downstream movement over the weir would expose larvae and free embryos to injury or mortality from high velocity and turbulence. These impacts would not only directly kill individuals in the early life stages but also severely disrupt the life-cycle processes necessary for recruitment to the adult population. Since there is no population estimate for Gulf Sturgeon in the Pearl, even the deaths of four adult sturgeon from their spawning grounds annually are problematic. These losses could be insurmountable for Gulf sturgeon due to their slow growth and late maturation. Alternatives D1 and E1 would appreciably diminish both the survival and the recovery potential of the Gulf sturgeon in the Pearl River.

B. Gulf Sturgeon Critical Habitat

In 2003, U.S. Fish and Wildlife Service designated critical habitat to protect and help recover the dwindling populations of Gulf Sturgeon.[47] The Pearl River is included in Critical Habitat Unit 1, the Pearl and Bogue Chitto Rivers in Louisiana and Mississippi, and includes the Pearl River System in St. Tammany and Washington Parishes in Louisiana and Walthall, Hancock, Pearl River, Marion, Lawrence, Simpson, Copiah, Hinds, Rankin, and Pike Counties in Mississippi. The Project Area occurs at the top extent of this Critical Habitat Unit, which is currently known to support a reproducing subpopulation of Gulf sturgeon.

Under the ESA, an analysis of effects of a proposed project on critical habitat is separate and distinct from that of the effects of a proposed project on the species itself.[48] The jeopardy analysis evaluates the action's impact on the survival and recovery of a species, while the destruction or adverse modification analysis evaluates the action's effects to the designated habitat's contribution to conservation of the species. The difference in outcomes of these two analyses represents the regulatory benefit of critical habitat which, in some instances, leads to different results and different regulatory requirements.

The Corps must ensure that the proposed action does not "result in the destruction or adverse modification" of federally-designated critical habitat,[49] which it cannot do if it selects Alternative D1. As the RDEIS plainly states, construction of a dam or weir as provided for in Alternative D1 will eliminate riverine habitat that the Gulf Sturgeon depends on. Because this reach of the Pearl River, which is designated as Critical Habitat Unit 1, contains spawning, nursery, and foraging areas that support all Gulf sturgeon life stages, its loss would appreciably diminish the habitat's value for the species' conservation. The inundation of spawning grounds, alteration of flow regimes necessary for substrate maintenance, and obstruction of migratory pathways would permanently impair the river's ability to provide the PCEs essential for reproduction, juvenile development, and long-term population viability. Such alterations would reduce the designated habitat's capacity to sustain a self-reproducing subpopulation, undermining both recovery efforts and the species' resilience to other threats.

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[47] 68 FR 13370.
[48] *See* 16 U.S.C. 1536(a)(2).
[49] 16 U.S.C. 1536(a)(2).

Further, in its November 2024 Report, USFWS identified seven primary constituent elements (PCEs) for Gulf Sturgeon critical habitat.[50] Alternatives D1 and E1 would adversely affect each of these seven PCEs. First, the proposed impoundment and dredging will harm the abundance of benthic prey species in the Pearl River by increasing turbidity and sedimentation, which can smother invertebrates and other aquatic organisms that sturgeon feed upon. Second, inundation under Alternative D1 will bury or erode suitable spawning substrates, such as limestone outcrops, bedrock, and coarse gravel, while sediment deposition downstream will further degrade remaining spawning areas. Third, dredging and impoundment will alter or eliminate deep resting and staging holes below the normal riverbed depth that serve as key aggregation areas for sturgeon by altering depth profiles and flow conditions. Fourth, both alternatives will alter the river's natural flow regime, disrupting migration cues, impeding spawning, and preventing the natural maintenance of spawning substrates. Fifth, water quality will be degraded: impoundment will increase temperatures and reduce dissolved oxygen levels, while construction and bank disturbance will elevate turbidity, impairing egg and larval survival. Sixth, sediment quality will be impaired as increased fine sediments from dredging and erosion settle over historically coarse substrates, rendering them unsuitable for spawning and potentially altering their chemical composition. Finally, the proposed weir in Alternative D1 would permanently obstruct migratory pathways for Gulf sturgeon, and the untested fish passage concept provides no assurance that the species could successfully migrate to upstream spawning grounds. Even partial functionality of the fish passage could result in delays that disrupt reproduction. These impacts would not only degrade, but in some cases destroy, the physical and biological features essential to the conservation of Gulf sturgeon, resulting in adverse modification of designated critical habitat in the Pearl River.

As one of the last remaining natal rivers of the Gulf Sturgeon, elimination or even significant alteration of the Pearl River will diminish its important contribution to conserving Gulf Sturgeon. The Corps should adopt Alternative A1 to ensure that it does not adversely modify federally-designated critical habitat for the Gulf Sturgeon.

C. Pearl River Map Turtle

Riverine turtles face significant conservation threats in the southeastern United States.[51] Over 60% of the turtle species in the southeastern United States are considered imperiled and at risk of decline.[52] Turtles within the genus *Graptemys*, like the Pearl River map turtle, are particularly susceptible to anthropogenic impacts including channelization, impoundments, desnagging, and collection for the pet trade.[53] Since many species of *Graptemys* are endemic to single river drainages in the southeastern United States, many of these species are threatened by impacts to their respective watersheds.[54]

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[50] USFWS 2024, pp. 20-21.
[51] Selman, W., Linear Activity Areas and Basking-Site Fidelity of Two Imperiled River Turtle Species (Graptemys oculifera and Graptemys flavimaculata) of Mississippi, 23 *Chelonian Conservation & Biology* 119 (2024) (Selman 2024a).
[52] Daniel L. Gaillard, Will Selman, Robert L. Jones, Brian R. Kreiser, Carl P. Qualls & Keri Landry, High Connectivity Observed in Populations of Ringed Sawbacks, *Graptemys oculifera*, in the Pearl and Bogue Chitto Rivers Using Six Microsatellite Loci, 103 *Copeia* 1075 (2015).
[53] Galliard et al. 2015.
[54] Galliard et al. 2015.

The Pearl River map turtle (*Graptemys pearlensis*) is endemic to the Pearl River system.[55] These turtles strictly require riverine habitat.[56] Surveys have not detected Pearl River Map Turtles in oxbow lakes or other lentic settings.[57]

In 2020, the estimated global population of Pearl River Map Turtles was 21,841, with 12,626 being in the mainstem Pearl.[58] The area immediately below Ross Barnett Reservoir and in the Project Area showed moderate abundance for Pearl River Map Turtles, while the area within the Ross Barnett Reservoir was very low.[59] Downstream, channelized portions of the Pearl River have low to very low abundance of Pearl River Map Turtles.[60] Recent studies show that populations of Pearl River Map Turtles are rapidly declining in parts of their range.[61] USFWS listed the Pearl River map turtle as threatened on July 12, 2024.[62]

In addition to factors like altered hydrology, human disturbance, lack of recruitment, excessive sedimentation, impaired water quality, and the pet trade, declines of the Pearl River map turtle may be attributable to increased human recreational boating on the river and extended human presence on nesting sandbars (*i.e.,* semipermanent camps during the summer months).[63] Turtle captures for the illegal pet trade are likely to be greatest near public boat ramps that facilitate access.[64]

The Ross Barnett Reservoir has greatly reduced habitat suitability of 5% of the main stem Pearl River for the Pearl River map turtle, and low densities were also found in the West and East Pearl rivers, where flow has been greatly altered by construction of the West Pearl River Navigation Canal, which also has very low densities.[65] The "One Lake" proposal represented by Alternative D1 would be at least as deleterious for Pearl River map turtles as these past river alterations and perhaps even worse.[66]

If the Pearl River is deepened and widened, it will convert the habitat from a lotic, riverine habitat to a more lentic lake habitat.[67] With changes to the riverine processes, the habitat of this

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[55] Will Selman, River Turtles and One Dam Lake: Two Imperiled *Graptemys* Species in the Pearl River and Potential Impacts of the Proposed One Lake Project, 19 *Chelonian Conservation & Biology* 186 (2020).
[56] Selman 2020.
[57] Selman 2020.
[58] Peter V. Lindeman, Ashley G. Gibson, Will Selman, Robert L. Jones, Grover J. Brown, Cybil C. Huntzinger & Carl P. Qualls, Population Status of the Megacephalic Map Turtles *Graptemys pearlensis* and *Graptemys gibbonsi* and Recommendations Regarding Their Listing Under the U.S. Endangered Species Act, 19 *Chelonian Conservation & Biology* 165 (2020).
[59] Lindeman et al. 2020.
[60] Lindeman et al. 2020.
[61] Will Selman, Distribution and Abundance of *Graptemys oculifera* (Ringed Sawback) and *Graptemys pearlensis* (Pearl Map Turtle) in the Pearl River System of Louisiana, USA, 19 *Herpetological Conservation & Biology* 129 (2024) (Selman 2024b).
[62] 89 Fed. Reg. 57206.
[63] Selman and Jones 2017.
[64] Selman and Jones 2017, Lindeman et al. 2020.
[65] Lindeman et al. 2020.
[66] Lindeman et al. 2020.
[67] Selman 2020.

lake will become vastly different from the existing riverine habitat.[68] These alterations will favor generalist turtles that prefer nonflowing lake settings at the expense of riverine *Graptemys* species.[69] The alteration will limit the input of additional deadwood snags that the turtles need for basking and foraging.[70] It also seems likely that food resources and sponge/invertebrate prey communities for the turtles could change dramatically with altered hydrology.[71]

The impacts on Pearl River map turtles from implementing Alternative D1 would be significant in intensity and long-term in duration, yet USFWS's 2024 Biological Opinion severely underestimates them. In 2017 and 2018, Dr. Will Selman conducted a study regarding the anticipated impacts to Pearl River map turtles within five segments (S) of the river directly affected by the One Lake project (now represented in Alternative D1). Based on his study, creation of the lake would have impacts on an estimated 88 individuals in S2–S4, with upstream impacts in S1 estimated at 70 individuals and downstream impacts in S5 estimated at 149 individuals.[72] The Biological Opinion anticipated lethal impacts to 70-88 turtles from the impoundment, with non-lethal take of roughly 300 turtles.[73] Conversion of the Pearl River into a lake would be a major setback to Pearl River map turtles and negatively impact their recovery potential.[74] Chances of localized extinctions due to environmental and demographic stochastic events are higher in small populations, such as those of Pearl River map turtles.[75] Alternative D1 presents an existential threat to this species.

The Biological Opinion also drew the unsupportable conclusion that widening the lake without impoundment (Alternative E1) would not take any Pearl River map turtles. Even without a weir, Alternative E1 presents a significant threat. Dredging and channelization modify and destroy habitat for aquatic species like the Pearl River map turtle. They do so by destabilizing the substrate, increasing erosion and siltation, removing woody debris, decreasing habitat heterogeneity, and stirring up contaminants which settle onto the substrate. Studies on past channelization show it has increased sediment input into the Pearl River and subsequently decreased the availability of deeper water habitats preferred by *Graptemys* species.[76] Channelization can also lead to head cutting, which causes further erosion and sedimentation. **Again, considerably low densities of Pearl River map turtles were observed in the lower reaches of the Pearl, where much channelization and flow diversion has occurred**.[77] Dredging removes woody debris which provides cover and nest locations for many aquatic species, and snags and logs are removed from some sites to facilitate boat navigation. The presence of such deadwood is so important to this Pearl River map turtles that, in population studies, higher basking densities of Pearl River map turtles were always associated with higher deadwood densities.

[68] Selman 2020.
[69] Selman 2020.
[70] Selman 2020.
[71] Selman 2020.
[72] Selman 2020.
[73] RDEIS, App. D, p. v.
[74] Selman 2020.
[75] Selman 2020.
[76] Selman and Jones 2017.
[77] *See* Lindeman et al. 2020.

Finally, implementation of Alternative D1 or E1 will not promote the survival or recovery of Pearl River Map Turtles even if mitigation occurs. The Corps relies heavily on relocation of turtles, nest monitoring, and habitat mitigation to downplay projected losses to the turtle that are likely to result from the project, but, even without the project, the Pearl River Map Turtle was already in need of active habitat management for rebuilding its populations.[78] Destruction of *even more* suitable habitat is not in keeping with its recovery goals. Scientists have also concluded that mussel habitat restoration efforts and reduction of sedimentation are critical components of recovery efforts for the turtle,[79] but the proposed action undermines both of these objectives by destroying mussel habitat on the Pearl and further altering natural sediment processes. Moreover, the Corps has not demonstrated that it can actually implement mitigation activities to rebuild nesting areas that are lost. Sandbar nesting habitats may require control of nonnative vegetation and contouring to improve access to female turtles, as well as control of nest predators, such as raccoons and fish crows.[80] Deadwood must be maintained in river reaches with less riparian cover. *Graptemys* species exhibit long-term basking-site fidelity to small areas or singular basking structures over multiple years.[81] Given this high site fidelity, there are likely unaccounted-for adverse impacts because turtles displaced by channelization or impoundment activities may not be able to relocate. If they do, they will be competing for habitat with Pearl River map turtles and other species that are already present in these areas. Preserving riverine corridors and mature riparian forest buffers is a conservation priority for Pearl River map turtles.[82] Alternatives D1 and E1 do the exact opposite.

As Kristina Alexander succinctly put it in her 2018 comment on One Lake: "Dredge, widen, and increase recreation: each would threaten the habitat and population of the Pearl River map turtle."[83] As a rare and endemic species, the Pearl River map turtle cannot afford the losses that Alternative D1 or E1 would cause. The Corps should adopt Alternative A1 with the Nonstructural Plan Canton Club Levee to ensure that it does not jeopardize the continued existence of the Pearl River map turtle or adversely modify any critical habitat that may be designated.

D. Ringed Map Turtle

The Ringed map turtle (*Graptemys oculifera*, sometimes referred to as the Ringed Sawback Turtle) is endemic to the Pearl River watershed.[84] Ringed map turtles are aquatic turtles. They need areas of the Pearl River that have moderate to fast currents with deep water and sand and gravel bottoms. Their riverine habitat must also include numerous basking logs located in direct sunlight and with large, sparsely vegetated sandbars that provide nesting habitat. Ringed map turtles nest on large, high sand bars adjacent to the river that feature a combination of open sand and herbaceous and woody vegetation. They nest from May to August and commonly lay

[78] Lindeman et al. 2020.
[79] Lindeman et al. 2020.
[80] Lindeman et al. 2020.
[81] Selman 2024a.
[82] Selman 2024a.
[83] Alexander, K., 48 ELR 10200 (2018).
[84] Galliard et al. 2015, Selman 2020.

2 to 3 clutches per year. The ringed map turtle primarily feeds on insects and mollusks, but it will also eat fish and carrion.

Ringed map turtle populations are primarily restricted to the main channel of the Pearl River and the lower portions of its largest tributary, the Bogue Chitto River. Ringed map turtles are found in much lower numbers in the channelized sections of the river (just south of RM 293 to approximately RM 287). In fact, while ringed map turtles have been observed in lentic environments, their population densities in such habitats are **ten times smaller** than in riverine habitats. Survey data indicate ringed map turtles occur in greater abundance throughout the Project Area than in other populations in the Pearl, and recruitment and reproduction are also better in this segment of the river.[85] Thus, the Project Area is important habitat for this rare, imperiled turtle which has been federally listed as threatened since 1986.[86]

One of the primary threats to this species is that the Pearl River has been altered by channelization and damming.[87] Dams fragment habitat for aquatic species like the ringed map turtle by blocking corridors for migration and dispersal, resulting in population geographic and genetic isolation and heightened susceptibility to extinction. Dams also prevent aquatic organisms from escaping polluted waters and accidental spills. The Pearl River has been excessively polluted by municipal and industrial waste downstream of Jackson, Mississippi.[88]Additional declines have been documented both upstream and downstream of the Ross Barnett Reservoir, which may be attributable to sedimentation.[89] Channelization has increased sediment input into the Pearl River and subsequently decreased the availability of deeper water habitats preferred by ringed map turtles.[90] Human recreational boating on the river and extended human presence on nesting sandbars is likely another cause of the turtle's decline.[91]

Alternative D1 will alter existing riverine processes and will favor generalist turtles that prefer nonflowing lake settings at the expense of riverine *Graptemys* species.[92] Ringed map turtle densities in lake sites were significantly lower than those observed at river sites.[93] Following construction, turtles may still persist in the Project Area, but rare species like the ringed map turtle and Pearl River map turtle "will disappear over time," be replaced by more generalist species.[94] The impacts of dredging and damming the river on ringed map turtle populations will be significant in intensity and long-term in duration.[95] If Alternative D1 is implemented, it will be a major setback to survival of ringed map turtles and will negatively impact their recovery potential.[96]

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[85] Selman 2020.
[86] 51 Fed. Reg. 45871.
[87] Galliard et al. 2015.
[88] Galliard et al. 2015.
[89] Will Selman & Robert L. Jones, Population Structure, Status, and Conservation of Two *Graptemys* Species from the Pearl River, Mississippi, 51 *J. Herpetology* 27 (2017).
[90] Selman and Jones 2017.
[91] Selman and Jones 2017.
[92] Selman 2020.
[93] Selman 2020.
[94] Selman 2020.
[95] Selman 2020.
[96] Selman 2020.

The Biological Opinion underestimates the impacts to ringed map turtles within the Project Area. In 2017 and 2018, Selman conducted a study regarding the anticipated impacts to ringed map turtles within the area affected by the One Lake Project.[97] Selman divided his observations into five river segments (S), where S2–S4 were within the project area, S1 was upstream, and S5 was downstream. Based on his study, the mean number of ringed sawback turtles impacted in S2–S4 was 1684 individuals.[98] This is inclusive of males, females, and juveniles that appear to represent a viable and reproducing population.[99] The number of ringed map turtles that might be impacted upstream in S1 would be 1164, and the mean number downstream in S5 would be 965 individuals,[100] adding to the losses. By contrast, the Biological Opinion projects direct mortality of roughly 1,200 Ringed Map Turtles.[101] USFWS also projected that Alternative D1 would cause mortality to eggs and non-lethal impacts to nearly 5,000 more turtles.

The Biological Opinion erroneously concludes that Alternative E1 will not result in the direct take of any ringed map turtles. This conclusion is not supportable. Alternative E1 will excavate 954 acres of riverbank along 9 miles of habitat, dredging out millions of cubic yards of sediment and using it to fill locations within the floodplain. Excavation and dredging would occur in areas that are existing habitat for reproducing ringed sawback turtle populations.[102] *Graptemys* species exhibited long-term basking-site fidelity to small areas or singular basking structures over multiple years.[103] Given this high site fidelity, there are likely unaccounted-for adverse impacts because turtles displaced by channelization or impoundment activities may not be able to relocate.

In addition to eliminating habitat and flooding nest sites, channelization reduces the turtles' food sources. Free-flowing river reaches typically support a higher quality macroinvertebrate community. Unless and until macroinvertebrates recolonized the channelized area, the competition for food resources would impact all ringed map turtles within the channelized areas. Invasive plants like Chinese tallow trees are likely to repopulate cleared areas of former riparian forest, and existing snags will be lost. Such a change to the Pearl River should qualify as "habitat alteration," a primary threat to ringed map turtles, as outlined in the USFWS Ringed Sawback Recovery Plan. Conservation of riverine corridors and mature riparian forest buffers should be of utmost conservation concern for both of these *Graptemys* species, as well as other imperiled river turtles.[104] Alternative E1 would not accomplish these objectives even though it would be less harmful than Alternative D1.

Both Alternatives D1 and E1 would jeopardize the survival and recovery of the ringed map turtle. Last year, the IUCN SSC Tortoise and Freshwater Turtle Specialist Group cautioned the Corps, "Thus, the proposed project would irreparably damage a critical part of the Pearl River and its downstream reaches, which would severely impact the unique and endemic Ringed Sawback

[97] Selman 2020.
[98] Selman 2020.
[99] Selman 2020.
[100] Selman 2020.
[101] RDEIS, App. D, p. v.
[102] Selman 2020.
[103] Selman 2024a.
[104] Selman 2024a.

and Pearl River Map turtle."[105] The Corps should adopt Alternative A1 Nonstructural Plan with the Canton Club Levee to ensure that it does not jeopardize the continued existence of the ringed map turtle.

E. Alligator Snapping Turtle

The Alligator snapping turtle (*Macrochelys temminckii*) is the largest freshwater species of turtle in North America and is among the most aquatic. Alligator snapping turtles are characterized as having a large head, long tail, and an upper jaw with a hooked beak. The alligator snapping turtle is found within river systems that flow into the Gulf of Mexico, including the Pearl River.

Alligator snapping turtles live in the deeper waters of large rivers, major tributaries, bayous, canals, swamps, lakes, ponds, and oxbows. In these places, alligator snapping turtles are dependent more on structure than open water. Riparian canopy cover is an important feature for alligator snapping turtles, as they typically select sites with a high percentage of coverage.

Alligator snapping turtles are slow breeders. Females lay no more than a single clutch per year in the wild. Alligator snapping turtles are also selective of nesting sites: they usually build their nests within 20 m of water (average nest distance of 12 m from water source), >1 m above water surface, in an area with partially open canopy cover. Fish comprise the majority of their diet. The alligator snapping turtle is the only turtle that uses a modified tongue appendage as a predatory lure to attract fish into range.

Historic threats from extensive overexploitation through commercial and recreational harvest in the last century resulted in significant declines of this species throughout much of its range, with recent, large-scale trapping industries operating in the mid-South.[106] Adult harvest (legal and illegal), bycatch, habitat alteration, nest predation, climate change, and disease threaten the existence of alligator snapping turtles. Although regulatory harvest restrictions have decreased the number of alligator snapping turtles being harvested from the wild, populations have not increased in response.[107] This lag in population response is likely due to any of the turtle's large size, slow growth rate, delayed sexual maturity (ranging from 11–21 years with average age of 17 years), low clutch size, low hatchling survivorship, large temporal intervals between reproduction, high adult survivorship, long life spans, ease in which individuals can be collected by hooking, and nest predation.[108] Fire ants, raccoons, armadillos, and other small mammals will prey on alligator snapping turtle nests, and these threats are exacerbated in disturbed areas.[109]

Habitat alteration is considered a major threat to survival of all life stages of this species. Reduced water levels and temperature shifts within suitable habitat motivate these aquatic turtles to seek deeper water or move overland to adjacent aquatic habitats to maintain moisture and cool

[105] August 6, 2024 Letter from IUCN SSC Tortoise and Freshwater Turtle Specialist Group to U.S. Army Corps of Engineers, *Re: Proposed New Lake Project – Commentary.*
[106] RDEIS, App. D, p. 72.
[107] RDEIS, App. D, p. 72.
[108] RDEIS, App. D, p. 72.
[109] RDEIS, App. D, p. 72, 86 Fed. Reg. 62439

their bodies.[110] Declining water availability, quantity, and quality across the species' range is likely to further reduce the species' viability in the future.[111]

Alligator snapping turtles can be killed and harmed by fishing and recreational activities even when not directed at turtle harvest. They may be captured as bycatch associated with commercial harvest of other species. They may ingest fishhooks or drown when captured on trotlines (a fishing line strung across a stream with multiple hooks set at intervals) and limb lines (single hooks hung from branches) (RDEIS, App. D, p. 73). Alligator snapping turtles can also drown from entanglement in various types of fishing line, and they may be killed or injured by boat propeller strikes.

As a highly aquatic species, alligator snapping turtles are adversely impacted by dams, which change the hydrology of streams and impede dispersal and genetic interchange. Other activities and processes that can alter habitat include dredging, deadhead logging, removal of riparian cover, channelization, stream bank erosion, siltation, and land use adjacent to rivers (e.g., clearing land).

The Pearl River has historically supported alligator snapping turtles. USFWS estimates that there are 1,772 alligator snapping turtles within the Project Area (Ross Barnett at RM 301.77 to Copiah Creek at RM 223) (RDEIS, App. D, p. 74).

Alternatives D1 and E1 will eliminate riverine habitat that the alligator snapping turtle depends on. These alternatives will further harm alligator snapping turtles by causing degradation of water quality, loss of woody debris and structure that the turtles need, flooding of nest sites, nest predation issues, and increases in bycatch due to recreational fishing. The project is also likely to impact local fish populations, which in turn may impact the local turtle population as these fish are the primary food source for alligator snapping turtles.

Under Alternatives D1 and E1, disturbance from excavation of material from within and adjacent to the river over approximately will result in death of individuals unable to escape the construction work area. Turtles in the construction area are expected to be disturbed in some form of alteration of normal feeding, basking, and nesting activities while channel excavation activities are taking place and they are displaced from the construction site. Each of these actions would lead to stress, require additional energy expenditure, and affect the reproductive process for individuals should they remain within the Project Area and attempt to nest.[112] Turtles would likely be edged out of their current habitat and forced up or downstream. There is high quality habitat in the 2.5 miles around LeFleur's Bluff State Park and north to Ross Barnett Reservoir that would be impacted by the project.

Although alligator snapping turtles are mobile and can avoid some in-water activities, they may be killed or injured due to construction within oxbow lakes and other impoundments found within the channel improvement area.[113] Death and injury could occur due to crushing if there are

[110] RDEIS, App. D, p. 72.
[111] 86 Fed. Reg. 62441.
[112] RDEIS, App. D, p. 75.
[113] RDEIS, App. D, p. 75.

individuals attempting to nest within the channel improvement or near shore areas of oxbows and other water impoundments.[114] Alterations to natural banks during nesting season may reduce the amount of suitable nesting habitat and result in long-term effects on future recruitment.[115] Loss of tree canopy cover may also result in females having to travel longer distances to locate suitable nesting substrate with adequate canopy cover.[116] Any increase in recreational activities like fishing and boating will increase adverse impacts to alligator snapping turtles.

The U.S. Fish and Wildlife Service proposed to list the alligator snapping turtle as threatened in 2021.[117] While it awaits listing, the Corps' proposal creates a perfect storm of threats for alligator snapping turtles by increasing their most significant threats: loss of habitat, including important nesting sites, loss of prey, degradation of water quality, and increased risk from recreational activities like fishing and boating on the Pearl River. Alternatives D1 and E1 would push this imperiled turtle further towards extinction. The Corps should reconsider adopting Alternative A1 Nonstructural Plan with the Canton Club Levee to ensure that it does not jeopardize the continued existence of the alligator snapping turtle.

F. Louisiana Pigtoe

Freshwater mussels are filter-feeding bivalves that inhabit freshwater rivers and streams, and they are critical to the health of these ecosystems. They stabilize streams and prevent erosion by partly burying themselves into the stream bed, locking in sediment. They are a food source for wildlife like turtles, otters, muskrats, birds, and racoons. Perhaps most importantly, mussels act as sentinels of freshwater both because they clean the water and alert us when something is wrong with it. Mussels are sometimes called the "liver of the river" because they filter water and reduce turbidity by removing algae, sediment, and other harmful substances. Mussels can filter out pharmaceuticals, personal care products, herbicides, flame retardants, *E. coli*, and avian influenza.[118] In fact, a single mussel can pump and filter between eight and fifteen gallons of water per day.[119]

The Louisiana pigtoe (*Pleurobema riddellii*) is a rare and highly imperiled freshwater mussel. It is medium-sized with a thick, inflated, triangular to sub-quadrate shell. Louisiana pigtoe mussels occur in gravel and coarse sandy substrates of rivers and streams. They are filter feeders that rely on natural, high quality (pollutant free) flowing water of sufficient volume to support their life cycle, and that of their host fishes, which are essential for reproduction.

In order to survive, Louisiana pigtoe mussels require: 1) flowing water of sufficient quantity and quality, 2) adequate food supply, 3) habitat that provides refugia from both high-and low-flow events, 4) appropriate substrate that is generally characterized as stable and free of excessive fine sediment, 5) access to appropriate fish hosts, and 6) habitat connectivity – *i.e.,* lack of impoundments and other barriers to fish passage. Louisiana pigtoes occur in medium to large-

[114] RDEIS, App. D, p. 75.
[115] RDEIS, App. D, p. 75.
[116] RDEIS, App. D, p. 75.
[117] 86 Fed. Reg. 62434.
[118] Caryn C. Vaughn, Ecosystem services provided by freshwater mussels, 810 *Hydrobiologia* 15 (2018).
[119] Anna Šverclová and U.S. Fish and Wildlife Service, *Mussels: The Muscles of a Healthy Waterway* (April 25, 2024), https://www.fws.gov/story/2024-04/mussels-muscles-healthy-waterway.

sized streams and rivers in flowing waters over substrates of cobble and rock or sand, gravel, cobble, and woody debris; they are often associated with riffle, run, and sometimes larger backwater tributary habitats. The Pearl River hosts areas of firm stable substrate with various sediment types ideal for mussels.[120] They can embed in this habitat (below sand bars and along flats/bottoms of river channels) without being dislodged by river currents.[121]

The Pearl River Basin is the only place east of the Mississippi River where the Louisiana pigtoe exists. The Pearl River Basin has a single population of the Louisiana pigtoe within the main stem that extends approximately 280 river miles (450 km) below Ross Barnett Dam near Jackson to Picayune, Mississippi (upstream of Interstate 59). The Louisiana pigtoe is found within the Project Area.[122]

Degraded water quality, altered hydrology, substrate changes, habitat fragmentation, direct mortality, invasive species, and climate change all threaten the existence of the Louisiana pigtoe.[123] There are very few extant populations of Louisiana pigtoes remaining. The remaining populations, including the population in the Pearl River, are low in abundance and, as the Corps has recognized, they are particularly vulnerable to extirpation. The U.S. Fish and Wildlife Service proposed listing the Louisiana pigtoe as threatened on March 20, 2023.[124] It also proposed to federally-designate critical habitat for the Louisiana pigtoe in the Pearl River that is downstream of Monticello, Mississippi.[125] It is ranked as G1 (Critically Imperiled).[126]

Dredging and damming the Pearl River would have disastrous effects on the already vulnerable Louisiana pigtoe. Alternative D1 would change the velocity and water surface elevation in the mussel's habitat, replacing the current lotic environment with a lentic environment. Louisiana pigtoes are not adapted to lentic or nonflowing environments (*e.g.*, reservoirs and impoundments) and do not persist or thrive in habitats unless they are free flowing (lotic), such as unimpeded stream and river reaches. Alternative D1 would eliminate available habitat for both the Louisiana pigtoe and its host fishes due to the impoundment. Reinvasion of Louisiana pigtoe would be nearly impossible because their small-bodied host fish would not be able cross the weir. The chance of reinvasion from the west Pearl is also low due to the distance for host fish to migrate.

Louisiana pigtoes downstream of the proposed weir would also be affected by increased sediment and siltation during construction activities. Excavation of material from within the Pearl River over approximately two years would result in death of individuals as well as displacement of host fishes. Over the longer term, Pearl River habitat downstream of the weir would experience instability that would occur with the capture of small amounts of sediment. Impacts from this capture would result in a river bottom shift and would bury mussel beds, suffocating them. The increase in turbidity and decreasing water quality would also impact potential host fishes. Mussel

[120] USFWS 2024, p. 21.
[121] USFWS 2024, p. 21.
[122] USFWS 2024, p. 21.
[123] *See* 88 FR 16782.
[124] 88 FR 16782.
[125] 88 FR 16810.
[126] https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.113470/Pleurobema_riddellii (Accessed August 15, 2025).

decline due to impacts to host fishes from the dam or channelization may not be observable for a long time, but, at that point, it may be irreversible.

In its November 2024 Report, USFWS concluded that Louisiana pigtoe would be "extirpate[ed]within the impounded reach of the river due to the loss of riverine conditions and stratification leading to hypoxic conditions near the lake bottom." Moreover, in its biological opinion, USFWS estimated that impoundment of the river would kill between 45,653 and 53,686 Louisiana pigtoes.[127] The expected loss of tens of thousands of mussels is staggering – especially for an animal that USFWS has already determined to be of low abundance.[128]

Even without impoundment, excavation of nine miles of the Pearl River would adversely affect these mussels. Dredging can cause mortality to mussels.[129] Channel widening could destabilize the banks, change flow regime, alter instream habitat, increase water temperatures, and cause direct mortality of some species.[130] Additionally, sediment plumes from these actions can smother species both within the project footprint and downstream.[131] The Project Area contains former landfills and other sites likely containing hazardous waste, and the Corps has identified the risk that there is a potential for contamination from excavated areas to leach into the water. Louisiana pigtoe require natural, high quality (pollutant free) water and are sensitive to both point and nonpoint source contaminants that deteriorate water quality and degrade their habitat.[132] Contaminants are capable of altering the chemical, physical, and biological characteristics of a stream to the point where mussels or their host fish can no longer survive.[133] Based on these threats, it was unreasonable for USFWS to conclude that channel excavation would not result in the take of Louisiana pigtoe mussels.[134]

The Louisiana pigtoe and its host fishes would be adversely affected by implementation of Alternatives D1 or E1, with an impoundment likely resulting in their extirpation. USFWS projects enormous losses for the mussel.[135] Given the imperiled status of the mussel and the impacts of habitat loss and fragmentation caused by the project, it is clear that the proposed action is likely to jeopardize the continued existence of the Louisiana pigtoe.

G. *Obovaria* cf. *unicolor*

Obovaria cf. *unicolor* is an extremely imperiled freshwater mussel endemic to Mississippi and Louisiana. Like other mussels, it has a complex life cycle that depends on suitable aquatic habitat and a host fish for larval development. During their larval (glochidia) stage, the mussels attach to and develop on the gills or fins of a host fish. Moving up or downstream, juvenile mussels drop off and burrow into the stream or riverbed. They move little, if at all, after settling. Adults typically burrow 6 to 10 centimeters deep in stable sand, gravel, or silt substrates and require well-

[127] RDEIS, App. D, pp. v, 81.
[128] USFWS Species Status Assessment for the Louisiana Pigtoe and Texas Heelsplitter, v.1.2, 2022.
[129] USFWS 2024, p. 35.
[130] USFWS 2024, p. 35.
[131] USFWS 2024, p. 35.
[132] RDEIS, App. D., p. 81.
[133] RDEIS, App. D., p. 81.
[134] RDEIS, App. D., p. v.
[135] USFWS Species Status Assessment for the Louisiana Pigtoe and Texas Heelsplitter, v.1.2, 2022.

oxygenated sediments and flowing water for respiration, feeding, and reproduction. Throughout their life stages, these mussels depend on adequate water quality, stable flow regimes, sufficient food availability, and habitat connectivity to survive and reproduce. Historically, *Obovaria* cf. *unicolor* lived in five rivers in Louisiana and Mississippi: the Pascagoula, Pearl, Tangipahoa, Tickfaw, and Amite Rivers. According to USFWS, *Obovaria* cf. *unicolor* has 16 subpopulations. Only one, the Pascagoula River subpopulation, is estimated to have moderate abundance. The rest are extirpated, low, or unknown.[136]

Obovaria cf. unicolor experienced significant declines as a result of damming and channelization of its native rivers beginning in the 1800s to mid-1900s.[137] Survival and overall reproductive success of the mussels decreases both upstream and downstream of dams.[138] Channelization of the Pearl River, including the completion of the West Pearl Navigation System in 1956, the Ross Barnett Reservoir in 1964, and channel changes of the lower Pearl River (increased width and decreased depth), has eliminated habitat for *Obovaria* cf. *unicolor.*[139] It has exacerbated threats like flooding and sea-level rise in the habitat that remains.[140] USFWS issued a proposed rule listing *Obovaria cf. unicolor* as a threatened species on September 10, 2024.[141]

Obovaria cf. *unicolor* occupies 144 miles of the Pearl River,[142] but very little of its range is protected there.[143] The proposal to dredge and dam the Pearl River under Alternatives D1 and E1 presents an existential threat to species like *Obovaria* cf. *unicolor* that are dependent on flowing freshwater. By the Corps' own admission, its project will "likely eliminate riverine habitat that many aquatic species depend on."[144] This project, in conjunction with the threats presented by pollution, flooding, sea level rise, drought, and development, could make the Pearl River subpopulation extinct.

USFWS's Biological Opinion does not include *Obovaria* cf. *unicolor.* In its November 2024 Report, however, USFWS concluded that *Obovaria* cf. *unicolor* would be "extirpate[ed]within the impounded reach of the river due to the loss of riverine conditions and stratification leading to hypoxic conditions near the lake bottom." The threat of complete extirpation from the Pearl River would be exacerbated by the loss of habitat connectivity caused by the impoundment. Excavation of nine miles of riverbanks will cause turbidity, sedimentation, and changes to the substrate that will adversely affect this imperiled mussel. Mussels are extremely vulnerable to water pollution, and *Obovaria* cf. *unicolor* would be harmed by contaminants disturbed by excavating the river. The Corps has an obligation to confer with USFWS on any action which is likely to jeopardize the continued existence of any proposed species, like *Obovaria* cf. *unicolor.* 16 U.S.C. 1536(a)(2), 50 C.F.R. § 402.10. It must confer regarding the impact of the project on *Obovaria* cf. *unicolor.*

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[136] USFWS Species Status Assessment for the Alabama hickorynut, 2024, p. 47.
[137] USFWS Species Status Assessment for the Alabama hickorynut, 2024, p. 41
[138] USFWS Species Status Assessment for the Alabama hickorynut, 2024, p. 22-23.
[139] USFWS Species Status Assessment for the Alabama hickorynut, 2024, p. 23-24.
[140] USFWS Species Status Assessment for the Alabama hickorynut, 2024, p. 25.
[141] 89 Fed. Reg. 73330.
[142] USFWS Species Status Assessment for the Alabama hickorynut, 2024, pp. 44-45.
[143] USFWS Species Status Assessment for the Alabama hickorynut, 2024, Figure 2.6.
[144] RDEIS, p. 4-10.

H. Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*) is a medium-sized bat about 3 to 3.7 inches in length with a wingspan of 9 to 10 inches. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*, which generally includes bats noted for their small ears (*Myotis* means mouse-eared).

The northern Long-eared Bat is found across much of the eastern and north central United States, ranging across 37 states, and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. The species typically overwinters in caves or mines and spends the remainder of the year in forested habitats.

Until recently, the northern long-eared bat was abundant throughout its range. In 2016, the U.S. Fish and Wildlife Service estimated that there were over 6.5 million northern long-eared bats. By 2023, the population had plummeted to just over 200,000. The northern long-eared bat was listed as endangered in 2022.[145] It also receives protection through Mississippi state law as it is designated as Endangered in Mississippi.

While the primary stressor to northern long-eared bats is white-nose syndrome, a fungal disease that causes bats to arouse during hibernation, the northern long-eared bat is also being driven towards extinction by habitat loss. Habitat loss includes loss of suitable roosting or foraging habitat, resulting in longer flights between suitable roosting and foraging habitats due to habitat fragmentation, fragmentation of maternity colony networks. Northern long-eared bats exhibit high interannual fidelity to roosting sites, so identifying these sites is paramount to understanding and avoiding adverse effects from habitat removal. Loss of or modification of their roosts can fragment bat colonies and result in impacts to individuals or at the population level. Alternatives D1 and E1 would remove potential roosting and foraging habitat (forests and structures such as abandoned bridges).

Habitat destruction can also cause direct injury or mortality, and it especially presents a risk for non-volant pups and bats that have entered torpor during cold temperatures. Although it varies geographically, pups may be born beginning in late May or early June and as late as mid-July, with pups being non-volant for approximately three-weeks. Bats could also be directly harmed by tree removal during the winter. USFWS has found that, based on a review of winter bat activity data, when temperatures fell below 40 degrees Fahrenheit, northern long-eared bats were less likely to be detected in mist-net and acoustic surveys. It concluded that, during these colder periods, northern long-eared bats are likely entering a state of prolonged torpor and, consequently, northern long-eared bats roosting in trees may not rouse in sufficient time to flush from tree roosts during tree removal activities.

Even though the Project Area is within the bat's known range and contains suitable habitat, the Corps concluded that the extensive, permanent deforestation resulting from the project would not adversely affect the northern long-eared bats. The Corps has **no survey data** for northern long-eared bats in the project area. Surveys should be conducted to determine whether the bats have roosting sites in trees, bridges, and culverts within the Project Area. Without such surveys, the

[145] 87 Fed. Reg. 73488.

Corps cannot make (and USFWS cannot concur with) a determination as to whether Alternatives D1 or E1 will adversely affect northern long-eared bats. In any scenario, conserving habitat for the northern long-eared bat is critical to its long-term survival and an essential part of its recovery plan. It is particularly important for those populations of northern long-eared bats in southern states like Mississippi that are less susceptible to White-Nose Syndrome because they do not hibernate; indeed, ensuring the persistence of these non-hibernating bats in the southern U.S. may be a key to securing their future.

I. Tricolored Bat

The tricolored bat *(Perimyotis subflavus)* is one of the smallest bats native to North America. It is distinguished by its unique tricolored fur that appears dark at the base, lighter in the middle, and dark at the tip. Tricolored bats are opportunistic feeders that eat small insects such as moths, beetles, flies, wasps, and flying ants.

Tricolored bats roost in live and dead leaf clusters of deciduous hardwood trees, Spanish moss, pine needles, eastern red cedar, barns, beneath porch roofs, bridges, concrete bunkers, and rarely within caves. During winter in the southern United States, where temperatures are warmer and hibernacula like caves and mines are sparse, tricolored bats often roost in road-associated culverts and trees, and they remain active and feed throughout winter. Tricolored bats exhibit high site fidelity with many individuals returning to the same roosting sites and hibernaculum year after year.

Tricolored bats were once common and ranged across the eastern and central United States and portions of southern Canada, Mexico and Central America. They are widespread throughout Mississippi, and they can be found in many different habitat types throughout the year.

Like the northern long-eared bat, tricolored bat populations have been decimated by white-nose syndrome, but habitat loss is compounding the significant declines that the tricolored bat has experienced due to the fungus. The U.S. Fish and Wildlife Service proposed the tricolored bat for endangered species listing in 2022.[146]

The implementation of Alternative D1 and E1 would harm the tricolored bat through removal of roosting and foraging habitat (forests and structures such as abandoned bridges) and could result in potential adverse effects. Although white-nose syndrome is the primary cause of decline in the tricolored bat population, habitat removal in the area will compound the impacts on the population. All three alternatives would remove suitable roosting and foraging habitat for tricolored bats. Habitat destruction can also cause direct injury or mortality, and it especially presents a risk for non-volant pups and bats that have entered torpor during cold temperatures. Construction activities could disturb, injure, or kill bats, especially during winter and the pup season.

Even though the area is within their range and USFWS assumes they use the area for foraging, roosting and potentially wintering, the Corps has **not surveyed** the Project Area for tricolored bats. Surveys should be conducted to determine whether the bats have roosting sites in

[146] 87 Fed. Reg. 56381.

trees, bridges, and culverts within the Project Area. Given their high site fidelity, identifying these sites is paramount to understanding and avoiding adverse effects from habitat removal. Without such surveys, the Corps cannot make (and USFWS cannot concur with) a determination as to whether Alternatives D1 or E1 will adversely affect northern long-eared bats. Instead of removing important habitat for this imperiled species, the Corps should adopt Alternative A1 Nonstructural Plan with the Canton Club Levee.

J. Monarch Butterfly

With its iconic orange and black pattern, the monarch butterfly (*Danaus plexippus*) is one of the most recognizable species in North America. Monarchs are particularly remarkable because of the continental migration they make each year, flying from as far as Canada and across the United States to congregate at a few forested overwintering sites in the mountains of central Mexico and coastal California. Over the past two decades, monarch numbers in North America have declined dramatically. Loss and degradation of habitat from conversion of grasslands to agriculture, widespread use of herbicides, logging at overwintering sites in Mexico, senescence, and incompatible management of overwintering sites in California, urban development, drought, exposure to insecticides, drought, and effects of climate change have all contributed to the decline of the monarch population. The monarch butterfly was proposed for listing as a threatened species in 2024.[147]

During migration to overwintering sites, monarchs need blooming nectar plants. On their return, monarchs need both nectar sources and milkweed. Milkweed is the only plant on which monarch butterflies lay their eggs and on which their larvae feed. Protection, restoration, enhancement, and creation of habitat is a central aspect of monarch conservation strategies. Preservation of native milkweed is particularly important because a parasite, *ophryocystis elektroscirrha* (OE), increases in areas reliant on non-native tropical milkweed.

The riparian forest proposed for removal along the Pearl River's banks contains habitat that supports blooming nectar plants and milkweed. Alternative D1 and E1 would harm monarchs because they would convert more than one thousand acres of their desired habitat to open water and eliminate their natural food sources. If the excavated or subsequently filled areas are mowed regularly and only allowed to self-vegetate with grass, there would be additional adverse impacts from the conversion of desired habitat to grassy uplands and elimination of food sources. Maintained areas may also be treated with pesticides and other chemicals, which would further degrade their suitability as monarch habitat. Monarchs could also be killed by collisions with vehicles or equipment.

By contrast, Alternative A1 Nonstructural Plan with the Canton Club Levee does not harm monarch habitat and would even provide opportunities for habitat creation through the acquisition of green space. The Corps should reconsider and adopt this alternative.

[147] 89 Fed. Reg. 100662.

K. Bald Eagles and Migratory Birds

Bald eagles are widespread from the United States to Canada, as well as parts of Northern Mexico, and they are usually found along coasts, rivers, lakes, and reservoirs. Bald eagles nest in tall trees in the months of October through May, preferring pines and cypress in the southern U.S. The bald eagle has been the national emblem of the United States since 1782 and a spiritual symbol for native people for far longer than that. Though once endangered, bald eagle populations rebounded after the bird was protected under the Endangered Species Act. Today, bald eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

More than one thousand species of birds are protected under the Migratory Bird Treaty Act, but many are experiencing population declines due to increased threats across the landscape. Millions of acres of bird habitat are lost or degraded every year due to development, agriculture, and forestry practices.

Again, Alternatives D1 and E1 would cause additional habitat loss for bald eagles and migratory birds along the Pearl River. Under these alternatives, existing riparian habitat would be dredged out and, especially in Alternatives D1 and E1, converted to open water. The riparian forests that would be removed provide important nesting sites for bald eagles, which have not been surveyed as of the RDEIS. Some portions excavated and filled areas would be converted to recreational use and maintained with grassy vegetation, which would make them less suitable for birds. Moreover, these alternatives are meant to drive private development along the newly created lake, which would exacerbate habitat loss and other anthropogenic sources of mortality. Alternative A1 Nonstructural Plan with the Canton Club Levee provides flood protection without causing habitat loss or mortality to bald eagles and other migratory birds. Prior to adopting any alternative, the Corps should obtain nesting surveys for bald eagles to ensure that their nesting sites are not affected by construction.

L. Pearl Darter

The Pearl darter *(Percina aurora)* is a small, snub-nosed fish with a black spot at the base of its tail fin. These fish live on river bottoms and use the spaces between rocks for hiding and breeding. Pearl darters are native to the Pascagoula River system of Mississippi, and their namesake is the Pearl River system of Mississippi and Louisiana. They have faced decline from poor water quality and degraded stream and river channels. In fact, the Southeastern Fishes Council named the Pearl darter as one of the 12 most endangered fish in the southeastern United States. Pearl darters still survive in the Pascagoula River system but, prior to 2023, they had not been seen in the Pearl River system for more than 40 years. Their remaining populations have low genetic diversity making them more vulnerable to drought, storms, and chemical spills.

Pearl darters were listed as threatened under the ESA in October 2017.[148] When a species is listed under the ESA, the U.S. Fish and Wildlife Service is required, where possible, to identify areas essential to the conservation of that species, known as critical habitat. In 2021, the U.S. Fish and Wildlife Service proposed designated critical habitat for the Pearl darter.[149]

[148] 82 Fed. Reg. 43885.
[149] 86 Fed. Reg. 36678.

The critical habitat is comprised of two units, one occupied and one unoccupied, in Mississippi's Clarke, Covington, Forrest, George, Lauderdale, Jackson, Jones, Newton, Perry, Simpson, Stone and Wayne counties. Both occupied and unoccupied critical habitat are essential for the conservation of the species and were designated as part of a transparent, inclusive process based off the best available science.

Critical Habitat Unit 2 is comprised of thirty river miles of the Strong River, the headwater of the Pearl River and one of its main tributaries. Strong River was historically occupied by the species, prior to 1973, and it was designated as unoccupied critical habitat.

In June 2023, the U.S. Fish and Wildlife Service published a recovery plan for the pearl darter pursuant to Section 4(f) of the ESA. A recovery plan serves as a road map for species recovery—the plan outlines the path and tasks required to restore and secure self-sustaining wild populations. Plans for the Pearl darter's recovery include reintroduction into the Pearl River drainage, and the first darters were reintroduced last summer. The recovery plan also includes monitoring, surveying, and research of the species. The goal of the recovery plan is to ensure the Pearl darter can survive long-term in both the Pascagoula and Pearl River systems to the point that it is no longer threatened.

Reintroduction into the Pearl River is an important step to preventing the extinction of the Pearl darter, because its extirpation from the Pearl greatly reduced the redundancy of the species and confined it to a single drainage. Further alternation of the Pearl River by damming and dredging will detrimentally impact the propagation and reintroduction plan to bring the Pearl darter back to the Pearl River system. Impoundment and channelization carry with them profound effects on the river's hydrology, both in riverbank erosion causing increased sediment flow and a change in freshwater availability – all of which could impair the Pearl darter's recovery. Accordingly, the Center opposes Alternatives D1 and E1 as detrimental to the recovery of the Pearl Darter.

V. Where Additional Information is Needed

The Corps' RDEIS is incomplete in many respects, particularly where it defers crucial studies and modeling to the pre-construction and engineering phase of the project. This missing information deprives the Corps, the consulting agencies, and the public of the ability to make a well-informed decision about the proposed alternatives. It also prevents evaluation of the alternatives' true costs, benefits, timeline, and impacts – particularly downstream.

The Center reiterates its request for additional information. Many informational deficiencies identified in the June 11, 2024, Commander's Report by Col. Christopher D. Klein have not been addressed, including the need for a comprehensive watershed study and improved monitoring. Completion of the habitat mitigation proposals, sedimentation analysis, velocity analysis, and reliable fish passage modeling is necessary and advisable before the Corps selects any project alternative. Otherwise, the Corps risks irretrievably committing public resources to a project that is neither economically viable nor environmentally acceptable. Worse, it risks inflicting irreversible damage to the Pearl River. Presently, implementation of Alternative A1 Nonstructural Plan with the Canton Club Levee avoids the significant time and monetary costs of

addressing all the unknowns and contingencies presented by Alternatives D1 and E1. It provides certain and timely flood risk management to Jackson, Mississippi and the surrounding communities without jeopardizing protected species or causing grave environmental harm.

VI. Conclusion

The Center for Biological Diversity appreciates this opportunity to participate in the public comment process. The Center urges the Corps to protect the Pearl River and the rare, unique species that live there. To do this, the Corps should reject Alternative D1 and E1. It should adopt Alternative A1 Nonstructural Plan with the Canton Club Levee to mitigate flood risks for the Jackson Metropolitan Area.

Sincerely,

/s/ Lindsay E. Reeves
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