

Final Independent External Peer Review Report Savannah Harbor Expansion Project Georgia and South Carolina, Fish Passage at New Savannah Bluff Lock and Dam Integrated Post-Authorization Analysis Report and Environmental Assessment

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Coastal Storm Risk Management Planning Center of Expertise
Baltimore District

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Executive Summary

Project Background and Purpose

The Savannah Harbor Expansion Project (SHEP) will deepen the existing 42-foot mean lower low water (MLLW) deep-draft navigation project to an authorized depth of 47 feet MLLW. The navigation project is a shipping channel on the Savannah River, which forms the border between the States of Georgia and South Carolina. The SHEP Fish Passage is an environmental mitigation feature that addresses adverse impacts on shortnose and Atlantic sturgeon and fulfills compliance with the Endangered Species Act. The approved 2012 SHEP General Reevaluation Report (GRR) and Final Environmental Impact Statement (FEIS) included the recommendation for construction of a fish passage around the New Savannah Bluff Lock and Dam (NSBLD).

Since the GRR/FEIS was published, a Periodic Assessment and Inspection of the lock and dam was conducted that identified significant deterioration and structural issues. As a result, the United States Army Corps of Engineers (USACE) closed the lock indefinitely in May 2014 due to safety concerns. In addition, USACE determined that the condition of the structure could adversely impact the function of the proposed fish passage around the lock and dam as designed. In response, the Savannah District included additional activities in the fiscal year (FY) 2017 updated SHEP cost estimate that would provide structural repairs to reduce the risk of a catastrophic failure of the dam and to ensure proper hydraulic operation of the proposed fish passage. In December 2016, the Water Infrastructure Improvements for the Nation (WIIN) Act was signed into law, requiring USACE to study two in-channel options in lieu of the original design to go around the lock and dam.

As a modification to the SHEP, the objective of the post-authorization analysis report is to determine how the SHEP fish passage feature should be modified as required by the WIIN Act of 2016 in the most cost-effective way.

The WIIN Act provides the Secretary of the Army with options to modify the SHEP fish passage feature as follows:

Option A: Repair the NSBLD lock wall and modify the structure such that the structure is able to:

- Maintain the pool for navigation, water supply, and recreational activities

- Allow safe passage over the structure to historic spawning grounds of shortnose sturgeon, Atlantic sturgeon, and other migratory fish

Option B:

- Construct at an appropriate location across the Savannah River a structure that can maintain the pool for water supply and recreational activities
- Remove the NSBLD when construction of the fish passage structure is completed

Following the construction of the in-channel weir and fish passage, and demolition of the NSBLD, USACE will convey the park and recreation area adjacent to the NSBLD to Augusta-Richmond County, Georgia, without consideration.

Independent External Peer Review Process

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. USACE is conducting an Independent External Peer Review (IEPR) of the 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 (IPAAR/SEA) (hereinafter: SHEP NSBLD IPAAR/SEA IEPR). As a 501(c)(3) non-profit science and technology organization, Battelle is independent, is free from conflicts of interest (COIs), and meets the requirements for an Outside Eligible Organization (OEO) per guidance described in USACE (2018). Battelle has experience in establishing and administering peer review panels for USACE and was engaged to coordinate this IEPR. The IEPR was external to the agency and was conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2018) and OMB (2004). This final report presents the Final Panel Comments of the IEPR Panel (the Panel). Details regarding the IEPR (including the process for selecting panel members, the panel members' biographical information and expertise, and the charge submitted to the Panel to guide its review) are presented in appendices.

Based on the technical content of the decision documents and the overall scope of the project, Battelle identified potential candidates for the Panel in the following key technical areas: planning formulator /economist, environmental law and compliance, cultural resources specialist, hydraulic engineer, and general engineer. Battelle screened the candidates to identify those most closely meeting the selection criteria and evaluated them for COIs and availability. USACE was given the list of all the final candidates to independently confirm that they had no COIs, and Battelle made the final selection of the five-person Panel from that list.

The Panel received electronic versions of the decision documents (1,802 pages of review documents in total), along with a charge that solicited comments on specific sections of the documents to be reviewed and 1,833+ pages of supplemental information. Following guidance provided in USACE (2018) and OMB (2004), USACE prepared the charge questions, which were included in the draft and final Work Plans.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference at the start of the review to provide the Panel an opportunity to ask questions of USACE and clarify uncertainties. In addition, an in-person/site visit was held at the NSBLD in Augusta, Georgia, on March 13, 2019; all five panel members attended this site visit, taking a tour of the lock and dam.

Other than the site visit and Battelle-facilitated teleconferences, there was no direct communication between the Panel and USACE during the peer review process.

IEPR panel members reviewed the decision documents individually and produced individual comments in response to the charge questions. The panel members then met via teleconference with Battelle to review key technical comments and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium/high, medium, medium/low, or low); and (4) recommendations on how to resolve the comment. Overall, 21 Final Panel Comments were identified and documented. Of these, three were identified as having high significance, seven had medium/high significance, two had medium significance, eight had medium/low significance, and one had low significance.

Battelle received public comments from USACE on the SHEP NSBLD IPAAR/SEA (approximately 346 letters) and provided them to the IEPR panel members. The panel members were charged with determining whether any information or concerns presented in the public comments raised any additional discipline-specific technical concerns with regard to the SHEP NSBLD IPAAR/SEA review documents. After completing its review, the Panel identified one new issue and subsequently generated one Final Panel Comment that summarized the concern.

Results of the Independent External Peer Review

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2018) in the SHEP NSBLD IPAAR/SEA documents. Table ES-1 lists the Final Panel Comment statements by level of significance. The full text of the Final Panel Comments is presented in Section 4.2 of this report. The following summarizes the Panel’s findings.

Based on its review, the Panel finds that the report is well-organized and clearly steps the reader through the complex genesis of the project. However, the Panel identified several elements of the project where additional analyses and evaluations are warranted, assumptions need to be clarified or documented, and some descriptions need clarification.

Environmental: The need and intent of the project to mitigate harbor expansion impacts on sturgeon is well-defined. The alternatives seem to be designed with Federal fisheries agencies (U.S. Fish and Wildlife Service [USFWS] and National Oceanic Atmospheric Administration National Marine Fisheries Service [NMFS]) requirements in mind; however, some currently proposed design features (including the top weir design, length of the weir, and positioning/design of the rock structures in the weirs) pose potential threats to the safety of downstream migrant sturgeons and possible impediments to the successful passage of upstream migrant sturgeons. The Panel noted that, except for a swimming ability metric, other sturgeon behaviors that are important to the design of upstream and downstream fish passage were not considered. The Panel also noted that the IPAAR/SEA does not consider several fishway designs known to be successful elsewhere, does not discuss the importance of locating the fishway entrance in close proximity to any upstream barriers, and does not address some project elements related to low flows. In addition, the IPAAR/SEA does not present adequate information on (1) the likelihood that the Recommended Plan will meet the project objectives related to fish passage, (2) the risk of injury/death during up- or downstream passage at the rock weirs, or (3) the probability of passage success overall.

Engineering: The Hydrologic Engineering Center-River Analysis System (HEC-RAS) analysis and reporting are good. The hydraulic analyses to determine water levels upstream of NSBLD were conducted with appropriate methodologies and are thorough. Two of the Panel's most significant findings, however, are that the project does not consider a wide range of alternative fishway types and does not consider alternatives that provide a smaller fishway with low discharge capacities. The Panel also noted that the report is unclear regarding some post-project water level fluctuations, and discrepancies were noted in the definition of normal water levels under the No Action Alternative (NAA). The Panel also found that the analysis did not use water level conditions observed during the “drawdown test” to verify the accuracy of low-flow modeling results.

Economics/Plan Formulation: The modeling of alternative flow levels and corresponding impacts on water supply, recreation, and surrounding properties are clearly presented. However, several significant issues were found by the Panel, including a lack of cost effectiveness/incremental cost analysis comparing alternatives and habitat availability; lack of detail and inconsistencies in the description of Average Annual Costs (AACs); and inadequate definitions of ratings thresholds of alternatives' outcomes. The Panel also noted that a discussion regarding elements of Section 106 of the National Historic Preservation Act (NHPA) was limited in scope, and that several project elements related to impacts of the alternatives on wetlands, sediment transport, and habitat loss were not evaluated.

Table ES-1. Overview of 21 Final Panel Comments Identified by the SHEP NSBLD IPAAR/SEA IEPR Panel

No.	Final Panel Comment
Significance – High	
1	Several design features of the rock structures in the arch ramp and top weir alternatives, including the Recommended Plan, pose risk of injury and a potential lethal danger to downstream migrant sturgeons due to head-on strikes and stranding.
2	The IPAAR/SEA focuses on a rock arch rapids fishway design and does not consider a wide range of alternative fishway types that could satisfy the first provision in the 2016 WIIN Act, “repair of the lock wall of the NSBLD and modification of the structure” to maintain the pool for navigation, water supply, and recreational activities and to allow safe fish passage.
3	The IPAAR/SEA does not consider alternatives that provide a smaller fishway with a discharge capacity less than the low end of the normal flow range, while retaining the operation of the spillway gates to maintain the upstream pool level and provide adequate discharge capacity for higher flows.
Significance – Medium/High	
4	The IPAAR/SEA does not include a cost-effectiveness/incremental cost analysis that compares the cost of each alternative to resulting changes in habitat availability.

Table ES-1. Overview of 21 Final Panel Comments Identified by the SHEP NSBLD IPAAR/SEA IEPR Panel (continued)

No.	Final Panel Comment
Significance – Medium/High	
5	The economic assumptions and calculation of the AACs used in the alternatives analysis are not described in enough detail to evaluate the acceptability of the economic assumptions.
6	The thresholds used to define ratings for recreation, water supply, and land inundation outcomes for the alternatives are not well-defined, and the assumption to equally weight all impacted entities within each outcome rating cannot be evaluated.
7	The alternatives analysis does not consider the differential effectiveness of each alternative at meeting the project objective of providing for utilization of upstream habitat areas.
8	The IPAAR/SEA does not adequately describe how the Recommended Plan would meet study objectives related to upstream and downstream passage of shortnose and Atlantic sturgeons and American shad at the top fixed weir.
9	Limitations of the data associated with risk of injury/death during up- or downstream passage at the rock weirs, or with the probability of passage success overall, undermine the credibility of some conclusions.
10	Conditions observed during the “drawdown test” are not documented in the IPAAR/SEA, and the results of the test are not used to verify the hydraulic modeling of post-project conditions.
Significance – Medium	
11	The IPAAR/SEA does not provide a comparative analysis of the river-wide arched weir alternatives with a smaller-scale arched weir fishway in the channel that considers hydraulic characteristics, the upstream and downstream behavior of Atlantic and shortnose sturgeon and American shad, the probability of passage success, and the risk of injury/stranding.
12	The likelihood of lower flows due to climate change and/or increased water supply allocations, the potential impacts of lower flows on project performance, and potential adaptations should lower flows occur are not addressed in the IPAAR/SEA.
Significance – Medium/Low	
13	The alternatives which retain the lock and spillway gates (the NAA and Alternative 1-1) do not take into consideration a key tenet of fishway design, which is to locate the entrance of the fishway as close as possible to the upstream barrier.

Table ES-1. Overview of 21 Final Panel Comments Identified by the SHEP NSBLD IPAAR/SEA IEPR Panel (continued)

No.	Final Panel Comment
Significance – Medium/Low	
14	It is unclear whether the 13 properties, in addition to the NSBLD, identified as “historic properties” meet that definition under Section 106 of the NHPA (36 CFR 800.16(l)(1)).
15	The IPAAR/SEA does not adequately convey the status of the NHPA Section 106 consultation process or the extent to which consulting party input has been (and will be) considered.
16	The alternatives analysis does not evaluate the relative impacts of the alternatives that would avoid or minimize adverse effects on the NSBLD.
17	The IPAAR/SEA is unclear regarding the overall daily range, likelihood, and uncertainty/probability of post-project water level fluctuations given the loss of gate management that currently manages upstream water levels.
18	The description of the change in “normal” water level conditions under the NAA is unclear.
19	The evaluation of wetland impacts does not take into consideration impacts of changed water level conditions on wetlands located beyond the immediate vicinity of the proposed construction work.
20	Potential changes to sediment transport due to construction of the fish passage structure and risk of habitat loss on the downstream gravel bar are not evaluated in the IPAAR/SEA.
Significance – Low	
21	The assumptions behind the applicability of using one-dimensional (1D) roughness values in a two-dimensional (2D) model are not presented in the Engineering Appendix.

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LIST OF ACRONYMS

1D	One Dimensional
2D	Two Dimensional
AAC	Average Annual Costs
APE	Area of Potential Effects
ATR	Agency Technical Review
CFM	Certified Floodplain Manager
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
COI	Conflict of Interest
DPS	Distinct Population Segment
DrChecks	Design Review and Checking System
EC	Engineer Circular
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ERDC	Engineer Research and Development Center
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GRR	General Reevaluation Report
HEC-RAS	Hydrologic Engineering Center-River Analysis System
HEP	Habitat Evaluation Procedure
IEPR	Independent External Peer Review
IPAAR/SEA	Integrated Post-Authorization Analysis Report and Supplemental Environmental Assessment
IWR	Institute for Water Resources
mgd	Million Gallons per Day
NAA	No Action Alternative
NAVD	North American Vertical Datum
NGVD	National Geodetic Vertical Datum

MLLW	Mean Lower Low Water
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NSBLD	New Savannah Bluff Lock and Dam
O&M	Operation and Maintenance
OEO	Outside Eligible Organization
OMB	Office of Management and Budget
PAL	Public Archaeology Laboratory
PCX	Planning Center of Expertise
PDT	Project Delivery Team
PWS	Performance Work Statement
RP	Recommended Plan
SHEP	Savannah Harbor Expansion Project
SHPO	State Historic Preservation Office
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WIIN	Water Infrastructure Improvements for the Nation
WRDA	Water Resources Development Act

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1. INTRODUCTION

The Savannah Harbor Expansion Project (SHEP) will deepen the existing 42-foot mean lower low water (MLLW) deep-draft navigation project to an authorized depth of 47 feet MLLW. The navigation project is a shipping channel on the Savannah River, which forms the border between the States of Georgia and South Carolina. The SHEP Fish Passage is an environmental mitigation feature that addresses adverse impacts on shortnose and Atlantic sturgeon and fulfills compliance with the Endangered Species Act. The approved 2012 SHEP General Reevaluation Report (GRR) and Final Environmental Impact Statement (FEIS) included the recommendation for construction of a fish passage around the New Savannah Bluff Lock and Dam (NSBLD).

Since the GRR/FEIS was published, a Periodic Assessment and Inspection of the lock and dam was conducted that identified significant deterioration and structural issues. As a result, the United States Army Corps of Engineers (USACE) closed the lock indefinitely in May 2014 due to safety concerns. In addition, USACE determined that the condition of the structure could adversely impact the function of the proposed fish passage around the lock and dam as designed. In response, the Savannah District included additional activities in the fiscal year (FY) 2017 updated SHEP cost estimate that would provide structural repairs to reduce the risk of a catastrophic failure of the dam and to ensure proper hydraulic operation of the proposed fish passage. In December 2016, the Water Infrastructure Improvements for the Nation (WIIN) Act was signed into law, requiring USACE to study two in-channel options in lieu of the original design to go around the lock and dam.

As a modification to the SHEP, the objective of the post-authorization analysis report is to determine how the SHEP fish passage feature should be modified as required by the WIIN Act of 2016 in the most cost-effective way.

The WIIN Act provides the Secretary of the Army with options to modify the SHEP fish passage feature as follows:

Option A: Repair the NSBLD lock wall and modify the structure such that the structure is able to:

- Maintain the pool for navigation, water supply, and recreational activities
- Allow safe passage over the structure to historic spawning grounds of shortnose sturgeon, Atlantic sturgeon, and other migratory fish

Option B:

- Construct at an appropriate location across the Savannah River a structure that can maintain the pool for water supply and recreational activities
- Remove the NSBLD when construction of the fish passage structure is completed

Following the construction of the in-channel weir and fish passage, and demolition of the NSBLD, USACE will convey the park and recreation area adjacent to the NSBLD to Augusta-Richmond County, Georgia, without consideration.

Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analysis. The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Savannah Harbor Expansion Project, Georgia and South Carolina, Fish Passage at New

Savannah Bluff Lock and Dam Integrated Post-Authorization Analysis Report and Environmental Assessment (hereinafter: SHEP NSBLD IPAAR/SEA IEPR) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers (USACE), Engineer Circular (EC) *Review Policy for Civil Works* (EC 1165-2-217) (USACE, 2018) and the Office of Management and Budget (OMB), *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

This final report presents the Final Panel Comments of the IEPR Panel (the Panel) on the existing engineering, economic, environmental, and plan formulation analyses contained in the SHEP NSBLD IPAAR/SEA IEPR documents (Section 4). Appendix A describes in detail how the IEPR was planned and conducted, including the schedule followed in executing the IEPR. Appendix B provides biographical information on the IEPR panel members and describes the method Battelle followed to select them. Appendix C presents the final charge to the IEPR panel members for their use during the review; the final charge was submitted to USACE in the final Work Plan according to the schedule listed in Table A-1. Appendix D presents the organizational COI form that Battelle completed and submitted to the Institute for Water Resources (IWR) prior to the award of the SHEP NSBLD IPAAR/SEA IEPR.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review, as described in USACE (2018).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the engineering, economic, environmental, and plan formulation analyses of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the SHEP NSBLD IPAAR/SEA was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization (OEO) (as defined by EC 1165-2-217). Battelle, a 501(c)(3) organization under the U.S. Internal Revenue Code, has experience conducting IEPRs for USACE.

3. METHODS FOR CONDUCTING THE IEPR

The methods used to conduct the IEPR are briefly described in this section; a detailed description can be found in Appendix A. The IEPR was completed in accordance with established due dates for milestones and deliverables as part of the final Work Plan; the due dates are based on the award/effective date and the receipt of review documents.

Battelle identified, screened, and selected five panel members to participate in the IEPR based on their expertise in the following disciplines: planning formulator/economist, environmental law and compliance, cultural resources specialist, hydraulic engineer, and general engineer. The Panel reviewed the SHEP NSBLD IPAAR/SEA documents and produced 21 Final Panel Comments in response to 29 charge

questions provided by USACE for the review. This charge also included two overview questions and one public comment question added by Battelle, for a total of 32 questions. Battelle instructed the Panel to develop the Final Panel Comments using a standardized four-part structure:

1. Comment Statement (succinct summary statement of concern)
2. Basis for Comment (details regarding the concern)
3. Significance (high, medium/high, medium, medium/low, or low; in accordance with specific criteria for determining level of significance)
4. Recommendation(s) for Resolution (at least one implementable action that could be taken to address the Final Panel Comment).

Battelle reviewed all Final Panel Comments for accuracy, adherence to USACE guidance (EC 1165-2-217), and completeness prior to determining that they were final and suitable for inclusion in the Final IEPR Report. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Panel's findings are summarized in Section 4.1; the Final Panel Comments are presented in full in Section 4.2.

4. RESULTS OF THE IEPR

This section presents the results of the IEPR. A summary of the Panel's findings and the full text of the Final Panel Comments are provided.

4.1 Summary of Final Panel Comments

The panel members agreed on their “assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used” (USACE, 2018) in the SHEP NSBLD IPAAR/SEA documents. The following summarizes the Panel's findings.

Based on its review, the Panel finds that the report is well-organized and clearly steps the reader through the complex genesis of the project. However, the Panel identified several elements of the project where additional analyses and evaluations are warranted, assumptions need to be clarified or documented, and some descriptions need clarification.

Environmental: The need and intent of the project to mitigate harbor expansion impacts on sturgeon is well-defined. The alternatives seem to be designed with Federal fisheries agencies (U.S. Fish and Wildlife Service [USFWS] and National Oceanic Atmospheric Administration National Marine Fisheries Service [NMFS]) requirements in mind; however, some currently proposed design features (including the top weir design, length of the weir, and positioning/design of the rock structures in the weirs) pose potential threats to the safety of downstream migrant sturgeons and possible impediments to the successful passage of upstream migrant sturgeons. The Panel noted that, except for a swimming ability metric, other sturgeon behaviors that are important to the design of upstream and downstream fish passage were not considered. The Panel also noted that the IPAAR/SEA does not consider several fishway designs known to be successful elsewhere, does not discuss the importance of locating the fishway entrance in close proximity to any upstream barriers, and does not address some project elements related to low flows. In addition, the IPAAR/SEA does not present adequate information on (1) the likelihood that the Recommended Plan will meet the project objectives related to fish passage, (2) the risk of injury/death during up- or downstream passage at the rock weirs, or (3) the probability of passage success overall.

Engineering: The Hydrologic Engineering Center-River Analysis System (HEC-RAS) analysis and reporting are good. The hydraulic analyses to determine water levels upstream of NSBLD were conducted with appropriate methodologies and are thorough. Two of the Panel's most significant findings, however, are that the project does not consider a wide range of alternative fishway types and does not consider alternatives that provide a smaller fishway with low discharge capacities. The Panel also noted that the report is unclear regarding some post-project water level fluctuations, and discrepancies were noted in the definition of normal water levels under the No Action Alternative (NAA). The Panel also found that the analysis did not use water level conditions observed during the “drawdown test” to verify the accuracy of low-flow modeling results.

Economics/Plan Formulation: The modeling of alternative flow levels and corresponding impacts on water supply, recreation, and surrounding properties are clearly presented. However, several significant issues were found by the Panel, including a lack of cost effectiveness/incremental cost analysis comparing alternatives and habitat availability; lack of detail and inconsistencies in the description of Average Annual Costs (AACs); and inadequate definitions of ratings thresholds of alternatives' outcomes. The Panel also noted that a discussion regarding elements of Section 106 of the National Historic Preservation Act (NHPA) was limited in scope, and that several project elements related to impacts of the alternatives on wetlands, sediment transport, and habitat loss were not evaluated.

4.2 Final Panel Comments

This section presents the full text of the Final Panel Comments prepared by the IEPR panel members.

Final Panel Comment 1

Several design features of the rock structures in the arch ramp and top weir alternatives, including the Recommended Plan, pose risk of injury and a potential lethal danger to downstream migrant sturgeons due to head-on strikes and stranding.

Basis for Comment

Sturgeons are benthic cruising predators with poor eyesight and have no fin morphology that gives them the ability to stop forward swimming movement when they encounter barriers. Further, a sturgeon's snout has several important sensory systems that are critical for foraging and need protection from striking barriers. The primary objective for safe and sure passage of sturgeons during upstream and downstream passage can be met only if arch rock structures are safe for sturgeon passage.

Observations on large 2-foot-long juvenile lake and shortnose sturgeons in a flume found that sturgeons swimming upstream or downstream could not stop when they encountered a barrier wall in their swimming path, resulting in a hard strike (direct head-on hit) when the barrier wall was at a right angle to the sturgeons' path (Kynard et al., 2008; B. Kynard, BK-Riverfish, LLC, Amherst, Massachusetts, unpublished data). When a sturgeon's head hit the weir at an angle to the direction of the sturgeon's movement, the sturgeon experienced only a glancing hit, which minimized injury.

The position of arch rock structures at a right angle to water flow described in the Recommended Plan (and in the SHEP-NSBLD Basis of Design [2014], as well as by Turek et al. [2016]) poses a high probability of harm due to sturgeons swimming directly into the broad side of the structures in a direct hard strike. Properly oriented and designed arch structures likely pose only a small danger to sturgeons from head strike during *upstream* migration, because sturgeons swim slowly and strikes against rock barriers would likely not occur with great force. However, arch rock structures pose a great danger to *downstream* migrant post-spawned, 6-foot-long, 120-pound (estimated) Atlantic sturgeon, which would be moving faster than the water current. A hard strike by such fast-moving, post-spawned sturgeons may result in a head injury when they strike rock structures in the arch ramp; these injuries can result in death, either directly or indirectly. The probability of a hard strike increases in an arch ramp system, where sturgeons must safely pass many rows of rock ramp structures.

Harmful indirect effects of a head strike could occur if a post-spawned downstream migrant sturgeon were stunned and immobilized by a hard strike due to a head-on collision with an arch rock structure, and were then carried to the structure's crest by upwelling current. Under this scenario, a sturgeon can be stranded and die—a particular concern for weakened post-spawned sturgeons. The probability of this event occurring could be high if tree limbs or other large debris were lodged on the structure's crest and the water level were low. Avoiding a hard strike and injury to the head of both shortnose and Atlantic sturgeons is required for safe passage through an arched rock ramp system.

Significance – High

Information provided in the Recommended Plan and supplemental documents on the design of the arch rock barriers is not adequate to ensure safe and sure passage for sturgeons under any weir alternative.

Final Panel Comment 1

Recommendation for Resolution

1. Consider incorporating into the IPAAR/SEA the findings of related analyses which suggest that sturgeons encountering a barrier wall at a 45° angle to their swimming direction may mitigate the chances of serious injury or death when such structures are used for an arched weir.

Literature Cited

Kynard, B., M. Horgan, D. Pugh, E. Henyey, and T. Parker (2008). Using juvenile sturgeons as a substitute for adults: a new way to develop fish passage for large fish. American Fisheries Society Symposium 61: 1-21.

SHEP-NSBLD. Basis of Design-Final (2014). Document # FY-14, L.I. 113006, Blair Remy Architects and TetraTech. Supplemental Documents, Savannah Fish Passage, Panel Files.

Turek, J., A. Haro, and B. Towler (2016). Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes. Interagency Technical Memorandum. 47 pp.

Final Panel Comment 2

The IPAAR/SEA focuses on a rock arch rapids fishway design and does not consider a wide range of alternative fishway types that could satisfy the first provision in the 2016 WIIN Act, “repair of the lock wall of the NSBLD and modification of the structure” to maintain the pool for navigation, water supply, and recreational activities and to allow safe fish passage.

Basis for Comment

The 2016 WIIN Act does not identify the type of fishway that should be considered at NSBLD. It only says that it is necessary for the project modifications to “*allow safe passage over the structure to historic spawning grounds of shortnose sturgeon, Atlantic sturgeon, and other migratory fish.*” This statement seems to allow for the consideration of fishway types other than the rock arch rapids fishway. For example, a large pool and weir fishway within the footprint of the lock would be an “in-channel” fishway that could “*allow safe passage over the structure.*”

However, the rock arch rapids fishway seems to be the only type of fishway design considered in the IPAAR/SEA. Many alternatives were included in the initial and intermediate screening of alternatives (Section 3.3 of the IPAAR/SEA, Formulation of the Initial Array of Action Alternatives), but all of these alternatives address only various configurations of the rock arch rapids fishway design.

Several fishway designs have been shown to be able “to allow safe passage...of shortnose sturgeon, Atlantic sturgeon, and other migratory fish.” These include pool and weir fishways (with submerged orifices), fish lifts, and vertical slot fishways. On the Columbia River, large pool and weir fishways with submerged orifices in the weirs have been shown to be successful at passing white sturgeon. Recent modifications to a fish lift at Holyoke Dam on the Connecticut River have been successful at passing shortnose sturgeon, and a fish lift at Menominee Dam on the Menominee River has been successful at passing lake sturgeon. Vertical slot fishways have traditionally been built to provide passage for target species smaller than sturgeon, but marginal sturgeon passage success at traditional vertical slot fishways like the Vianney-Legendre Fishway at St. Ours dam on the Richelieu River has shown that sturgeon passage through a vertical slot fishway specifically designed for sturgeon (wider slots, larger pools, etc.) is feasible. These other types of fishways could be equally or more effective at providing safe fish passage when compared to a rock arch rapids fishway, and they could also be equally or more cost-effective than the rock arch rapids fishway alternatives considered in the IPAAR/SEA.

In a subsequent review of the public comments, it was observed that several comments (Comment Letters 65, 138, 144, 210, 211, and 219) also request that other types of fishways (aside from the rock arch rapids fishway) be considered.

Significance – High

Without a discussion of all potential types of fishways that are known to be effective at providing safe passage for shortnose sturgeon, Atlantic sturgeon, and other migratory fish, the Formulation of Alternative Plans (Section 3.0) in the IPAAR/SEA is incomplete.

Recommendations for Resolution

1. Review and discuss in the IPAAR/SEA all types of fishways that are known to be effective at providing safe passage for shortnose sturgeon, Atlantic sturgeon, and other migratory fish.

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2. Provide alternatives in Section 3.3, Formulation of the Initial Array of Action Alternatives, that incorporate other types of fishways, or discuss why these other types of fishways are not included among the action alternatives.

Final Panel Comment 3

The IPAAR/SEA does not consider alternatives that provide a smaller fishway with a discharge capacity less than the low end of the normal flow range, while retaining the operation of the spillway gates to maintain the upstream pool level and provide adequate discharge capacity for higher flows.

Basis for Comment

Section 3.4 of the IPAAR/SEA states, “Ultimately, USACE must recommend an alternative that best solves the overriding issue, which in this case is controlling the natural flow of the river.” This overriding issue of controlling the natural flow of the river can be broken into two primary goals:

1. “...to maintain the pool for navigation, water supply, and recreational activities, as in existence on the date of enactment of [the 2016 WIIN] Act”; and
2. to minimize flooding impacts.

Retaining the existing spillway gates seems like the simplest way of accomplishing these two objectives. However, the Formulation of Alternative Plans (Section 3.0) considers only two alternatives (the No Action Alternative [NAA] and Alternative 1-1) that include continued operation of the spillway gates to maintain the upstream pool level and pass high flows, while it considers 13 alternatives that include removal of the spillway gates.

Further, the 2016 WIIN Act explicitly states that it is necessary for project modifications to “maintain the pool for navigation, water supply, and recreational activities, *as in existence on the date of enactment of this Act.*” None of the alternatives seem to fully satisfy this requirement since they all appear to have a direct impact by lowering the normal pool elevation below the existing conditions. One way to maintain the existing pool level would be to retain the spillway gates and provide a smaller fishway that does not convey more flow than the low end of the normal flow range (3,600 cubic feet per second [cfs]). With a smaller fishway flow, the spillway gates would need to be operated in a manner similar to their current regime in order to discharge the remainder of the normal river flow, thus maintaining the existing pool level. If operation of the spillway gates was continued, then the fishway entrance would need to be located adjacent to the spillway gates, and the gate(s) closest to the fishway entrance would need to be the first gate(s) opened to regulate the river flow. In this way, the flow from the spillway gate(s) adjacent to the fishway entrance could be considered supplemental attraction flow due to their close proximity to the fishway entrance.

It is unclear why smaller-sized fishways are not considered in the Formulation of Alternatives. The language in the WIIN Act does not seem to preclude the consideration of smaller rock arch rapids fishway designs or other types of structural fishways. Presumably, during the development of alternatives, the consideration of fishway size was focused on trying to maximize the flow that would be conveyed down the fishway to maximize attraction to the fishway, but this approach results in a larger fishway that draws the pool level down below existing conditions when river flows are in the low/normal range.

The Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes (cited in the IPAAR/SEA) recommends a minimum channel width of 50 feet for nature-like fishways to accommodate Atlantic and shortnose sturgeon. A fishway of this width could fit within the footprint of the lock, allowing the spillway gates to be retained and operated to maintain pool level and provide adequate flood discharge capacity. However, any alternatives that consider a

Final Panel Comment 3

fishway within the footprint of the lock should also consider removing the compromised portion of the lock wall downstream of the spillway gates to allow the fishway entrance to be located adjacent to the spillway gates.

In a subsequent review of the public comments, it was observed that many public comments also request further consideration of other alternatives that retain the spillway to “maintain the pool for navigation, water supply, and recreational activities, *as in existence on the date of enactment of [the] Act*” (Comment Letters 5, 6, 65, 69, 77, 106, 120, 125, 138, 144, 149, 156, 210, 211, 219, & 254).

Significance – High

Consideration of smaller fishway alternatives that would result in better control of river flow could affect the selected alternative.

Recommendations for Resolution

1. Analyze alternatives that retain the spillway gates and include a fishway with a conveyance flow capacity less than the low end of the normal flow range (3,600 cfs), or explain why such alternatives were not considered.
2. Reconsider whether the proposed alternatives meet the intent of the 2016 WIIN Act requirement that project modifications must “maintain the pool for navigation, water supply, and recreational activities, *as in existence on the date of enactment of [the] Act*.”

Final Panel Comment 4

The IPAAR/SEA does not include a cost-effectiveness/incremental cost analysis that compares the cost of each alternative to resulting changes in habitat availability.

Basis for Comment

The selection of the Recommended Plan in the IPAAR/SEA is based on an evaluation matrix that gives equal weight to fish passage, recreation, water supply, and land inundation. The standard methodology to evaluate mitigation projects for migratory fish species is cost-effectiveness/incremental cost analysis, which focuses primarily on habitat availability and develops a metric of changes in habitat availability (e.g., annual habitat units) to compare the alternatives. This approach was not used, and the IPAAR/SEA analysis assumes that the in-channel weir alternatives would be equally effective for fish passage. Therefore, there is only a comparison of AACs for the alternatives.

The IPAAR/SEA (p. 101) states that a cost-effectiveness analysis was performed between Alternatives 1-1, 2-8, and 2-6d, and that Alternative 2-6d was the most cost-effective. However, this cost-effectiveness comparison raises questions because Table 29 shows that Alternatives 1-1 and 2-8 received ratings of “0” for fish passage and would not achieve the primary objective of the project. Within the alternatives that received “1” ratings for fish passage, Table 29 also shows that Alternative 2-3 had a considerably lower AAC (\$2,376,000) than the selected Alternative 2-6d (\$3,334,000). Yet, despite its lower AAC, Alternative 2-3 was not selected because the recreation and water supply impacts under Alternative 2-6d were deemed to be lower, even though no analysis was conducted to determine the costs of mitigating these recreation and water supply impacts under either alternative.

Significance – Medium/High

Because no rationale was provided for the methodology used in this study, the validity of the cost analysis of the alternatives cannot be determined.

Recommendations for Resolution

1. Explain the alternative evaluation methodology used for this study and, if the methodology differs from the standard cost-effectiveness/incremental cost analysis, discuss the potential shortcomings of this approach.
2. Provide a complete accounting of the costs associated with mitigating the recreation and water supply impacts of the alternatives.
3. Compare the costs to mitigate the recreation, water supply, and land inundation impacts under each alternative and the AACs of those alternatives.
4. Re-examine the values in Table 29 and confirm whether they support the statements regarding the most cost-effective of the alternatives.

Final Panel Comment 5

The economic assumptions and calculation of the AACs used in the alternatives analysis are not described in enough detail to evaluate the acceptability of the economic assumptions.

Basis for Comment

The project evaluation data for the planning alternatives is very limited. In particular, the full cost data for the alternatives is not documented in the IPAAR/SEA (except for the selected alternative). AACs are reported in Table 29 of the main report, but there is no information about the total project costs for the alternatives or how the AACs were computed. In addition, the cost data reported in Table 29 differs from the cost data reported in Appendix A, Engineering. Appendix A appears to be the only other source of cost data in documents provided for review. Some cost data, such as the cost for cultural resource preservation included in Table 30, Project First Cost, are not discussed.

Significance – Medium/High

Complete documentation of the economic assumptions and cost calculations for each alternative is necessary to evaluate the information used to select the preferred alternative.

Recommendations for Resolution

1. Provide complete information about the economic assumptions and computations used to develop cost information for the project alternatives.
2. Provide a cost appendix that provides full details on the costing methodology.

Final Panel Comment 6

The thresholds used to define ratings for recreation, water supply, and land inundation outcomes for the alternatives are not well-defined, and the assumption to equally weight all impacted entities within each outcome rating cannot be evaluated.

Basis for Comment

The WIIN Act states that any alternative should be able "...to maintain the pool for navigation, water supply, and recreational activities, as in existence on the date of this Act." This statement requires assumptions about how to interpret this requirement. The evaluation criteria listed in Tables 14 and 15 of the IPAAR/SEA describe the criteria used for navigation, water supply, recreation, and flooding, but no justification is provided for the arbitrary thresholds used to define ratings for each criterion. Similarly, there is no explanation for why each user impacted by an alternative should be equally weighted with other users within a criterion.

For example, six water supply users are identified, but their usage rates vary from as little as 1 million gallons per day (mgd) to 217 mgd. The IPAAR/SEA states that some modifications for these users would be needed with lower water levels (p. 51), but there is no indication of what the actual modifications or costs would be. In the final screening/selection, modifications required for two water supply users are identified, but no costs of these modifications are provided.

Table 30 of Appendix G, Recreation, also shows that there are relatively small differences in the number of boat docks impacted under the alternatives. Further, Appendix G (p. 18) states: "By evaluating the additional number of boat docks adversely impacted for Alternative 2-6d in comparison to the NAA SHEP Plan at 5,000 cfs only, it is hard to distinguish a measurable and significant difference between Alternative 2-6d and Alternatives 2-6c, 2-6b, and 2-3. All of those alternatives could be lumped together and given the same rating value." The information presented is not adequate to evaluate whether the evaluation criteria are sufficient for selection of the preferred alternative.

An understanding of the significance of each effect threshold is also important to evaluate whether equal weighting of impacts is a reasonable assumption. Equal weighting would presume that the thresholds for impact would be roughly comparable for each criterion, in that a threshold impact for one criterion should have a similar magnitude of negative effect as the other threshold impacts. Without further justification of the threshold levels, it is difficult to determine whether the equal weighting assumption is reasonable.

Significance – Medium/High

Without an explanation to justify the criteria used to evaluate navigation, water supply, recreation, and flooding impacts, it is difficult to determine whether these criteria meet the intent of the WIIN Act.

Recommendations for Resolution

1. Discuss in more detail the criteria used to evaluate navigation, water supply, recreation, and flooding impacts under the alternatives.
2. Explain why these criteria are adequate to evaluate the project alternatives.

Final Panel Comment 7

The alternatives analysis does not consider the differential effectiveness of each alternative at meeting the project objective of providing for utilization of upstream habitat areas.

Basis for Comment

Section 1.4.6 states that “all alternatives discussed in this SEA provide the same output (mitigation lift).” The assumption that all of the alternatives provide equal fish migration benefits (specifically, that they will all allow full, or at least equal, utilization of the upstream habitat areas and downstream passage) is not justified within the text and is unlikely to be valid. The alternatives differ in numerous passage-relevant ways, including weir length, entrance configuration, attraction flow configuration, risk of stranding, and downstream passage capabilities. The report also does not clearly identify the characteristics and quantities of the notches to be provided under each alternative; these elements are crucial for successful passage of benthic fish such as sturgeon.

Incremental difference in project performance, if it exists, should be considered when comparing alternatives and evaluating cost effectiveness. All of the alternatives, including the NAA, would likely provide some degree of fish passage, but it seems unlikely that each would provide equal fish passage benefits. If the study intends to retain such an assumption, evidence justifying that assumption should be presented in the project documents.

Significance – Medium/High

Establishing the relative effectiveness of the alternatives would have significant impacts on both the cost effectiveness analysis and the alternative selection process.

Recommendations for Resolution

1. Provide scientific justification for the assumption that each alternative will provide the required mitigation lift.
2. Develop a metric that discriminates the ability of the various alternatives to provide habitat connectivity and usage for the target species, and incorporate that metric into the alternative selection process and the cost effectiveness evaluation.

Final Panel Comment 8

The IPAAR/SEA does not adequately describe how the Recommended Plan would meet study objectives related to upstream and downstream passage of shortnose and Atlantic sturgeons and American shad at the top fixed weir.

Basis for Comment

The IPAAR/SEA does not fully describe the top weir physically or hydraulically to determine (1) whether upstream migrant sturgeons, particularly shortnose sturgeons, would be able to swim upstream past the selected configuration, and (2) whether post-spawned shortnose and Atlantic sturgeons would be able to safely swim downstream between the rock arch structures in the top weir (and in other rock arches). The Recommended Plan indicates that the design of the top weir and arch rock structures will be based on the arch design in the SHEP-NSBLD Basis of Design - Final (2014); however, this document ignores sturgeon behavior and does not design sturgeon passage for safe upstream and downstream movements; thus, it provides no suitable design criteria for the Panel to evaluate. Depending on which arch ramp design location is selected (passage on the Georgia side in the channel, where sturgeons will be migrating) or whether a full river arch ramp is selected (designed to pass sturgeon without regard to their migration route), appropriately designed arch notches in the top weir section where sturgeons can safely pass upstream and downstream will be required. The dimensions and hydraulics of these openings in the top weir are not presented in the Recommended Plan, making it impossible for the Panel to evaluate the suitability of top weir notches.

A major concern is suitability of the size and design of notches in the top weir for upstream and downstream migrant sturgeon passage. The 2014 Basis of Design document (which was adopted by the Recommended Plan as its basic design) had 2-foot-wide openings between arch structures. This distance is too small for 6-foot-long Atlantic sturgeon with an 18- to 24-inch-wide pectoral fin span, particularly for safe passage of post-spawned downstream migrants that may be disoriented and swimming weakly. Results of research studies in flumes, a prototype fish ladder, and a pool and weir ladder at Bonneville Dam, Columbia River, on behavior and passage success of several species of upstream migrant sturgeons found that sturgeons attempting to swim over weir crests in the overflow failed, while attempts to swim through a notch (vertical slot) or a submerged orifice succeeded (Warren and Beckman, 1993; Kynard et al., 2008; Kynard et al., 2011). Sturgeons (particularly shortnose sturgeon, but depending on velocity over the top weir, Atlantic sturgeon also) that attempt to ascend a top weir without notches (or with poorly sized / designed notches) will likely fail.

Downstream passage of sturgeons at the top weir (and at the other arch structures in the arch rock ramp) is omitted from discussion of all weir alternatives; yet, post-spawned adult sturgeons will surely attempt to return from spawning to the estuary/ocean. Inclusion of appropriately sized and designed notches in whatever section of the top weir is selected for passage of sturgeons is of critical importance. Post-spawned sturgeons encountering the top weir during downstream migration will be exhausted and will have little energy to control movements (as was found at the Chesapeake Power Station, James River, Virginia, in 2015, where a post-spawned Atlantic sturgeon about 6 feet long was impinged on the plant's trash rack in a water velocity of less than 1 foot per second). Because the Recommended Plan does not identify whether the top weir will be notched (although the 2014 Basis of Design document does have a notched top weir), the Panel does not know what hydraulic-structure configuration will exist at any of the top weirs in the weir alternatives for passing post-spawned sturgeons. Downstream-moving lake and shortnose sturgeons easily passed over the weir crest in the

Final Panel Comment 8

flume studies cited previously, which indicates that downstream migrant sturgeons could swim over sections of an unnotched top weir. However, this movement should be rare because sturgeons (all species yet tracked) migrate upstream and downstream in the channel (two species of Danube River sturgeons [Kynard et al., 2002]; Connecticut River shortnose sturgeon [Kieffer and Kynard, 2012]; Yangtze River Chinese sturgeon [B. Kynard, unpublished data]). Because migrant sturgeons are in the channel, if the top weir on the channel side (Georgia side) were notched, most individual sturgeon migrating in the channel would easily encounter the notched top weir and successfully pass downstream (or upstream). For a rare sturgeon migrating downstream out of the channel, there is a small chance that it could pass head-first in fast current over an unnotched section of the top weir, lose control of body orientation, strike the river bottom, and be injured. Design of arch structures is critical to the safe downstream passage of weakened post-spawned sturgeon, with the design goal of presenting only a rare chance of a sturgeon hitting a glancing blow to the bottom or to arch rock structures.

The upstream and downstream movements of migrant American shad should not be affected by configuration of the top weir (or arch weirs). This species has the swimming ability to ascend and descend the current over the top and arch weirs, whether they are notched or not.

Significance – Medium/High

The design and hydraulics of the top weir under all weir alternatives (or for any fishway considered for passing sturgeons) is critical to sturgeons' successful migration to and from the spawning reach.

Recommendations for Resolution

1. Consider sturgeon passage using an arch ramp only on the Georgia side of the river and an unnotched top weir over the remainder of the river width (to regulate upstream water level).
2. If upstream and downstream passage for sturgeons is planned for most of the river width, notch the top weir appropriately in the entire section envisioned for upstream and downstream passage.
3. Design the opening (notch) between arch rock structures of 4 to 5 feet wide (and bottom to top) to ensure safe upstream passage of Atlantic sturgeon, as well as their safe downstream passage even in a weakened post-spawned condition.

Literature Cited

Kieffer, M., and B. Kynard (2012). Spawning and non-spawning migrations, spawning, and the effect of river regulation on spawning success of Connecticut River shortnose sturgeon. pp. 73-113. *In* Life history and behaviour of Connecticut River shortnose sturgeon and other sturgeons. Special Publication #4, World Sturgeon Conservation Society, Schifferstrasse 48, 21629 Neu Wulmstorf, Germany. 320 pp.

Kynard, B., R. Suci, and M. Horgan. (2002). Migration and habitats of diadromous Danube River sturgeons in Romania: 1998-2000. *Journal of Applied Ichthyology* 18: 529-535.

Kynard, B., M. Horgan, D. Pugh, E. Henyey, and T. Parker (2008). Using juvenile sturgeons as a substitute for adults: a new way to develop fish passage for large fish. American Fisheries Society Symposium 61: 1-21.

Kynard, B., D. Pugh, and T. Parker. (2011). Passage and behavior of cultured lake sturgeon in prototype side-baffle fish ladder: I. Ladder hydraulics and fish ascent. Journal of Applied Ichthyology 27: 77-88.

SHEP-NSBLD. Basis of Design-Final (2014). Document # FY-14, L.I. 113006, Blair Remy Architects and TetraTech. Supplemental Documents, Savannah Fish Passage, Panel Files.

Warren, J., and L. G. Beckman (1993). Fishway use by white sturgeon on the Columbia River. Document WSG-AS-93-02, Washington Sea Grant Program, Seattle, Washington.

Final Panel Comment 9

Limitations of the data associated with risk of injury/death during up- or downstream passage at the rock weirs, or with the probability of passage success overall, undermine the credibility of some conclusions.

Basis for Comment

The Recommended Plan does not compare the weir alternatives with regard to either the possibility of upstream or downstream passage success or the risk of injury or death to protected sturgeons and American shad. Specifically, weir alternatives are discussed (Section 4.10, Risk and Uncertainty) without analyzing (1) behaviors of sturgeons and American shad during upstream and downstream migration, or (2) risk of injury or death for sturgeons posed by the top weir and rock ramp barriers.

In addition, no risk and uncertainty analysis was integrated into the evaluation method used to select the preferred alternative(s). There was apparently some consideration of risk in the Cost Engineering analysis (Appendix B), but the methods used to integrate the risk analysis are not discussed.

Significance – Medium/High

The probability that the alternatives will meet the objective of successful passage for protected sturgeons is a necessary part of risk and uncertainty analysis of the alternatives.

Recommendation for Resolution

1. Develop a conceptual model of risk and uncertainty for all fish passage designs that includes the potential for successful upstream and downstream fish passage and the risk of fish injury/death.

Final Panel Comment 10

Conditions observed during the “drawdown test” are not documented in the IPAAR/SEA, and the results of the test are not used to verify the hydraulic modeling of post-project conditions.

Basis for Comment

The effects of lower water levels during the “drawdown test” were the subject of numerous public comments. However, an analysis of the actual water levels measured during this event is not presented within the documents provided, and an assessment was not conducted to determine whether the flow and water level conditions during the test were representative of the conditions expected after implementation of any of the project alternatives. Without this information, it is not possible to place the public observations into a proper context or to determine whether the results merit changes to any of the alternatives considered.

Since the foundation of the hydraulic modeling conducted for this project is the Federal Emergency Management Agency (FEMA) regulatory Hydrologic Engineering Center-2 (HEC-2) model, which presumably was developed to simulate high-flow events, it is possible that the hydraulic characteristics (cross-sections and Manning’s “n” values) within the models may be less representative of low-flow conditions than they are for high-flow conditions. For this reason, it is especially useful to check simulated water surface elevations with actual observations when using models to project conditions that differ from the conditions for which the model was originally developed. If deviations between expected and observed water level conditions are found, it may indicate that the model may need adjustment to better represent actual hydraulic conditions.

Also, numerous comments took exception to the exposed mud flats, tree trunks, and banks observed during the test. This condition is likely to be temporary, with vegetation expected to rapidly colonize the exposed areas; however, the condition of the exposed areas is not described in the IPAAR/SEA, and there appears to be a public presumption that these conditions are expected to occur over an extended duration after the project.

Note that the Panel recognizes the drawdown was not conducted until after release of the IPAAR/SEA, however, given the results of the drawdown and the public comments, believe it is important to do a comparison and evaluation as suggested above.

Significance – Medium/High

If the findings and conclusions of the drawdown test are incorporated in the alternatives analysis, public confidence that the selected alternative will perform as expected and meet the requirements of the WIIN Act will be strengthened.

Recommendations for Resolution

1. Incorporate a description of the river hydraulic conditions experienced during the drawdown test into Appendix A, Engineering.
2. Explain whether the observed conditions would be considered to meet the water level requirements of the WIIN Act language.
3. Determine whether the observations justify an adjustment of model parameters in order to accurately represent post-project conditions.

Final Panel Comment 11

The IPAAR/SEA does not provide a comparative analysis of the river-wide arched weir alternatives with a smaller-scale arched weir fishway in the channel that considers hydraulic characteristics, the upstream and downstream behavior of Atlantic and shortnose sturgeon and American shad, the probability of passage success, and the risk of injury/stranding.

Basis for Comment

The Fishway section of the Recommended Plan has no metrics on which to base the selection of weir alternatives and includes only full river-wide arched rock ramps; no smaller-scale design is considered. The IPAAR/SEA also does not adequately address assumptions and opinions on the behavior of sturgeons during upstream (and downstream) migrations; problems for sturgeon passage upstream and downstream in the proposed arched rock system; and hydraulic modeling at the top weir crest under any of the weir alternatives.

For example, a smaller-scale fishway using migratory behavior of sturgeons (and American shad) to select the location and width of the arch ramp fishway would focus on the channel at and just downstream of the top weir location. Migrant sturgeons moving upstream in the channel on the Georgia side could enter the fishway entrance in the channel and be guided by structure flow to and through notches in the top weir section. Sturgeons moving upstream outside the channel that encountered the top weir (with no notch section extending across the river) would not be able to swim over the top weir crest (Warren and Beckman, 1993; Kynard et al., 2008). These sturgeons would be guided by the top weir to the Georgia side, where the top weir is notched for a short section (possibly, 150 feet), and a short arch rock system from and downstream of the top weir could provide sturgeons with target velocities and rock structures for successful upstream and downstream passage. American shad also migrate in the channel and will search downstream of a barrier for a passage route upstream of the barrier. Some American shad may be guided to the Georgia side of the river and pass in the arch ramp for sturgeons, but most American shad would likely burst swim directly over the unnotched top weir.

The assumptions that underlie the evaluation of weir alternatives are never stated, nor are the weir alternatives analyzed for any factor related to fish passage success. The soundness of any models based on the weir alternates would be of little value because the basic conclusion—that all weir alternatives are equal and acceptable for sturgeons—is not addressed by the analyses; thus, the conclusion is speculative.

Significance – Medium

A conceptual model for the Recommended Plan that rates all existing weir alternatives and any smaller or alternative designs would facilitate the selection of the best fish passage design for sturgeons.

Final Panel Comment 11

Recommendations for Resolution

1. Evaluate a smaller-scale, less expensive, conceptual fishway model that
 - a. considers the behavior and swimming ability of sturgeons plus water level control, and
 - b. envisions an arched rock ramp only on the Georgia side (thalweg, where upstream and downstream migrating sturgeons and American shad in rivers prefer to migrate) and an unnotched top weir (for water level regulation) that would be a barrier to upstream migrant sturgeons but which would guide sturgeons to the Georgia side arched rock ramp system and the notched top weir.
2. Evaluate a conceptual model that compares the existing arch ramp and weir alternatives with the proposed smaller arch fishway (and any other smaller fishway designs) for water level control, hydraulic characteristics at the top weir, arch structures, and (for sturgeon and American shad) the probability of upstream and downstream migration success and of injury/stranding.

Literature Cited

Kynard, B., M. Horgan, D. Pugh, E. Henyey, and T. Parker (2008). Using juvenile sturgeons as a substitute for adults: a new way to develop fish passage for large fish. American Fisheries Society Symposium 61: 1-21.

Warren, J., and L. G. Beckman (1993). Fishway use by white sturgeon on the Columbia River. Document WSG-AS-93-02, Washington Sea Grant Program, Seattle, Washington.

Final Panel Comment 12

The likelihood of lower flows due to climate change and/or increased water supply allocations, the potential impacts of lower flows on project performance, and potential adaptations should lower flows occur are not addressed in the IPAAR/SEA.

Basis for Comment

The analysis presented presumes that the project will experience the current range of low flows (3,600 to 8,000 cfs) through the foreseeable future. This flow regime is maintained due to the operations of Thurmond Dam. However, it is possible that future changes to dam operations might result in lower flow releases from the dam.

Although Appendix K, Climate Change Assessment, determined that this watershed is not particularly vulnerable to climate change compared to other watersheds nationally, its water supply function is more vulnerable to climate change than other watersheds in the region (Appendix K, Section 1.3). Combined with the fact that a portion of Savannah River flows is already being diverted for that purpose at upstream reservoirs, it can be anticipated both that climate change may alter the water yield of the basin upstream of the Thurmond Dam and that population changes and/or changes to the reservoir drought plans may alter the water available for discharge downstream. Either of these scenarios, if realized, would modify the future flow regime experienced by the project and, depending on project design, lower flows may have the potential to negatively affect fish passage performance.

Significance – Medium

If future conditions resulted in lower-than-anticipated flows, the project could function less effectively than desired. Mitigation of this risk, if significant, could impact alternative selection and/or the incorporation of design features needed to provide for adequate passage for these lower flows.

Recommendations for Resolution

1. Describe the likelihood and uncertainty/probability of changes to flow reductions due to both climate change and potential increases in water supply withdrawals.
2. Discuss whether (1) potential flow changes due to either climate change or increased upstream water supply withdrawals, or both, would affect fish passage project performance, (2) any of the alternatives would be relatively more vulnerable than others to reduced performance, and (3) any measures will be incorporated into the design of the final project to lower the risk of reduced performance.

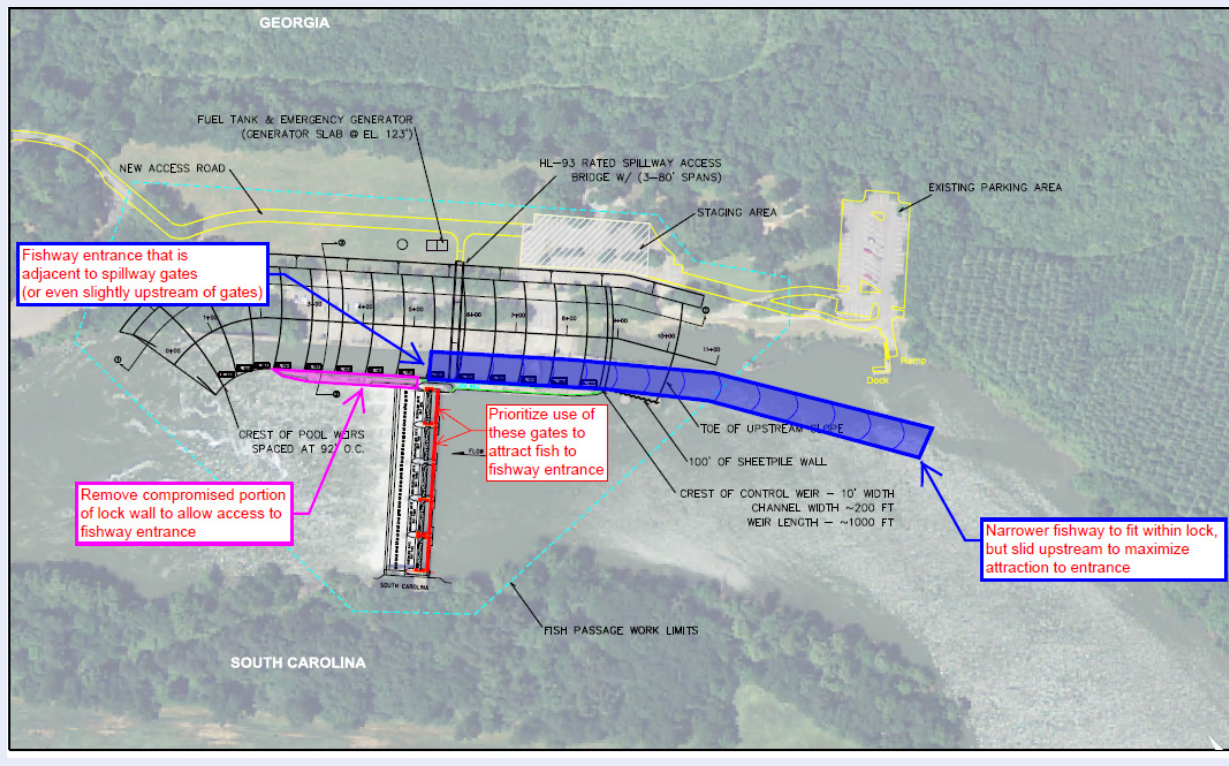
Final Panel Comment 13

The alternatives which retain the lock and spillway gates (the NAA and Alternative 1-1) do not take into consideration a key tenet of fishway design, which is to locate the entrance of the fishway as close as possible to the upstream barrier.

Basis for Comment

One of the key tenets of fishway design is to locate the entrance of the fishway as close as possible to the upstream barrier. This principle does not seem to have been considered in either of the two alternatives (NAA and Alternative 1-1) which retain the lock and spillway gates.

Sections 3.6.6.1 and 3.6.6.2 of the IPAAR/SEA state that the National Oceanic Atmospheric Administration believes the NAA and Alternative 1-1 will likely lead to delay of immigrating fish "...because the entrance to the fish passage structure is approximately 450 feet downstream from the existing gate system of the dam. Therefore, during high flow conditions, false attraction to the operating gates will lead immigrating fish to the dam and not the fish passage structure thereby causing a migratory delay." It is unclear why the IPAAR/SEA does not consider options that repair and retain spillway gates and establish a fishway layout that locates the fishway entrance adjacent to the spillway gates to mitigate the concern for false attraction and delay. This option could be achieved by removing the compromised portion of the lock wall downstream of the spillway gates, as shown in the following illustration revised from the Concept Design Drawing for Alternative 1-1 (Appendix A of the IPAAR/SEA, Attachment 1):



Final Panel Comment 13

Regarding Alternative 1-1 specifically, the rating of “0” for fish passage in Table 29 (p. 100 of the IPAAR/SEA) could be upgraded to a rating of “1” if the compromised portion of the lock wall downstream of the spillway gates were removed and the fishway entrance were moved upstream to be adjacent to the spillway gates.

Presumably, during the development of alternatives, the consideration of fishway size/width was focused on trying to maximize the flow that would be conveyed down the fishway to maximize attraction to the fishway. However, this approach results in a larger fishway, and it is difficult to place a large fishway entrance immediately adjacent to the spillway gate structure. If the entrance to the fishway were placed immediately adjacent to or even upstream of the spillway gates, and the gates closest to the fishway entrance were opened first as river flows increased, then fish would be attracted to those gates and would quickly find the adjacent fishway entrance. An example of this type of fishway layout developed specifically for sturgeon is shown in the following photograph (Lenney, 2018):



Significance – Medium/Low

Without an exhaustive review of potential fishway alternatives, including alternatives that locate the fishway entrance as close as possible to the upstream barrier (i.e. the spillway gates), the Formulation of Alternative Plans (Section 3.0) in the IPAAR/SEA is incomplete.

Final Panel Comment 13

Recommendation for Resolution

1. Consider analyzing the following alternatives in the IPAAR/SEA, or explain why such alternatives were not considered:
 - a. Alternatives that retain the spillway gates and locate the entrance of the fishway as close as possible to the gates.
 - b. Alternatives that remove the compromised portion of the lock wall downstream of the spillway gates while retaining the rest of the lock and spillway gates.
 - c. Alternatives with smaller-sized fishways that could rely on the discharge from an adjacent spillway gate to provide supplemental attraction flow to draw migrating fish to the fishway entrance.

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Lenney, C. (2018). Unique passage around Heuvelton dam on Oswegatchie River entering final stage. *Watertown Daily Times*. October 15, 2018. Accessed from: <http://www.watertowndailytimes.com/news05/unique-passage-around-heuvelton-dam-on-oswegatchie-river-entering-final-stage-20181015>.

Final Panel Comment 14

It is unclear whether the 13 properties, in addition to the NSBLD, identified as “historic properties” meet that definition under Section 106 of the NHPA (36 CFR 800.16(l)(1)).

Basis for Comment

Section 2.2.9, Cultural Resources, begins with the statement that “Cultural resources presented in this section are those defined by the NHPA as properties listed, or eligible for listing, in the National Register of Historic Places (NRHP) and are referred to as historic properties.” The statement is consistent with the regulations governing Section 106 of the NHPA, which defines the term “historic property” to mean “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior” (36 CFR 800.16(l)(1)). The term “eligible for inclusion in the National Register” includes properties that have been formally determined eligible and all others that meet the NRHP criteria (36 CFR 800.16(l)(2)).

The IPAAR/SEA states that 14 historic properties are located within the project’s area of potential effects (APE) (p. 35). One of those properties is the NSBLD, which was determined eligible for the NRHP during consultation among the USACE and the South Carolina and Georgia State Historic Preservation Officers (SHPOs) for the SHEP in 2013 (p. 39 and Appendix D, Environmental Correspondence). It is not clear which, if any, of the other 13 properties have been evaluated for NRHP eligibility and qualify as historic properties under the NHPA. The IPAAR/SEA states that information about those properties was gathered through a search of geographic information systems and online cultural resource information systems maintained by the South Carolina and Georgia SHPOs (p. 33), and that most appear to have been identified during cultural resource surveys conducted in the late 1970s and early 2000s for projects that are unrelated to the SHEP (p. 39). Based on the cursory information provided about those properties, it appears that at least some have not been evaluated for NRHP eligibility and should not be classified as historic properties.

The IPAAR/SEA also states that during a bathymetric survey in January 2018, USACE discovered a training wall and three other structures that may be remnants of various navigation features mentioned in Chief of Engineers reports from the late 1880s to the mid-1930s (p. 40). The features were not further investigated, and no NRHP eligibility determination was made.

Public comments on the IPAAR/SEA suggest that the park adjoining the NSBLD (NSBLD Park) has potential local significance in the history of recreation and race relations (Comment 258, Cities of Augusta, Georgia, and North Augusta, South Carolina; Comment 274, Southern Environmental Law Center; and Comment 278, Savannah Riverkeeper®). This park, along with other potentially significant archaeological and historic resources that may be discovered during the additional historic property identification efforts proposed in Section 2.2.9, warrants an evaluation for eligibility for listing in the NRHP before a finding of effect for the Recommended Plan is made pursuant to 36 CFR 800.5.

Significance – Medium/Low

Due to the lack of specificity regarding which previously identified resources within the APE qualify as historic properties, the discussion of project impacts in Section 3.6.9 is unclear and potentially inaccurate.

Final Panel Comment 14

Recommendations for Resolution

1. Revise the discussion of the 13 properties (p. 39) to clearly state the NRHP eligibility status of each property.
2. Include a description of the NSBLD Park and its potential historic significance in Section 2.2.9.
3. State in Section 2.2.9 that the National Register criteria for evaluation will be applied to all potentially significant properties in the APE, including the NSBLD Park and those that may be identified during the proposed historic resources and archaeological surveys, and that the effects of the project will be assessed for all properties that are eligible for inclusion in the National Register before a final determination of effect for the project is made.
4. In Section 3.6.9, delete from the discussion of the project alternatives' impacts on historic properties any references to impacts on properties that do not qualify as historic properties or have not yet been evaluated for NRHP eligibility.

Final Panel Comment 15

The IPAAR/SEA does not adequately convey the status of the NHPA Section 106 consultation process or the extent to which consulting party input has been (and will be) considered.

Basis for Comment

Based on the record contained in Appendix D, the Section 106 consultation process, as outlined in 36 CFR Part 800, is still in its earliest phase (36 CFR 800.3), making some of the statements in the IPAAR/SEA regarding findings of effect and potential mitigation premature. In early February 2018, USACE notified the South Carolina and Georgia SHPOs that it was revising the manner in which the fish passage that had been authorized under the SHEP would be constructed in order to comply with Section 1319 of the WIIN Act. In short, the current alternatives being considered are wholly different from the original authorized fish passage design, and the original project did not include the conveyance of the 50 acres of land that will require archaeological survey. With the letter to the SHPOs, USACE supplied some information (not provided in Appendix D) about the alternatives being considered and requested their comments.

The South Carolina and Georgia SHPOs agreed with USACE that all of the proposed alternatives would adversely affect the NSBLD. Although Historic American Engineering Record documentation and interpretive signage were mentioned by the Georgia SHPO as possible mitigation, both SHPOs recommended that further consultation was necessary to resolve adverse effects. Both SHPOs also stated that additional information was needed about archaeological resources in order to assess project effects and to continue consultation to resolve adverse effects. USACE indicated in the IPAAR/SEA that (1) archaeological investigations would be conducted at a later date and would be carried out under the terms of the Programmatic Agreement executed for the SHEP in 2013, and (2) investigations pertaining to “historic resources” would be undertaken in accordance with the Section 106 regulations.

USACE also contacted, via email, Historic Augusta and the Augusta-Richmond Historical Society to determine their interest in participating in the consultation. Historic Augusta responded that it would like to participate, but there is no record that any further correspondence or information about the project was supplied. No response from Augusta-Richmond Historical Society was included in Appendix D.

Native American tribes or other parties may wish to be parties to the consultation, depending on the results of the archaeological investigations of the 50-acre parcel to be conveyed out of Federal ownership and the effort to complete historic property identification.

A significant amount of work remains to complete the Section 106 process. The IPAAR/SEA would benefit from explanations about the process that would be followed for considering input from the consulting parties during the project design, the timing of the archaeological and historic property surveys, the assessment of project effects, and the consultation required to resolve adverse effects (36 CFR 800.4–800.6).

Final Panel Comment 15

Significance – Medium/Low

A discussion in the IPAAR/SEA of the status of the consultation and the input that the consulting parties would have in the design of the project will convey how USACE will comply with the spirit of Section 106 as a consultative process.

Recommendations for Resolution

1. State that the results of the additional cultural resources investigations, including an assessment of the effects of the Recommended Plan on all historic properties identified in the APE, will be supplied to any parties that express interest in participating in the consultation for review and comment. Also state that upon receipt of comments, USACE will make a finding of effect and consult with those parties to seek ways to avoid, minimize, or mitigate any adverse effects.
2. Consider treating the current project as a separate undertaking from the SHEP for the purposes of Section 106, and consult with the parties on that basis.
3. State that a Memorandum of Agreement will be developed in consultation with the consulting parties to specify the activities that will be carried out to mitigate adverse effects of the selected alternative on historic properties, including those that may be discovered during the archaeological investigations and historic property survey.

Final Panel Comment 16

The alternatives analysis does not evaluate the relative impacts of the alternatives that would avoid or minimize adverse effects on the NSBLD.

Basis for Comment

Section 3.6.9 of the report does not discuss the relative impacts of the NAA, Alternative 1-1, or Alternatives 2-3, 2-6a-d, and 2-8 on the NSBLD or the extent to which the consideration of those impacts factored into the selection of the Recommended Plan. Each alternative is correctly characterized as having an adverse effect on the structure, and the affected characteristics of significance are mentioned; however, the different overall effects of the alternatives on the NSBLD are not compared. The selection of Alternative 1-1, for example, would minimize the effects of the project on the NSBLD and, if designed in a sensitive manner, could be preferable over the NAA. Alternative 1-1 also would obviously minimize impacts compared to the full removal of the structure contemplated under all of the Alternative 2 proposals, including the Recommended Plan.

Significance – Medium/Low

The lack of discussion of relative impacts calls into question the extent to which the effects of the project on NSBLD were considered in the selection of the alternatives.

Recommendation for Resolution

1. Include an evaluation of the relative impacts of NAA, Alternative 1-1, or Alternatives 2-3, 2-6a-d, and 2-8 on the NSBLD in the discussion in Section 3.6.9.

Final Panel Comment 17

The IPAAR/SEA is unclear regarding the overall daily range, likelihood, and uncertainty/probability of post-project water level fluctuations given the loss of gate management that currently manages upstream water levels.

Basis for Comment

Section 3.6 of the IPAAR/SEA (pp. 70-71) states that the NSBLD gates are currently operated several times per day to maintain relatively stable upstream water level conditions. The Panel understands this to mean that the purpose of this activity is to moderate the water level impacts of changing flows from Stevens Creek Dam, which is operated to attenuate the large intra-daily flow changes from Thurmond Dam. Removal of the NSBLD gates would eliminate this opportunity to moderate the water level conditions within the pool upstream of NSBLD, and water levels would be expected to fluctuate more on a daily or hourly basis.

Figure 31 (p. 72 of the IPAAR/SEA) presents a range of water levels for the 8,000-cfs flow under existing conditions. Presumably, the range of water levels for a given flow would be reduced after the gates are removed; however, the pool level may change more often in response to changes in upstream inflows. As noted in Section 4.9 of the IPAAR/SEA (p. 112), “Residents and business owners may not be aware (of) water level fluctuations in the pool without the lock and dam”; however, the anticipated nature of these fluctuations is not described in the IPAAR/SEA or its appendices.

Finally, Section 3.6.2 (p. 71) of the IPAAR/SEA attributes the increased incidence in fluctuation of the pool level to construction of the fish passage structure rather than to the actual reason for increased fluctuation: removal of the gates. This is an important distinction to be made to members of the public who might incorrectly attribute potential negative impacts to construction of the fish passage structure itself.

Significance – Medium/Low

Accurate information on pool levels and water level fluctuations should be presented to the affected public, but the information is unlikely to affect alternative selection because the differences between alternatives will likely be small.

Recommendations for Resolution

1. Incorporate a probabilistic analysis of the post-project water level fluctuation regime, including the likely magnitude of sub-daily fluctuations, seasonal effects, and potential impacts of these fluctuations on recreation and water supply uses, into Appendix A, and summarize the findings in Section 3.6 of the IPAAR/SEA.
2. State clearly in the IPAAR/SEA that increased fluctuations in water levels would be due to the removal of gate control, not the construction of the fish passage facility.

Final Panel Comment 18

The description of the change in “normal” water level conditions under the NAA is unclear.

Basis for Comment

Section 3.6.2 (p. 71) states that “Any modifications to the structure of NSBLD are likely to have an impact on water surface elevations...”, but given the unusual nature of the NAA and its significant difference from “existing” conditions, it would be more accurate and more informative to say that all of the alternatives under consideration would result in lower water levels during normal flows, relative to existing flows.

Section 3.6.2.1 indicates that the NAA pool elevation at the dam would be 113.2 feet NGVD29 (114.0 feet NAVD88) for a flow of 8,000 cfs. This elevation is inconsistent with Figure 31, which shows an elevation of 113.2 feet NAVD88 for a flow of 8,000 cfs.

Section 3.6.2.1 also presents an “average” normal pool elevation. Since 114.0 feet NGVD29 (114.8 feet NAVD88) is higher than the range of elevations for 8,000 cfs at the dam (from Figure 31), it is not clear where the location of this “average” normal pool elevation is and whether it represents existing conditions or some other condition.

In addition, Section 3.6.2.1 identifies elevation 114.2 feet NAVD88 as “0.8 feet lower than existing” at the 5th Street Bridge during normal flow conditions. This elevation is inconsistent with the other sections, which describe the existing normal pool elevation at the 5th Street Bridge as 114.3 feet NAVD88. Given the close alignment of the NAA and Alternative 1-1 profiles in Figure 31, it appears that the NAA elevation at the 5th Street Bridge is actually lower than 114.2 feet NAVD88.

The alternation of NAVD88 and NGVD29 elevations in Section 3.6.2.1 reduces the consistency and clarity of the discussion of impacts and comparison of differences between alternatives.

In general, the effects of each alternative are compared relative to the NAA. In Sections 3.6.2.2 through 3.6.2.8, the water levels for each alternative are compared to the existing condition but not to the NAA. While this information is informative and should be retained, the difference in water level relative to the NAA should also be presented.

Significance – Medium/Low

A clear, consistent description of the difference in water level conditions between the NAA and the other project alternatives would clarify the discussion of impacts and the comparison of alternatives.

Recommendations for Resolution

1. Clearly state in Section 3.6.2 that all of the alternatives described in the IPAAR/SEA (including the NAA) will result in a lower water level under “normal flow” conditions relative to the existing structure.
2. Revise the description of NAA water level conditions in Section 3.6.2.1, specifically focusing on datum consistency and on consistency between Figure 31 and other portions of Section 3.6.2.
3. Report the difference in water levels between each alternative and the NAA, as well as the difference relative to existing conditions. A table might be appropriate.

Final Panel Comment 18

4. Report elevations in Section 3.6.2.1 as NAVD88, with NGVD29 elevations in parentheses where appropriate.

Final Panel Comment 19

The evaluation of wetland impacts does not take into consideration impacts of changed water level conditions on wetlands located beyond the immediate vicinity of the proposed construction work.

Basis for Comment

Section 3.6.4 describes impacts to wetlands within the area disturbed by construction activities. However, it does not discuss all impacts to wetlands due to the presence of the constructed project. All of the project alternatives would create water level conditions that would differ from existing conditions, and the different water level conditions have the potential to affect the composition and function of plant and animal communities in wetlands influenced by the pool water level, extending from the lock and dam upstream to Stevens Creek Dam. Potential dewatering of wetlands and impacts to wetlands were raised as concerns by several public comments and should be addressed in the report.

Significance – Medium/Low

Without a discussion of all wetlands impacted by the project, the IPAAR/SEA is incomplete; however, these impacts are unlikely to be significant enough to affect alternative selection.

Recommendation for Resolution

1. Discuss potential impacts to the upstream wetlands affected by changes in the pool water level regime.

Final Panel Comment 20

Potential changes to sediment transport due to construction of the fish passage structure and risk of habitat loss on the downstream gravel bar are not evaluated in the IPAAR/SEA.

Basis for Comment

Each of the project alternatives will change the downstream hydraulic conditions by shifting the distribution of flow across the channel. These hydraulic changes have the potential to affect the transport of sediment in this area, which under current conditions has formed a gravel bar downstream of the dam.

The Sedimentation Evaluation (dated August 9, 2018) states that all of the alternatives would “limit the source of sediment to accumulate at the gravel bar” and that “the gravel bar may shift and re-deposit in areas down river.” The Section 7(a)(2)/7(d) Evaluation identifies this bar as critical habitat for Atlantic sturgeon, and states that this project “May Affect but Not Adversely Modify” the habitat on this bar.

Significance – Medium/Low

A sediment transport evaluation would support the assumption that the project will not adversely modify the critical habitat immediately downstream.

Recommendations for Resolution

1. Evaluate the potential impacts of the constructed project on downstream hydraulic conditions and sediment dynamics during final design.
2. Evaluate impacts on the downstream gravel bar and consider incorporating measures to limit potential habitat loss.

Final Panel Comment 21

The assumptions behind the applicability of using one-dimensional (1D) roughness values in a two-dimensional (2D) model are not presented in the Engineering Appendix.

Basis for Comment

The roughness values listed in Appendix A, Engineering, Table 5 (p. A-15) were originally developed for 1D channel modeling. For this project, these values were used for 2D modeling of flooding effects. 2D flow modeling uses different model equations and flow assumptions than 1D modeling, so roughness values developed for one approach may not always be appropriate for use in the other. The Panel anticipates, however, that any changes to the analysis results would likely be minor if the roughness values were adjusted.

Significance – Low

The use of 1D roughness values for 2D modeling of flooding impacts is unlikely to change the overall conclusions of the modeling analysis.

Recommendation for Resolution

1. Provide additional justification for the applicability of the roughness values used for 2D modeling in Section 2.2.2.4 of Appendix A.

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APPENDIX A

IEPR Process for the SHEP NSBLD IPAAR/SEA Project

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A.1 Planning and Conduct of the Independent External Peer Review (IEPR)

Table A-1 presents the major milestones and deliverables of the Independent External Peer Review (IEPR) for the Savannah Harbor Expansion Project (SHEP) Georgia and South Carolina, Fish Passage at New Savannah Bluff Lock and Dam (NSBLD) Integrated Post-Authorization Analysis Report and Environmental Assessment (hereinafter: SHEP NSBLD IPAAR/SEA IEPR). Due dates for milestones and deliverables are listed in Table A-1. The review documents were provided by U.S. Army Corps of Engineers (USACE) on March 11, 2019. Note that the actions listed under Task 6 occur after the submission of this report. Battelle anticipates submitting the pdf printout of the USACE's Design Review and Checking System (DrChecks) project file (the final deliverable) on July 23, 2019. The actual date for contract end will depend on the date that all activities for this IEPR are conducted and subsequently completed.

Table A-1. Major Milestones and Deliverables of the SHEP NSBLD IPAAR/SEA IEPR

Task	Action	Due Date
1	Award/Effective Date	4/27/2018
	Review documents available	3/11/2019
	Public comments available	4/29/2019
	Battelle submits draft Work Plan ^a	11/7/2018
	USACE provides comments on draft Work Plan	11/28/2018
	Battelle submits final Work Plan ^a	12/18/2018
2	Battelle submits list of selected panel members ^a	11/13/2018
	USACE confirms the panel members have no COI	11/28/2018
3	Battelle convenes kick-off meeting with USACE	12/11/2018
	Battelle convenes kick-off meeting with panel members	2/12/2019
	Battelle convenes kick-off meeting with USACE and panel members	2/14/2019
	Battelle and Panel participate in a site visit with USACE	3/13/2019
4	Panel members complete their individual reviews	4/9/2019
	Panel members provide draft Final Panel Comments to Battelle	4/22/2019
	Battelle sends public comments to panel members for review	4/30/2019
	Panel determines that a Final Panel Comment is necessary with regard to the public comments	5/8/2019
	Panel finalizes Final Panel Comments	5/10/2019
5	Battelle submits Final IEPR Report to USACE ^a	5/16/2019
6	Battelle convenes Comment Response Teleconference with panel members and USACE	7/1/2019
	Battelle submits pdf printout of DrChecks project file ^a	7/17/2019
	Contract End/Delivery Date	10/31/2019

^a Deliverable.

Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., terminology to use, access to DrChecks, etc.). Any revisions to the schedule were submitted as part of the final Work Plan; however, changes in the schedule continued after submission of the final Work Plan, due to delays in the receipt of documents. The final charge consisted of 29 charge questions provided by USACE, two overview questions and one public comment question added by Battelle (all questions were included in the draft and final Work Plans), and general guidance for the Panel on the conduct of the peer review (provided in Appendix C of this final report).

Prior to beginning their review and after their subcontracts were finalized, all the members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication procedures, and other pertinent information for the Panel. Battelle planned and facilitated a second kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meetings, the IEPR Panel received an electronic version of the final charge, as well as the review documents and reference/supplemental materials listed in Table A-2.

Table A-2. Documents to Be Reviewed and Provided as Reference/Supplemental Information

Review Documents	No. of Pages
Main Report: Integrated Post Authorization Analysis & Environmental Assessment	139
Appendix A: Engineering Appendix (4 files)	93
Water Intake Mitigation Analysis Report	1,266
Appendix B: Cost Engineering	8
Appendix C Environmental Resources Documentation	200
Appendix E - Real Estate Appendix	40
Appendix G – Recreation Analysis	21
Appendix K – Climate Change Assessment	35
Total No. of Review Pages	1,802
Supplemental Information^a	No. of Pages
SHEP Cultural Programmatic Agreement	25
Public Comments	121+
SHEP EIS	415
SHEP NSBL&D Fish Passage Georgia and South Carolina Basis of Design (Tetra Tech)	708
Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes	52
Appendix D Environmental Correspondence Documentation	512
Total No. of Reference Pages	1,833+

^a Supporting documentation only. These documents are not for Panel review and should be used as information sources only. They are not included in the total page count.

In addition to the materials provided in Table A-2, the panel members were provided the following USACE guidance documents.

- USACE guidance, *Review Policy for Civil Works* (EC 1165-2-217), February 20, 2018
- Office of Management and Budget, *Final Information Quality Bulletin for Peer Review*, December 16, 2004.

A.2 Site Visit

A site visit to the New Savannah Bluff Lock and Dam (NSBLD) in Augusta, Georgia, was held on March 13, 2019. All five panel members and one Battelle staff member attended. USACE, Battelle staff, and the panel members toured the lock and dam facilities while discussing the current operation of the dam facilities and the current mechanical and structural problems. USACE pointed out the anticipated potential areas that may flood during extreme high-flow events and areas where the future construction will take place for the various portions of fish passage.

Throughout the site visit, USACE staff pointed out specific project features to help the panel members better comprehend previous events, repairs, and issues associated with the existing project features and the intent of the project demolition and construction. USACE staff then answered questions posed by the panel members. This tour provided an opportunity for the panel members to see the project area and project features and to ask clarifying questions of the USACE Project Delivery Team (PDT).

A.3 Review of Individual Comments

The Panel was instructed to address the charge questions/discussion points within a charge question response form provided by Battelle. At the end of the review period, the Panel produced individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. At the end of the review, Battelle summarized the individual comments into a preliminary list of overall comments and discussion points. Each panel member's individual comments were shared with the full Panel.

A.4 IEPR Panel Teleconference

Battelle facilitated a teleconference with the Panel so that the panel members could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the Final IEPR Report and decide which panel member should serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final IEPR Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of significant importance to the findings, and merged any related individual comments. At the conclusion of the teleconference, Battelle reviewed each Final Panel Comment with the Panel, including the associated level of significance, and confirmed the lead author for each comment.

The Panel also discussed responses to specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be conflicting. Each comment

was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

A.5 Preparation of Final Panel Comments

Following the teleconference, Battelle distributed a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the SHEP NSBLD IPAAR/SEA IEPR:

- **Lead Responsibility:** For each Final Panel Comment, one panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed a summary email detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with the other panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Panel Comments:** Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium/high, medium, medium/low, and low; see descriptions below)
 4. Recommendation(s) for Resolution (see description below).
- **Criteria for Significance:** The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. **High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 2. **Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 3. **Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.
 4. **Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is

uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan.

5. Low: There is a minor technical or scientific discrepancy or inconsistency that affects the clarity, understanding, or completeness of the study documents but does not influence the selection of, justification of, or ability to implement the recommended plan.

- Guidelines for Developing Recommendations: The recommendation section was to include specific actions that USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. At the end of this process, 21 Final Panel Comments were prepared and assembled. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The full text of the Final Panel Comments is presented in Section 4.2 of the main report.

A.6 Conduct of the Public Comment Review

Following the schedule in Table A-1, Battelle received a PDF file containing 346 public comment letters on the SHEP NSBLD IPAAR/SEA from USACE. Battelle then sent the public comments to the panel members in addition to the following charge question:

- 1. Do the public comments raise any additional discipline-specific technical concerns with regard to the overall report?**

The Panel produced individual comments in response to the charge question. Each panel member's individual comments for the public comment review were shared with the full Panel. Battelle reviewed the comments to identify any new technical concerns that had not been previously identified during the initial IEPR. Upon review, Battelle determined, and the Panel confirmed, that one new concern was identified in addition to those already covered in the Final Panel Comments. The Panel also noted that some of the issues raised in the public comments were similar to concerns raised in the IEPR Final Panel Comments, particularly regarding other alternatives that retain the spillway to "maintain the pool for navigation, water supply, and recreational activities, as in existence on the date of enactment of the WIIN Act."

A.7 Final IEPR Report

After concluding the review and preparation of the Final Panel Comments, Battelle prepared a final IEPR report (this document) on the overall IEPR process and the IEPR panel members' findings. Each panel member and Battelle technical and editorial reviewers reviewed the IEPR report prior to submission to USACE for acceptance.

A.8 Comment Response Process

As part of Task 6, Battelle will enter the 21 Final Panel Comments developed by the Panel into USACE's DrChecks, a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator

Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle. Battelle will provide USACE and the Panel a pdf printout of all DrChecks entries, through comment closeout, as a final deliverable and record of the IEPR results.

APPENDIX B

Identification and Selection of IEPR Panel Members for the SHEP NSBLD
IPAAR/SEA Project

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B.1 Panel Identification

The candidates for the Savannah Harbor Expansion Project (SHEP), Georgia and South Carolina, Fish Passage at New Savannah Bluff Lock and Dam (NSBLD) Integrated Post-Authorization Analysis Report and Environmental Assessment (hereinafter: SHEP NSBLD IPAAR/SEA IEPR) Panel were evaluated based on their technical expertise in the following key areas: planning formulator/economist, environmental law and compliance, cultural resources specialist, hydraulic engineer, and general engineer. These areas correspond to the technical content of the review documents and overall scope of the SHEP NSBLD IPAAR/SEA project.

To identify candidate panel members, Battelle reviewed the credentials of the experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle evaluated these candidate panel members in terms of their technical expertise and potential conflicts of interest (COIs). Of these candidates, Battelle chose the most qualified individuals, confirmed their interest and availability, and ultimately selected five experts for the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

Candidates were screened for the following potential exclusion criteria or COIs. These COI questions were intended to serve as a means of disclosure in order to better characterize a candidate's employment history and background. Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. Guidance in OMB (2004, p. 18) states,

“...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects.”

The term “firm” in a screening question referred to any joint venture in which a firm was involved. It applied to any firm that serves in a joint venture, either as a prime or as a subcontractor to a prime. Candidates were asked to clarify the relationship in the screening questions.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the SHEP NSBLD IPAAR/SEA

1. Previous and/or current involvement by you or your firm in the Savannah Harbor Expansion Project (SHEP), Georgia and South Carolina, Fish Passage at New Savannah Bluff Lock and Dam (NSBLD) Integrated Post-Authorization Analysis Report and Environmental Assessment (SHEP NSBLD IPAAR/SEA) and related projects.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the SHEP NSBLD IPAAR/SEA

2. Previous and/or current involvement by you or your firm related to the Savannah River and the NSBLD.
3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&M) of any projects in the SHEP NSBLD IPAAR/SEA and related projects.
4. Current employment by the U.S. Army Corps of Engineers (USACE).
5. Previous and/or current involvement with paid or unpaid expert testimony related to SHEP NSBLD IPAAR/SEA
6. Previous and/or current employment or affiliation with members of the cooperating agencies or any of the following cooperating Federal, State, County, local and regional agencies, environmental organizations, and interested groups (*for pay or pro bono*):
 - Georgia Ports Authority
 - Georgia Department of Transportation
 - U.S. Environmental Protection Agency, Region 4
 - National Marine Fisheries Service, Southeast Regional Office
 - U.S. Fish and Wildlife Service, Southeast Region
 - South Carolina Department of Health and Environmental Control
 - Georgia Department of Natural Resources.
 - Savannah Riverkeeper®
7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to Savannah Harbor, the City of North Augusta, South Carolina, and Augusta, Georgia.
8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, Engineer Research and Development Center [ERDC], etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Savannah District.
9. Previous or current involvement with the development or testing of models that will be used for, or in support of the SHEP NSBLD IPAAR/SEA project.
10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Savannah District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Savannah District. Please explain.

Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the SHEP NSBLD IPAAR/SEA

11. Any previous employment by USACE as a direct employee, notably if employment was with the Savannah District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
12. Any previous employment by USACE as a contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the Savannah District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood management and fish passages, and include the client/agency and duration of review (approximate dates).
14. Pending, current, or future financial interests in SHEP NSBLD IPAAR/SEA related contracts/awards from USACE
15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.
16. Significant portion of your personal or office's revenues within the last three years came from Georgia Department of Transportation contracts.
17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the SHEP NSBLD IPAAR/SEA.
18. Participation in relevant prior and/or current Federal studies relevant to this project and/or SHEP NSBLD IPAAR/SEA.
19. Previous and/or current participation in prior non-Federal studies relevant to this project and/or SHEP NSBLD IPAAR/SEA.
20. Has your research or analysis been evaluated as part of the SHEP NSBLD IPAAR/SEA?
21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.

Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

B.2 Panel Selection

In selecting the final members of the Panel, Battelle chose experts who best fit the expertise areas and had no COIs. Table B-1 provides information on each panel member's affiliation, location, education, and overall years of experience. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. USACE was given the list of candidate panel members, but Battelle selected the final Panel.

Table B-1. SHEP NSBLD IPAAR/SEA IEPR Panel: Summary of Panel Members

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
Planning Formulator / Economist					
J. Walter Milon	Independent consultant	Orlando, FL	Ph.D., Economics	N/A	38
Environmental Law and Compliance					
Boyd Kynard	BK-Riverfish, LLC	Amherst, MA	Ph.D., Fisheries Biology	N/A	39
Cultural Resources Specialist					
Stephen Olausen	Public Archaeology Laboratory, Inc	Pawtucket, RI	M.A., Applied History and Historic Preservation	N/A	31
Hydraulic Engineering					
Michael Schwar	Stony Point Hydrology, LLC	Mukwonago, WI	Ph.D., Civil and Environmental Engineering	Yes	25+
General Engineering					
Jesse Waldrip	Kleinschmidt Associates	Lexington, SC	B.S., Civil Engineering	Yes	18

Table B-2 presents an overview of the credentials of the final five members of the Panel and their qualifications in relation to the technical evaluation criteria. More detailed biographical information on the panel members and their areas of technical expertise is given in Section B.3.

Table B-2. SHEP NSBLD IPAAR/SEA IEPR Panel: Technical Criteria and Areas of Expertise

Technical Criterion	Milon	Kynard	Olausen	Schwar	Waldrip
Planning Formulator/Economist					
Minimum 15 years of demonstrated experience in economics	X				
M.S. degree or higher in economics	X				
Senior water resources planner with experience in plan formulation, including least cost analysis and fish passage	X				
Expert in the field of economics, with thorough understanding of life-cycle cost analysis, least cost analysis, and recreation economics	X				
Familiarity with USACE plan formation processes, procedures, and standards as they relate to ecosystem restoration and inland navigation	X				
Environmental Law and Compliance					
Minimum 15 years of experience directly related to water resources environmental evaluation or review and National Environmental Policy Act (NEPA) compliance		X			
M.S. degree or higher in a related field		X			
Expert in the field of fish passage, with knowledge of Atlantic and shortnose sturgeon behavior and performance requirements, and thorough understanding of fish passage for anadromous and resident migratory fish		X			
Familiarity with the habitat, fish, and wildlife species that may be affected by the project alternatives in this study area		X			
Familiarity with fisheries (spawning, rearing, freshwater migration), with knowledge of riverine systems		X			
Familiarity and experience with United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) (USFWS, 1980), Endangered Species Act (ESA), Clean Water Act, and essential fish habitat (EFH)		X			
Cultural Resources Specialist					
Minimum of 10 years of experience directly related to historic structure evaluation or review and National Historic Preservation Act (NHPA) compliance			X		
M.S. degree or higher in historic preservation, architectural history, public history, history or a related field (waived by USACE due to years of experience)			X		
Expert in the field of architectural history with knowledge of industrial architecture			X		

Table B-2. SHEP NSBLD IPAAR/SEA IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Milon	Kynard	Olausen	Schwar	Waldrip
Cultural Resources Specialist					
Familiarity and experience with cultural resource survey work, the Secretary of the Interior's Standards for Archeology and Historic Preservation, the National Register Program, Heritage Documentation Programs, and the applicable Code of Federal Regulations (CFR)			X		
Expertise in compliance with environmental laws, policies, and regulations, including compliance with National Environmental Policy Act (NEPA)			X		
Knowledge of construction impacts on historic structures is preferred			X		
Hydraulic Engineer					
A registered professional engineer				X	
Minimum 10 years of experience in large river engineering project and hydraulic theory and practice				X	
M.S. degree or higher in engineering in the field of riverine hydraulics and water control structures				X	
A thorough understanding of large Civil Works hydraulic control structures and fish passage facilities associated with anadromous fish of the southeastern United States				X	
Expertise in hydraulic modeling, including familiarity with the USACE Hydrologic Engineering Center-River Analysis System (HEC-RAS) 4.0 and requirements and regulations for Civil Works structures to include dam safety and floodplain inundation				X	
Familiarity with large, complex Civil Works lock and dam projects with high public and interagency interests is preferred				X	
General Engineer					
A registered professional engineer					X
Minimum 10 years of experience in engineering theory and practice of water control and fish passage structures associated with anadromous fish of the southeastern United States					X
Experience in engineering with an emphasis on design and construction of large river engineering projects					X
Experience in the design and construction of low-head dams and fish passage structures as well as USACE rules and regulations for Civil Works dams					X

Table B-2. SHEP NSBLD IPAAR/SEA IEPR Panel: Technical Criteria and Areas of Expertise (continued)

Technical Criterion	Milon	Kynard	Olausen	Schwar	Waldrip
General Engineer					
Specific area of expertise includes civil/site design, electrical systems, mechanical systems, and structural design					X
Familiarity with large, complex Civil Works dam projects with high public and interagency interests					X

B.3 Panel Member Qualifications

Detailed biographical information on each panel members' credentials and qualifications and areas of technical expertise are summarized in the following paragraphs.

Name	J. Walter Milon, Ph.D.
Role	Planning Formulator / Economist
Affiliation	Independent Consultant

Dr. Milon is the Provost's Distinguished Research Professor in the Department of Economics at the University of Central Florida's College of Business Administration, where he has taught graduate-level courses in benefit-cost and social impact analyses, economic theory, and natural resource and environmental economics. He earned his Ph.D. in economics from Florida State University in 1978 and has 38 years of experience in natural resource and environmental economics and water resource economic evaluation. He is a member of the Association of Environmental and Resource Economists and the American Economic Association.

Dr. Milon is familiar with USACE plan formulation processes, procedures, and standards as they relate to ecosystem restoration and flood risk management. He has more than 10 years of experience reviewing Federal water resource economic documents justifying construction efforts. He has participated in planning and technical advisory support for the USACE Florida Everglades Restudy (1995-1999) and was lead economist on five USACE IEPRs: the Everglades C-111 construction project (2009); the Louisiana Coastal Areas Restoration Project (2009-2011); the White Oak Bayou, Texas, flood control plan (2011); the Caño Martín Peña Ecosystem Restoration Project, San Juan, Puerto Rico (2013); and the Lower Yellowstone Intake Diversion Dam Fish Passage Project, Montana, Draft Environmental Impact Statement. Dr. Milon is familiar with large, complex Civil Works projects with high public and interagency interests, having served as a consultant for planning and technical advisory support on the USACE Florida Everglades Restudy (1995-1999).

In addition, Dr. Milon has more than 20 years of experience in research and economic analysis related to fisheries economics and recreational fishing; supervised several fisheries research projects for the National Marine Fisheries Service (NMFS), and served as technical expert for Federal fishery

management councils and journals; as such he has significant experience working with the USACE six-step planning formulation process.

Dr. Milon has written an economics book and more than 15 book chapters, 45 reports, and 40 journal articles. He has been involved in more than 25 university contracts and grants and serves as a private economic consultant to both government and private clients.

Name	Boyd E. Kynard, Ph.D.
Role	Environmental Law and Compliance
Affiliation	BK-Riverfish, LLC

Dr. Kynard is a fish behaviorist with almost 40 years of experience working in academia, government agencies, and, most recently, his own private consulting firm, BK-Riverfish. He holds a Ph.D. in fisheries biology from the University of Washington and a B.S. in biology from the University of Massachusetts. Dr. Kynard studies the behavior of migratory fish during life history to conserve them and to design fish passage for them at dams. His expertise is in migratory fish life history behavior (timing and ecology of up- and downstream migrations and evolution of migration styles); research, development, and design of up- and downstream passage for migrant fish at dams in North America, China, and Brazil; design of research facilities and techniques to study migratory fish and fish passage in large rivers and in artificial streams; and conservation of migratory fish in large north temperate and neo-tropical rivers with hydroelectric dams.

Prior to moving to Massachusetts, Dr. Kynard was a tenured professor of fisheries at the University of Arizona, where he started the undergraduate fisheries major and studied endangered desert fishes. He has 39 years of experience studying the behavior, ecology, and fish passage of Atlantic coast diadromous fishes. Research has involved eastern fish species: American shad, river herring, Atlantic salmon, striped bass, anadromous sea lamprey, shortnose and Atlantic sturgeons; and western fish species: pallid, shovelnose, green and white sturgeons and American paddlefish.

Dr. Kynard has led or co-led field and laboratory research projects on migrations, habitats, and fish passage for migratory fishes in the United States (Connecticut, Merrimack, Kootenai, and Potomac rivers), Brazil (San Francisco and Grande rivers and the Madeira River, a headwater tributary of the Amazon River), Romania (Danube River), and China (Yangtze River).

As a Federal employee of the U.S. Fish and Wildlife Service (USFWS) and U.S. Geological Survey, Dr. Kynard developed four state-of-the-art research programs: (1) field and laboratory research on migrations and habitats of shortnose and white sturgeons, (2) a laboratory research program on the ontogenetic behavior, habitat selection, and dispersal of sturgeons from North America, Asia, and Europe, (3) flume research on American shad, sturgeons, and riverine fishes to develop up- and downstream passage systems, and (4) evaluation of river regulation on migratory fish life history behavior.

After retiring from the U.S. Department of Interior in 2007, Dr. Kynard established a private consulting business, BK-Riverfish, LLC, and for 10 years has continued to conduct research on fish behavior in his laboratory, conduct research to develop a new type of fish ladder for fish with moderate swimming ability, and consult on migratory fish conservation and protection in the United States, China, and Brazil.

Dr. Kynard has 30 years of experience with the Endangered Species Act (ESA). He has held a NMFS scientific collection permit for endangered shortnose sturgeon for 27 years and has been a member of the NMFS Recovery Team for shortnose sturgeon for 11 years, preparing the first draft Recovery Plan for the species.

Dr. Kynard has participated in multiple activities related to lawsuits involving the ESA, NEPA, or both. In 2016, for The Sierra Club, he evaluated NMFS listing of critical habitat, coast-wide, for Atlantic sturgeon (Fed. Reg., Vol. 81, No.197, 3 June 2016). In 2017-18, for the Southern Environmental Law Center, he evaluated (a) impacts of a power-generating station on James River Atlantic sturgeon, and (b) the NMFS 5-year Review of the Status of Chesapeake Bay Atlantic sturgeon distinct population segment (DPS). In 2018, for Duke Law Center and the Chesapeake Bay Office of the National Park Service, he reviewed the impact of a power line structure/installation on James River Atlantic sturgeon and shortnose sturgeon. In 2016, he helped develop the Environmental Impact Statement and reviewed the fish passage design for migratory fish, particularly pallid sturgeon, by USACE for the Lower Yellowstone Intake Diversion Dam Fish Passage Project (NEPA compliance).

Dr. Kynard received the Dwight Webster Award of Merit from the Northeast Division, American Fisheries Society, in 2008 and the Distinguished Lifetime Service Award from the National Conference on Engineering for Fish Passage in 2012.

Name	Stephen A. Olausen
Role	Cultural Resources Specialist
Affiliation	Public Archaeology Laboratory

Mr. Olausen has 31 years of experience as an architectural historian, including 21 years working for the Public Archaeology Laboratory (PAL) in Rhode Island. He received an M.A. in applied history and historic preservation in 1988 from the University of South Carolina. As a PAL Senior Architectural Historian and Project Manager, Mr. Olausen conducts cultural resource management projects that require the identification, evaluation, and registration of historic architectural and landscape properties. He fully meets the Secretary of Interior's Professional Qualification Standards for conducting historic architectural projects (36 CFR Part 61 Appendix A).

Mr. Olausen is an expert at coordinating projects that are conducted under Federal historic preservation laws: the National Historic Preservation Act (NHPA), National Environmental Policy Act (NEPA), and Section 4(f) of the Department of Transportation Act, as well as the various state historic preservation laws of the New England and Mid-Atlantic regions. He has completed hundreds of cultural resources identification and evaluation surveys conducted for projects that require compliance under Section 106 of the NHPA and NEPA. Nearly all these projects have involved the assessment of project impacts on historic properties pursuant to Section 106 regulations. Mr. Olausen has overseen the completion of more than 150 successful National Register of Historic Places (NRHP) nominations that involve the evaluation of historic properties in accordance with the National Register Criteria. He is also expert at assisting clients in conducting consultation under Section 106 and drafting agreement documents that specify actions required to avoid, minimize, or mitigate project impacts on historic properties. Mr. Olausen has managed numerous projects that require the production of mitigation documentation, such as Historic American Buildings Surveys and Historic American Engineering Record documentation, interpretive materials, and displays. Other areas of expertise include the preparation of cultural resource

management plans, Section 106 reports and agreement documents, Section 4(f) statements, architectural design guidelines, and historic preservation tax incentive certifications.

Mr. Olausen has conducted projects for a wide variety of Federal clients, including USACE, the National Park Service, the U.S. Coast Guard, the U.S. Department of Agriculture, the Federal Emergency Management Agency (FEMA), the Federal Railroad Administration, the National Railroad Passenger Corporation (Amtrak), the General Services Administration, the U.S. Army, and the U.S. Navy. He has also managed aboveground historic property work for PAL projects conducted for the transportation departments of Connecticut, Rhode Island, Massachusetts, and Maine.

Mr. Olausen's experience directly related to the SHEP NSBLD IPAAR/SEA includes serving as the lead architectural historian and project manager for evaluation and treatment of historic industrial and transportation resources. He has extensive knowledge of historic industrial property types, ranging from Colonial period grist mills to mid-twentieth century manufacturing plants. His work has included managing cultural resources investigations for a large number of dam removal projects that have involved the evaluation of significance and the assessment of project effects for historic dams, reservoirs, and associated factory complexes. Since 1998, Mr. Olausen has served as the lead cultural resource management consultant for an extensive system of historic hydroelectric developments on the Deerfield and Connecticut River Hydroelectric Projects in Vermont, New Hampshire, and Massachusetts. He has assessed the effects of improvement projects, including the installation of fish passage facilities, consulted with the Federal Energy Regulatory Commission and State Historic Preservation Officers, and authored and implemented historic properties management plans.

The following are examples of some of the major projects on which Mr. Olausen has served as project manager and senior architectural historian: Amtrak's Northeast Corridor-New Haven to Boston Electrification; New Bedford/Fall River Rail Restoration (Massachusetts); Stetson Wind Project, Maine; I-95 Ramp Improvements (Providence, Rhode Island); and Manchester Airport Expansion (Manchester, New Hampshire). His work for the National Park Service has included the preparation of NRHP documentation for some of the nation's most significant historic properties, including the Statue of Liberty National Monument, Minuteman National Historical Park, Saratoga National Historical Park, and Appomattox Court House National Historical Park.

Name	Michael Schwar, Ph.D., P.E., CFM, D.WRE
Role	Hydraulic Engineer
Affiliation	Stony Point Hydrology, LLC

Dr. Schwar, Principal Water Resources Engineer with Stony Point Hydrology LLC in Mukwonago, Wisconsin, has more than 25 years of professional and academic experience focusing on the hydrology and hydraulics of surface water systems, with special emphasis on the restoration of streams, rivers, lakes, and wetlands. He earned an M.S. in environmental engineering and sciences from the University of Washington in 1991 and a Ph.D. in civil and environmental engineering from the University of Wisconsin-Madison in 2002. He has worked on more than 150 surface water projects in 21 states, Canada, and Puerto Rico. He is a registered P.E. in six states (Washington, Wisconsin, North Dakota, Iowa, Arizona, and Illinois) and a Certified Floodplain Manager (CFM), and has been recognized as a Diplomat, Water Resources Engineer (D.WRE) by the American Academy of Water Resources Engineers.

While a hydraulic engineer with the USACE Rock Island District, Dr. Schwar worked on ecosystem restoration projects (specifically, riverine, backwater and floodplain wetland, fish passage enhancement, and stream restoration projects), both along the mainstem Mississippi and Illinois Rivers and within the tributary watersheds. He was one of the primary authors of the Illinois River Basin Restoration Comprehensive Plan, which received the Mississippi Valley Division's "Outstanding Planning Achievement Award" in 2007.

Dr. Schwar's graduate work focused on the restoration of freshwater ecosystems, first in lakes and then in rivers and wetlands. His background provides him with the basis to analyze both the physical drivers (such as flows, water levels, substrate) and the water quality aspects (such as nutrients, dissolved oxygen) that are key to supporting healthy ecosystems. Throughout his career, he has conducted planning and implementation of restoration projects, working at scales ranging from site-specific practices to watershed plans encompassing thousands of square miles.

Dr. Schwar has demonstrated experience in aquatic ecosystem restoration, particularly techniques and practices used in wetland and riverine restoration (specifically, the creation or restoration of freshwater estuarine wetlands [marshes, marsh atolls, riparian forests, beaches and dunes, reefs, and fish passage structures]). Among his relevant design projects are several backwater wetland restorations along the Illinois and Mississippi rivers, island creation in Peoria Lake (Illinois River), Grand Isle dune rehabilitation (Louisiana), and restoration of the lower Kinnickinnic River/Milwaukee River Estuary. He has also designed channel creation, stabilization, and softening projects, as well as invasive species removal and dredging projects. He has designed restoration measures focusing on habitat enhancement, channel reconstruction, and restoration of sediment and geomorphic processes within 17 rivers and streams in five states (Wisconsin, Illinois, Iowa, Missouri, and Arizona).

Dr. Schwar is trained in the advanced analysis and design of open-channel systems. He has analyzed and designed channel modifications for flood risk reduction, stabilization, sediment transport, and ecosystem restoration. Projects include Boneyard Creek Restoration (Urbana, Illinois), Blue River Grade Control (USACE, Kansas City), Menomonee River-Western Milwaukee (Milwaukee Metropolitan Sewerage District, Wisconsin), Tres Rios Phase 3A (USACE, Los Angeles), and Ebner Coulee Creek (La Crosse, Wisconsin). He is specifically familiar with the hydraulics of water control structures, including ungated low-head dams, gated navigation dams, and high-head/hydroelectric dams. He has contributed to projects that analyzed fish-passage enhancement within various systems, including the Mississippi-Illinois River watershed, the Great Lakes and the Pacific Northwest.

Dr. Schwar has contributed to the assessment of flood risk for 21 levee systems in six states (Wisconsin, Iowa, Illinois, Missouri, New Jersey, and Texas) and seven dams in three states (Wisconsin, Illinois, and Washington). He also led the floodplain permitting, including FEMA coordination where necessary, for seven other projects. He developed and currently teaches a course titled "Watercourse Design" at the Milwaukee School of Engineering.

Dr. Schwar is a member of the American Society of Civil Engineers, the Environmental and Water Resources Institute River Restoration Task Committee (past chair), the Association of State Floodplain Managers, the Water Environment Federation and its Watershed Management Committee, and the Society of American Military Engineers.

Name	Jesse Waldrip, P.E.
Role	General Engineer
Affiliation	Kleinschmidt Associates

Mr. Waldrip is the Fish Passage Discipline Leader at Kleinschmidt Associates. He has a background in civil engineering and structural design and 16 of a total 18 years of experience in the planning and design of fish passage facilities across North America. He has a B.S in civil engineering from Auburn University in Alabama and is a licensed professional engineer in Maine, Wisconsin, Michigan, Utah, and Alabama. At Kleinschmidt Associates, he is responsible for technical leadership of large fish passage projects, advisory oversight, and quality control for fish passage projects led by other team members and mentoring and development of technical staff. He has experience working with engineers, biologists, and regulators on all phases of fish passage projects, from feasibility studies and alternatives analysis, through conceptual and final design, into bidding and construction support, and finally monitoring and effectiveness testing. Mr. Waldrip has been involved in a wide array of fish passage projects, including steep-pass fishways, Denil ladder fishways, pool and weir fishways, vertical slot fishways, fish elevators, nature-like fishways, eel ladders, and downstream fish passage facilities.

Mr. Waldrip routinely manages and participates in engineering design projects, site inspections, and feasibility studies. His engineering experience covers design, inspection, evaluation, and rehabilitation of steel, concrete, and wood structures at dams and hydroelectric facilities using guidelines and design criteria from USACE Engineering Manuals, American Institute of Steel Construction Steel Construction Manual, American Concrete Institute Building Code Requirements for Structural Concrete, and National Design Specification for Wood Construction. He has managed and performed engineering design for a variety of projects, including fish passage facilities, dams, powerhouses, intakes, trash racks and rakes, gates, penstocks, retaining walls, flashboards, and inflatable rubber dams.

Mr. Waldrip's East Coast fish passage experience includes substantial engineering and construction projects in large rivers such as the Great Pee Dee River and the Roanoke River (North Carolina); the Susquehanna River (Pennsylvania); the Connecticut River (Massachusetts); the Saco, Kennebec, and Penobscot Rivers (Maine); and the St. John River (New Brunswick). He routinely leads the design and construction support for complex fish passage projects such as fish elevators, which require the coordination of multiple engineering disciplines such as civil, structural, geotechnical, hydraulic/hydrologic, mechanical, and electrical.

Examples of recent fish passage projects that Mr. Waldrip has worked on as a senior fish passage engineer are the Nature-like Fishway Design at the York Haven Hydroelectric Project (Pennsylvania), Nature-like Fishway Design at the Island Farm Weir on the Raritan River (New Jersey), Fish Lift and Downstream Fish Passage Design at the Blewett Falls Hydroelectric Project (North Carolina), Value Engineering Study for the Downstream Fish Passage Facility at Cougar Dam (Oregon, with USACE), and Design of Fish Ladder Modifications to Improve Monitoring at the Lower Granite Lock and Dam (Washington State, with USACE).

Regionally, Mr. Waldrip has consulted on the feasibility and conceptual design of fish passages at the King Mill Project (Augusta, Georgia) and six hydroelectric projects on the Coosa River (Alabama). He also performed condition assessments at the Columbia Hydroelectric Project, the Lockhart Hydroelectric Project, and the Riverdale Hydroelectric Project (South Carolina), and the Weiss Hydroelectric Development (Alabama).

APPENDIX C

Final Charge for the SHEP NSBLD IPAAR/SEA IEPR

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Charge Questions and Guidance to the Panel Members for the Independent External Peer Review (IEPR) of the Savannah Harbor Expansion Project (SHEP) Georgia and South Carolina, Fish Passage at New Savannah Bluff Lock and Dam (NSBLD) Integrated Post-Authorization Analysis Report and Environmental Assessment

This is the final Charge to the Panel for the SHEP NSBLD IPAAR/SEA IEPR. This final Charge was submitted to USACE as part of the final Work Plan, originally submitted on December 18, 2018. The dates and page counts in this document have not been updated to match actual changes made throughout the project.

BACKGROUND

The Savannah Harbor Expansion Project (SHEP) will deepen the existing 42 foot mean lower low water (MLLW) deep-draft navigation project to an authorized depth of 47 feet MLLW. The navigation project is a shipping channel on the Savannah River, which forms the border between the States of Georgia and South Carolina. The SHEP Fish Passage is an environmental mitigation feature that addresses adverse impacts on shortnose and Atlantic sturgeon and fulfills compliance with the Endangered Species Act. The approved 2012 SHEP General Reevaluation Report (GRR) and Final Environmental Impact Statement (FEIS) included the recommendation for construction of a Fish Passage around the New Savannah Bluff Lock and Dam (NSBLD).

Since the GRR/FEIS was published, a Periodic Assessment and Inspection of the lock and dam was conducted that identified significant deterioration and structural issues. As a result, the Corps closed the lock indefinitely in May 2014 due to safety concerns. In addition, the Corps determined that the condition of the structure could adversely impact the function of the proposed Fish Passage around the lock and dam as designed. In response, Savannah District included additional activities in the FY2017 updated SHEP cost estimate that would provide structural repairs to reduce the risk of a catastrophic failure of the dam and to ensure proper hydraulic operation of the proposed Fish Passage. In December 2016, the Water Infrastructure Improvements for the Nation (WIIN) Act was signed into law, requiring the Corps to study two in-channel options in lieu of the original design to go around the lock and dam.

As a modification to the SHEP, the objective of this post-authorization analysis report is to determine how the SHEP Fish Passage feature should be modified as required by the WIIN Act of 2016 in the most cost-effective way.

The WIIN Act provides the Secretary of the Army with options to modify the SHEP Fish Passage feature as follows:

Option A: Repair the NSBLD lock wall and modify the structure such that the structure is able to:

- Maintain the pool for navigation, water supply, and recreational activities
- Allow safe passage over the structure to historic spawning grounds of shortnose sturgeon, Atlantic sturgeon, and other migratory fish

Option B:

- Construct at an appropriate location across the Savannah River a structure that can maintain the pool for water supply and recreational activities

- Remove the NSBLD on completion of construction of the Fish Passage structure

Following the construction of the in-channel weir and fish passage, and demolition of the NSBLD, the Corps will convey the park and recreation area adjacent to the NSBLD to Augusta-Richmond County, Georgia, without consideration.

OBJECTIVES

The objective of this work is to conduct an independent external peer review (IEPR) of the Savannah Harbor Expansion Project (SHEP) Georgia and South Carolina, Fish Passage at New Savannah Bluff Lock and Dam (NSBLD) Integrated Post-Authorization Analysis Report and Environmental Assessment (hereinafter: SHEP NSBLD IPAAR/SEA IEPR) in accordance with the Department of the Army, U.S. Army Corps of Engineers (USACE), Water Resources Policies and Authorities' *Review Policy for Civil Works* (Engineer Circular [EC] 1165-2-217, dated February 20, 2018), and the Office of Management and Budget's (OMB's) *Final Information Quality Bulletin for Peer Review* (December 16, 2004). Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

The purpose of the IEPR is to “assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in evaluation of economic or environmental impacts, and any biological opinions” (EC 1165-2-217; p. 39) for the decision documents. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) who meet the technical criteria and areas of expertise required for and relevant to the project.

The Panel will be “charged” with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-217 (p. 41), review panels should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel members may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents, supporting information, and reference materials that will be provided for the review. The review assignments for the panel members may vary slightly according to discipline.

Review Documents	Subject Matter Experts					
	Approx. No. of Review Pages	Planning Formulator/Economist	Environmental Law and Compliance	Cultural Resource Specialist	Hydraulic Engineer	General Engineer
Main Report: Integrated Post Authorization Analysis & Environmental Assessment	130	130	130	130	130	130
Engineering Appendix:	200				200	200
Water Intake Mitigation Analysis Report	800				800	800
Lock and Dam Demolition Plan	20				20	20
Cost Appendix	40	40				
Environmental/NEPA Appendix:						
USFWS Coordination Report	50		50			
Cultural Resources Report	75		75	75		
T&E Species Assessment	25		25			
Economics Appendix	20	20				
Real Estate Appendix	30	30	30	30		
Lock and Dam Park Turnover Process	15	15	15	15		
Total No. of Review Pages	1405	235	325	250	1150	1150
Supplemental Information						
SHEP Cultural Programmatic Agreement	25	25	25	25		
Public Comments ^a	100	100	100	100	100	100
SHEP EIS	391	391	391	391	391	391
SHEP NSBL&D Fish Passage Georgia and South Carolina Basis of Design (Tetra Tech)	708	708	708	708	708	708
Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes	40	40	40	40	40	40
USACE Implementation Guidance for Section 1319 of the Water Resources Development Act of 2016 (WRDA 2016), New Savannah Bluff Lock and Dam, Georgia and South Carolina	5	5	5	5	5	5

Review Documents	Subject Matter Experts					
	Approx. No. of Review Pages	Planning Formulator/Economist	Environmental Law and Compliance	Cultural Resource Specialist	Hydraulic Engineer	General Engineer
CESAD-PDP Memorandum dated 9 Aug 2017, SUBJECT: Implementation Guidance for Section 1319 of the Water Resources Development Act of 2016 (WRDA 2016), Savannah District Questions Submitted for Clarification	13	13	13	13	13	13
Previous Section 106 Consultation	10	10	10	10		
Total No. of Reference Pages	1292	1292	1292	1292	1257	1257

^a Page count for public comments is approximate. USACE will submit public comments to Battelle, which will in turn submit the comments to the IEPR Panel.

Documents for Reference

- USACE guidance *Review Policy for Civil Works* (EC 1165-2-217, February 20, 2018)
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (December 16, 2004)
- Foundations of SMART Planning
- Feasibility Study Milestones (PB 2017-01)
- SMART – Planning Overview
- Planning Modernization Fact Sheet.

SCHEDULE & DELIVERABLES

This schedule is based on the receipt date of the final review documents and may be revised if review document availability changes. This schedule may also change due to circumstances out of Battelle's control such as changes to USACE's project schedule and unforeseen changes to panel member and USACE availability. As part of each task, the panel member will prepare deliverables by the dates indicated in the table (or as directed by Battelle). All deliverables will be submitted in an electronic format compatible with MS Word (Office 2003).

Task	Action	Due Date
3	Battelle convenes kick-off meeting with USACE	12/11/2018
	Battelle sends review documents to panel members	2/5/2019
	Battelle convenes kick-off meeting with panel members (estimated)	2/4/2019
	Battelle convenes kick-off meeting with USACE and panel members (estimated)	2/4/2019
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE at site visit (estimated)	2/20/2019
4	Panel members complete their individual reviews	3/6/2019
	Battelle provides talking points for Panel Review Teleconference to panel members	3/8/2019
	Battelle convenes Panel Review Teleconference	3/11/2019
	Battelle provides Final Panel Comment templates and instructions to panel members	3/12/2019
	Panel members provide draft Final Panel Comments to Battelle	3/18/2019
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	3/19/2019-3/25/2019
	Panel finalizes Final Panel Comments	3/26/2019
4¹	Battelle receives public comments from USACE	4/1/2019
	Battelle sends public comments to Panel	4/3/2019
	Panel completes its review of public comments	4/8/2019
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	4/9/2019
	Panel drafts Final Panel Comment for public comments, if necessary	4/11/2019
	Panel finalizes Final Panel Comment regarding public comments, if necessary	4/15/2019
5	Battelle provides Final IEPR Report to panel members for review	4/17/2019
	Panel members provide comments on Final IEPR Report	4/19/2019
	*Battelle submits Final IEPR Report to USACE	4/23/2019
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	4/30/2019
6	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	5/2/2019
	Battelle convenes teleconference with USACE to review Comment Response process	5/2/2019
	Battelle convenes teleconference with Panel to review Comment Response process	5/2/2019

Task	Action	Due Date
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	5/20/2019
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	5/24/2019
	USACE PCX provides draft PDT Evaluator Responses to Battelle	5/28/2019
	Battelle provides draft PDT Evaluator Responses to panel members	5/30/2019
	Panel members provide draft BackCheck Responses to Battelle	6/4/2019
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	6/5/2019
	Battelle convenes Comment Response Teleconference with panel members and USACE	6/6/2019
	USACE inputs final PDT Evaluator Responses to DrChecks	6/13/2019
	Battelle provides final PDT Evaluator Responses to panel members	6/14/2019
	Panel members provide final BackCheck Responses to Battelle	6/19/2019
	Battelle inputs panel members' final BackCheck Responses to DrChecks	6/20/2019
	*Battelle submits pdf printout of DrChecks project file	6/21/2019

* Deliverables

** Battelle will provide public comments to panel members after they have completed their individual reviews of the project documents to ensure that the public comment review does not bias the Panel's review of the project documents.

CHARGE FOR PEER REVIEW

Members of this IEPR Panel are asked to determine whether the technical approach and scientific rationale presented in the decision documents are credible and whether the conclusions are valid. The Panel is asked to determine whether the technical work is adequate, competently performed, and properly documented; satisfies established quality requirements; and yields scientifically credible conclusions. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel (by report section or appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the decision documents. Please focus your review on the review materials assigned to your discipline/area of expertise and technical knowledge. Some sections have no questions associated with them; however, you may still comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-217).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluating economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also, please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review (ATR).
2. Please contact the Battelle Project Manager and Program Manager (Lynn McLeod; mcleod@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle Program Manager, Lynn McLeod (mcleod@battelle.org) immediately.
4. Your name will appear as one of the panel members in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to the Project Manager, no later than 10 pm ET by the date listed in the schedule above.

Independent External Peer Review of the Savannah Harbor Expansion Project (SHEP) Georgia and South Carolina, Fish Passage at New Savannah Bluff Lock and Dam (NSBLD) Integrated Post-Authorization Analysis Report and Environmental Assessment

Charge Questions and Relevant Sections as Supplied by USACE

The following Review Charge to Reviewers outlines the objectives of the Independent External Peer Review (IEPR) for the subject study and identifies specific items for consideration for the IEPR Review Panel.

The objective of the IEPR is to obtain an independent evaluation of whether the interpretations of analysis and conclusions based on analysis are reasonable for the subject study. The IEPR Review Panel is requested to offer a broad evaluation of the overall study decision document in addition to addressing the specific technical and scientific questions included in the Review Charge. The Review Panel has the flexibility to bring important issues to the attention of decision makers, including positive feedback or issues outside those specific areas outlined in the Review Charge. The Review Panel can use all available information to determine what scientific and technical issues related to the decision document may be important to raise to decision makers. This includes comments received from agencies and the public as part of the public review process.

The Panel review is to focus on scientific and technical matters, leaving policy determinations for USACE and the Army. The Panel should not make recommendations on whether a particular alternative should be implemented or present findings that become “directives” in that they call for modifications or additional studies or suggest new conclusions and recommendations. In such circumstances the Review Panel would have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review.

Panel review comments are to be structured to fully communicate the Panel’s intent by including the comment, why it is important, any potential consequences of failure to address, and suggestions on how to address the comment. The IEPR Performance Work Statement (PWS) provides additional details on how comments should be structured.

The Review Panel is asked to consider the following items as part of its review of the decision document and supporting materials.

Broad Evaluation Review Charge Questions

1. Is the need for and intent of the decision document clear?
2. Does the decision document adequately address the stated need and intent relative to scientific and technical issues?
3. Given the need for and intent of the decision document, assess the adequacy and acceptability of project evaluation data used in the study analyses.

4. Given the need for and intent of the decision document, assess the adequacy and acceptability of economic, environmental, and engineering assumptions that underlie the study analyses.
5. Given the need for and intent of the decision document, assess the adequacy and acceptability of economic, environmental, and engineering methodologies, analyses, and projections.
6. Given the need for and intent of the decision document, assess the adequacy and acceptability of models used in the evaluation of existing and future without-project conditions and of economic or environmental impacts of alternatives.
7. Given the need for and intent of the decision document, assess the adequacy and acceptability of methods for integrating risk and uncertainty.
8. Given the need for and intent of the decision document, assess the adequacy and acceptability of formulation of alternative plans and the range of alternative plans considered.
9. Given the need for and intent of the decision document, assess the adequacy and acceptability of quality and quantity of the surveys, investigations, and engineering sufficient for conceptual design of alternative plans.
10. Given the need for and intent of the decision document, assess the adequacy and acceptability of overall assessment of significant environmental impacts and any biological analyses.
11. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
12. Assess the considered and tentatively selected alternatives from the perspective of systems, including systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

Project-Specific Evaluation Review Charge Questions

13. Does the report text for public and agency involvement cover the results of the NEPA Scoping Meeting and the results of other coordination and public involvement efforts to date?
14. Are all supporting analyses complete?
15. Is the need for and intent of the decision document clear as outlined in USACE Implementation Guidance for Section 1319 of the Water Resources Development Act of 2016 (WRDA 2016), New Savannah Bluff Lock and Dam, Georgia and South Carolina, dated 25 May 2017?
16. Does the decision document adequately address the stated need and intent relative to scientific and technical issues?
17. Does the draft report document an adequate investigation of restoring upstream passage for shortnose and Atlantic sturgeon, to address the Corps' ESA responsibilities, using a cost-effective analysis approach?
18. Do the main decision document and appendices form an integrated and consistent product?

19. Does the draft report adequately describe how the Draft Recommended Plan (RP) would meet the study objectives related to upstream passage and habitat connectivity for shortnose and Atlantic sturgeon?
20. Is the formulation and evaluation of alternatives consistent with applicable regulations and guidance?
21. Are the sources, amounts, and levels of detail of the data used in the analysis appropriate for the draft report stage for an integrated post-authorization analysis and environmental assessment report, which presents concept-level designs and costs for a RP that will be further developed during the post-report approval design phase?
22. Has the integrated post-authorization analysis and environmental assessment report adequately described and considered the characteristics and migratory behavior of the target species (shortnose and Atlantic sturgeon) in the formulation and evaluation of in-channel fish passage alternatives?
23. Has the integrated post-authorization analysis and environmental assessment report adequately evaluated water supply options to propose a technically feasible, least-cost option (initial costs and operation) that would effectively meet the water supply requirements of the proposed fish passage and upstream users?
24. Has the integrated post-authorization analysis and environmental assessment report adequately evaluated navigation options to propose a technically feasible, least-cost option (initial costs and operation) that would effectively meet the navigation requirements as contained in Section 1319 of the WRDA 2016?
25. Has the integrated post-authorization analysis and environmental assessment report adequately evaluated recreation options to propose a technically feasible, least-cost option (initial costs and operation) that would effectively meet the recreation requirements contained in Section 1319 of the WRDA 2016?
26. Is risk appropriately considered throughout the alternatives formulation and analysis process and does the cost estimate reflect risks appropriately for the draft report?
27. Does the draft report adequately describe risks and uncertainties associated with the construction methods proposed for the RP at this stage, given the current concept-level of detail?
28. Are real estate considerations consistent with the draft report stage (RP and concept-level designs/costs)?
29. Are environmental considerations, environmental operating principles, and environmental law compliance applied appropriately at this stage of the report?

Battelle Summary Charge Questions to the Panel Members¹

Summary Questions

30. Please identify the most critical concerns (up to five) you have with the project and/or review documents. These concerns can be (but do not need to be) new ideas or issues that have not been raised previously.
31. Please provide positive feedback on the project and/or review documents.

Public Comment Questions

32. Do the public comments raise any additional discipline-specific technical concerns with regard to the overall report?

¹ Questions 30 through 32 are Battelle-supplied questions and should not be construed or considered part of the list of USACE-supplied questions. These questions were delineated in a separate appendix in the final Work Plan submitted to USACE.

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APPENDIX D

Conflict of Interest Form

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Conflicts of Interest Questionnaire
Independent External Peer Review
SAVANNAH HARBOR EXPANSION PROJECT
GEORGIA AND SOUTH CAROLINA
FISH PASSAGE AT NEW SAVANNAH BLUFF LOCK AND DAM
INTEGRATED POST-AUTHORIZATION ANALYSIS REPORT AND
ENVIRONMENTAL ASSESSMENT

The purpose of this document is to help the U.S. Army Corps of Engineers identify potential organizational conflicts of interest on a task order basis as early in the acquisition process as possible. Complete the questionnaire with background information and fully disclose relevant potential conflicts of interest. Substantial details are not necessary; USACE will examine additional information if appropriate. Affirmative answers will not disqualify your firm from this or future procurements.

NAME OF FIRM: **Battelle Memorial Institute Corporate Operations**
REPRESENTATIVE'S NAME: **Jason Jenkins**
TELEPHONE: **614-424-4873**
ADDRESS: **505 King Avenue, Columbus, Ohio 43201**
EMAIL ADDRESS: **jenkins@battelle.org**

I. INDEPENDENCE FROM WORK PRODUCT. Has your firm been involved in any aspect of the preparation of the subject study report and associated analyses (field studies, report writing, supporting research etc.) **No** Yes (if yes, briefly describe):

II. INTEREST IN STUDY AREA OR OUTCOME. Does your firm have any interests or holdings in the study area, or any stake in the outcome or recommendations of the study, or any affiliation with the local sponsor? **No** Yes (if yes, briefly describe):

III. REVIEWERS. Do you anticipate that all expert reviewers on this task order will be selected from outside your firm? No **Yes** (if no, briefly describe the difficulty in identifying outside reviewers):

IV. AFFILIATION WITH PARTIES THAT MAY BE INVOLVED WITH PROJECT IMPLEMENTATION. Do you anticipate that your firm will have any association with parties that may be involved with or benefit from future activities associated with this study, such as project construction? **No** Yes (if yes, briefly describe):

V. ADDITIONAL INFORMATION. Report relevant aspects of your firm's background or present circumstances not addressed above that might reasonably be construed by others as affecting your firm's judgment. Please include any information that may reasonably: impair your firm's objectivity; skew the competition in favor of your firm; or allow your firm unequal access to nonpublic information.

No additional information to report.

Courtney M. Brooks

Courtney Brooks

March 26, 2018

Date

BATTELLE

It can be done