UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

04/08/2019

F/SER32: AH

Colonel Daniel Hibner
Commander
U.S. Army Corps of Engineers-Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia
31401-0889

Dear Colonel Hibner:

Per your request received March 22, 2019, we reviewed Alternative 2-6d (Recommended Plan), Alternative 1-1, and additional alternatives that maintain higher weir and pool heights for the proposed fish passage at the New Savannah Bluff Lock and Dam (NSBLD) associated with the Savannah Harbor Expansion Project (SHEP). We believe that Alternative 2-6d (Recommended Plan) provides a higher likelihood of passing endangered Atlantic and shortnose sturgeon without delay than Alternative 1-1. We also believe other full-river-width fish passage structures, following the same overall design as Alternative 2-6d, would provide a higher likelihood of passing fishes without delay than Alternative 1-1.

Comments on Alternatives 2-6d (Recommended Plan)
Alternative 2-6d is an in-channel fish passage design with a 500-foot-wide fixed crest weir at elevation 109 feet NGVD29 with a floodplain bench that maintains a pool height of 111 feet NGVD 29 at 5,000 cfs (Figure 1). Alternative 2-6d is an example of a full-river-width nature-like fishway (NLF).

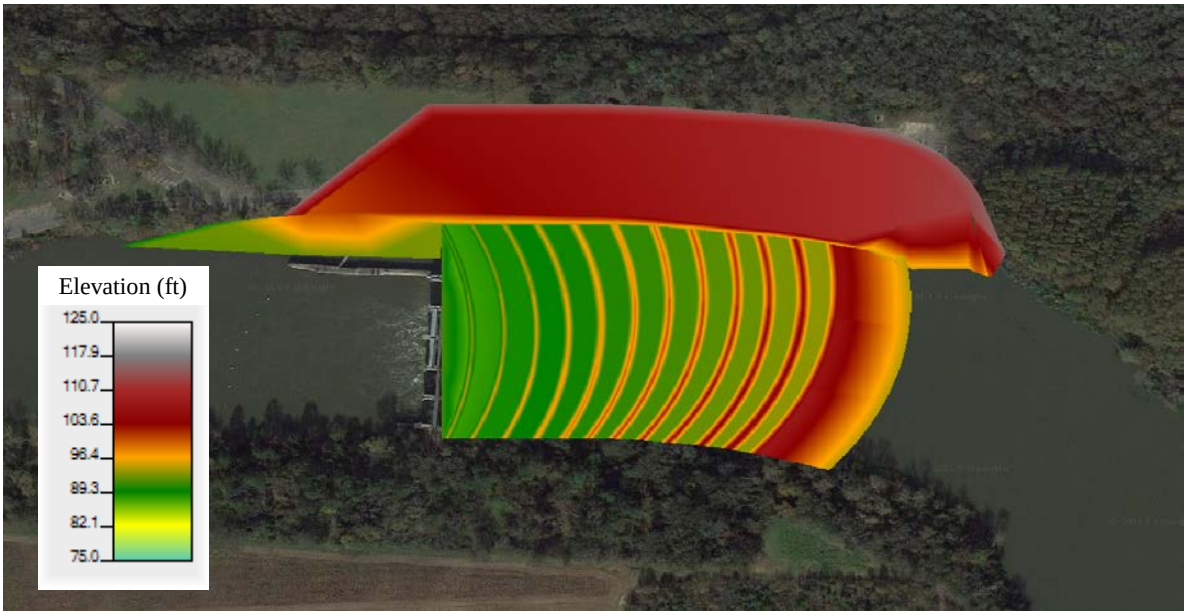

Figure 1 – Alternative 2-6d (Recommended Plan) with Elevation[1]

[1] USACE. 2018. Savannah Harbor Expansion Project, Georgia and South Carolina: Fish Passage at New Savannah Bluff Lock and Dam Integrated Post Authorization Analysis Report and Supplemental Environmental Assessment. Appendix A.

A full-river-width NLF eliminates the potential for poor fishway entrance siting and false attraction.[2] A fishway spanning the entire width of the river makes entrance location irrelevant, minimizes attraction delay, and maximizes attraction efficiency [3,4,5] A full-river-width NLF also passes all river flows during non-flood conditions. This design ensures no false attraction occurs because all flows ultimately lead to the NLF structure.

The zone-of-passage refers to the contiguous area of sufficient lateral, longitudinal, and vertical extent in which adequate hydraulic and environmental conditions exist to provide a route of passage for fish through a stream reach.[6] A full-river-width NLF ensures a continuum of hydraulics that provides a zone-of-passage across different river flow regimes. At low river flows, sturgeon will find a zone-of-passage through the deeper parts of the NLF while the shoreline zones will be too shallow for passage. At higher river flows, the deeper parts of the NLF may develop excessive turbulence and velocity, but the shoreline zones will become deep enough to provide a zone-of-passage. This design feature, and the hydraulic diversity it provides, ensures that regardless of species' swimming ability, fishes are more likely to find suitable routes of passage at a multitude of flow conditions.[7]

The downstream toe of the NLF in the Alternative 2-6d is approximately even with the location of the existing dam, which is well upstream from an existing gravel bar, likely used by sturgeon to spawn ("Spawning Area" in Figure 2). The distance away from the gravel bar reduces the likelihood Alternative 2-6d will adversely impact it via changes in fluvial geomorphic processes (e.g., scour) caused by the NLF.

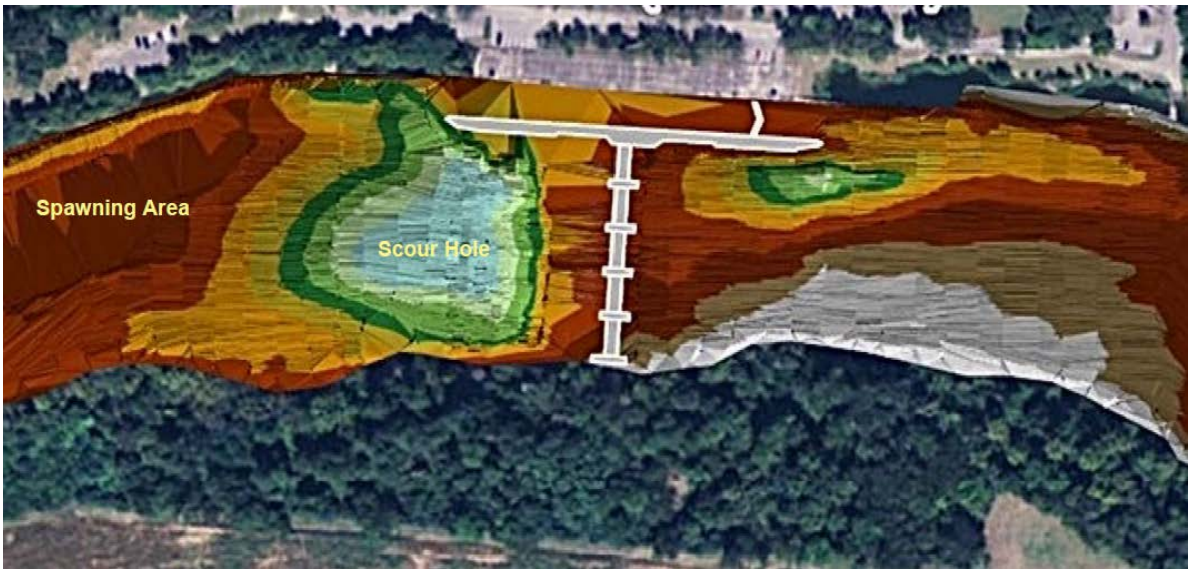

Figure 2 – Existing bathymetry of the Savannah River near the NSBLD showing the scour hole and sturgeon spawning area.[8]

[2] Bunt, C.M., T. Castro-Santos, and A. Haro. 2012. Performance of fish passage structures at upstream barriers to migration. River Research and Applications 28, 457– 478.
[3] *Attraction delay* refers to the amount of time it takes a fish to enter the fishway.
[4] *Attraction efficiency* refers to the percentage of fishes that approach a structure that enter the fishway.
[5] Franklin, A.E., A. Haro, T. Castro-Santos, and J. Noreika. 2012. Evaluation of nature-like and technical fishways for the passage of alewives (*Alosa pseudoharengus*) at two coastal streams in New England. Transactions of the American Fisheries Society 141(3): 624-637.
[6] USFWS. 2017. Fish Passage Engineering Design Criteria. USFWS, Northeast Region R5, Hadley, Massachusetts.
[7] Turek, J., A.J. Haro, and B. Towler. 2016. Federal interagency nature-like fishway passage design guidelines for Atlantic coast diadromous fishes. NOAA National Marine Fisheries Service.
[8] USACE hydrographic survey completed in 2012

Comments on Alternative 1-1

Alternative 1-1 maintains the dam and existing gates, repairs the lock wall, and constructs a 200-foot wide fixed crest weir at elevation 110 feet NGVD29, which maintains a pool height of 112.9 feet NGVD 29 at 5,000 cfs (Figure 3). Alternative 1-1 is an example of a bypass-channel NLF.

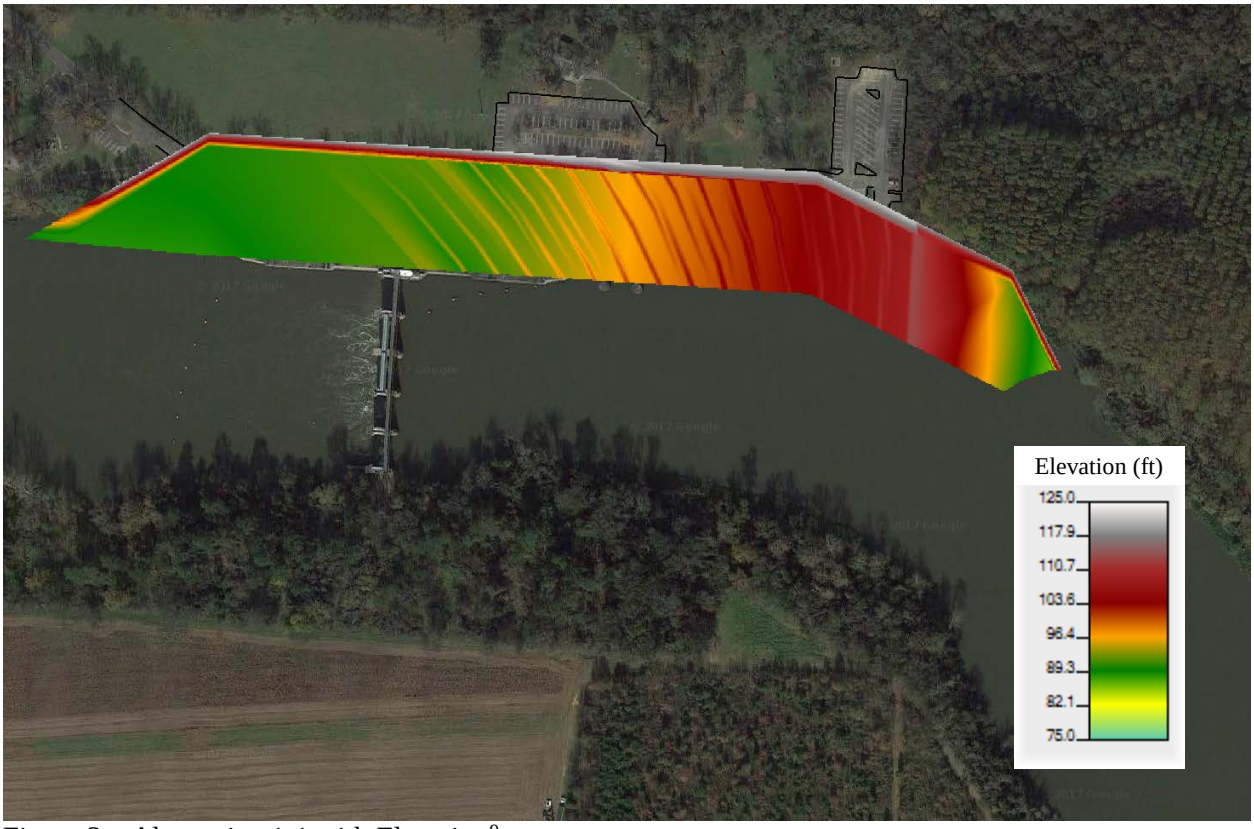

Figure 3 – Alternative 1-1 with Elevation[9]

Alternative 1-1 is unlikely to be as effective at passing fishes relative to the Alternative 2-6d. Unlike Alternative 2-6d, concerns regarding false attraction and entrance siting are an important design consideration with this alternative. When the river flow exceeds the proposed NLF's capacity, water will discharge through or over the dam gates causing a false attraction approximately 300 feet away from the NLF entrance. Historically, river flows of this magnitude occur in late winter and early spring. False attraction during high flow periods is of particular concern for shortnose sturgeon, which make their upriver migration during the winter/spring when flows are highest. The narrower crest and overall width of the NLF proposed under Alternative 1-1 also make it more likely than the Recommended Plan to have water velocities outside the preferred range of species trying to use it for passage. There is simply less room to provide the hydraulic complexity needed to maximize the zone-of-passage for a multitude of fishes across a variety of flow conditions.

The downstream toe of the NLF bypass proposed under Alternative 1-1 (Figure 3) is close to the existing gravel bar downstream of the dam that is likely used by sturgeon to spawn. The discharge from the NLF bypass points directly at the gravel bar. Increased velocities in this area under Alternative 1-1 will likely scour the gravel bar much more than Alternative 2-6d. This may adversely impact likely sturgeon spawning habitat.

[9] USACE. 2018. Savannah Harbor Expansion Project, Georgia and South Carolina: Fish Passage at New Savannah Bluff Lock and Dam Integrated Post Authorization Analysis Report and Supplemental Environmental Assessment. Appendix A.

Conclusion
For the reasons described above, we conclude the design proposed for Alternative 2-6d (Recommended Plan) is more likely to pass fishes without delay than Alternative 1-1. Alternative 2-6d (Recommended Plan) is also more likely to achieve the success criteria described in the biological opinion issued for the SHEP than Alternative 1-1 without the need for additional funding or significant changes to the structure once built.

We believe our conclusions regarding the benefits of Alternative 2-6d, relative to Alternative 1-1, are also appropriate for the other full-river-width NLF alternatives being considered. Because these alternatives will maintain the same overall design and slope as the Alternative 2-6d, they also have a higher likelihood of passing fishes without delay than Alternative 1-1. A taller weir crest and resultant longer ramp structure is likely to increase the bioenergetic requirements of the species using the ramp. We anticipate those additional bioenergetics costs will be relatively minor given the proposed weir heights.

We anticipate the Alternative 2-6d, and the alternative full-river-width NLF designs, are likely to further the survival and recovery of both endangered sturgeon. Conversely, our concerns over water velocities and false attraction, coupled with concerns over potential scouring of likely spawning habitat downstream of the dam, lead us to conclude Alternative 1-1 is less likely to promote survival and recovery of the two species.

Thank you very much for your continued engagement, coordination, and leadership on this project. If you any questions or require additional information please contact Andy Herndon at 727-824-5312 (Andrew.Herndon@noaa.gov), or Fritz Rohde at 252 838-0828 (Fritz.Rohde@noaa.gov).

Sincerely,

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Roy E. Crabtree, Ph.D.
Regional Administrator