

**Brunswick Harbor Navigation Project Modifications and
Harbor Dredging Operations and Maintenance,
Glynn County, Georgia**

**FINAL Integrated Feasibility Report and Environmental
Assessment and Finding of No Significant Impact**

**U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
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Executive Summary

The U.S. Army Corps of Engineers, Savannah District (Corps) has prepared this Integrated Feasibility Report and Environment Assessment (IFR/EA) to investigate the feasibility of reducing transportation inefficiencies associated with the Federal deep draft navigation channel at Brunswick Harbor, Georgia and to update the Corps' National Environmental Policy Act (NEPA) analysis for operations and maintenance (O&M) of the existing Brunswick Harbor, Georgia Project. The feasibility study is authorized by Section 1201 of the Water Resources Development Act (WRDA) of 2016, Public Law 114-322. The Corps is undertaking this action in partnership with the Georgia Ports Authority (GPA), the non-Federal sponsor for the proposed improvements. This IFR/EA identifies a recommended plan for improving navigation that is economically justified and contributes to National Economic Development (NED) consistent with protecting the Nation's environment. It also recommends conducting O&M of the existing Brunswick Harbor, Georgia Project in compliance with the requirements of the 2020 South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (2020 SARBO).

The Brunswick Harbor, Georgia Project includes Federal channels in the outer harbor and the inner harbor. The Port of Brunswick, located in the inner harbor, consists of three terminals for the import and export of various commodities. Navigation channel widths at specific locations between St. Simons Sound and the Colonel's Island Terminal create navigation and maneuverability issues for the larger Roll-on/Roll-off (RO/RO) vessels. RO/RO cargo is wheeled non-containerized freight, such as automobiles and construction equipment. Colonel's Island Terminal is the largest terminal within the Port of Brunswick and is the destination for all RO/RO traffic in Brunswick Harbor.

The Colonel's Island Terminal is the second busiest terminal in the United States (U.S.) for total RO/RO cargo and busiest for RO/RO imports. The Brunswick harbor pilots adhere to guidelines and restrictions for vessel operations depending on RO/RO vessel dimensions and draft. The navigation channel dimensions, and the associated vessel operation restrictions, result in transportation inefficiencies and increased costs for RO/RO ships calling on Colonel's Island Terminal. The purpose of the proposed Federal action is to reduce transportation inefficiencies experienced by the largest ships utilizing the Brunswick Harbor, Georgia Project. Therefore, the focus of the feasibility study and plan formulation process is on the portion of the Federal navigation project used by the RO/RO vessels where they experience navigation and maneuverability issues.

The Corps analyzed eight action alternatives and a No Action Alternative for harbor improvements in this report. The action alternatives propose channel modifications to improve navigation as well as O&M for those improvements. Modifications considered as part of the study include expanding the channel bend widener near Cedar Hammock Range (Alternative 2), expanding the turning basin near Colonel's Island Terminal (Alternative 3), widening the channel west of the Sidney Lanier Bridge (Alternative 4), creating a vessel meeting area within St. Simons Sound (Alternative 5), and

combinations of these alternatives (Alternative 6 through 9). No new work dredging would occur under the No Action Alternative and for Alternative 5. All other action alternatives require dredging. Alternative 8, a combination of Alternative 2, 3, and 5, provides the highest average annual equivalent (AAEQ) net benefits among the alternatives and is the NED Plan and the recommended plan. Figure ES.1 illustrates the location of proposed modifications for the recommended plan and Table ES.1 provides the results of the economic evaluation.



Figure ES.1. Alt. 8 - Bend widener, turning basin expansion, and meeting area at St. Simons Sound. Existing Federal navigation channel denoted by yellow lines with areas of proposed channel widening highlighted in blue.

The recommended plan would generate \$2,956,000 in AAEQ benefits per year over the 50-year period of analysis and has a benefit-cost ratio (BCR) of 4.7. The project first cost for Alternative 8 is \$14,369,000 (FY22). Implementation would be cost shared with a Federal contribution of \$9,447,900 and a non-Federal sponsor contribution of \$5,031,100¹. The non-Federal sponsor, GPA, supports the recommended plan, Alternative 8, and has not proposed a locally preferred plan.

Table ES.1 Average Annual Equivalent (AAEQ) Benefits and Costs of the Brunswick Harbor Recommended Plan (Alternative 8).

	Cost and Benefit Summary of the NED Plan (FY 22 price level)
Interest Rate (Fiscal Year 2022)	2.25%
Construction Period, Months	12
Period of Analysis, Years	50
Construction First Costs	\$14,369,000
Interest During Construction (First Costs only)	\$323,000
Estimated Local Service Facilities	\$0
Estimated Aids to Navigation	\$110,000
<i>Estimated Economic Costs (FY 22 price level)</i>	<i>\$14,803,000</i>
AAEQ Costs	
Amortized Cost	\$482,000
OMRR&R	\$150,000
<i>Total AAEQ Costs</i>	<i>\$632,000</i>
AAEQ Benefits	
Origin-to-Destination Transportation Cost Savings ¹	\$2,956,000
<i>Total AAEQ Benefits</i>	<i>\$2,956,000</i>
AAEQ Net Benefits (AAEQ Benefits – AAEQ Costs)	<i>\$2,324,000</i>
Benefit-to-Cost Ratio (computed at 2.25%)	<i>4.7</i>
¹ Transportation costs and cost savings benefits are based on FY16 vessel operating costs updated from EGM 17-04.	

Additionally, this IFR/EA evaluates various alternatives for the continued O&M of the Brunswick Harbor, Georgia Project at its authorized depths and updates the prior NEPA analysis. With the replacement of the 1997 South Atlantic Regional Biological Opinion

1. Project costs include \$110,000 for aids to navigation which are a Federal cost and not subject to cost-sharing. Aids to navigation are an economic cost and not included in the certified cost estimate used for construction. See section 6.7 for a full description on the recommended plan cost share.

(SARBO) with the 2020 SARBO issued by the National Marine Fisheries Service (NMFS) on March 27, 2020 and revised on July 30, 2020, the Corps is proposing to update its O&M practices to be consistent with the 2020 SARBO. The preferred alternative for O&M is Alternative 4: Apply a risk assessment and management process to avoid and minimize impacts to species protected under the Endangered Species Act (ESA).

Implementation of the recommended plan for harbor improvements, O&M of the improvements under the 2020 SARBO, and complying with the 2020 SARBO to continue conducting O&M of the current Brunswick Harbor, Georgia Project would not result in significant environmental impacts to water quality, existing wetlands, threatened and endangered species, essential fish habitat, terrestrial resources and habitat, aquatic resources and habitat, and other protected resources within the study area. To minimize adverse impacts, the Corps will follow best management practices in its design and operations.

FINDING OF NO SIGNIFICANT IMPACT

Brunswick Harbor Navigation Project Modifications and Harbor Dredging Operations and Maintenance, Glynn County, Georgia Integrated Feasibility Report and Environmental Assessment

The U.S. Army Corps of Engineers, Savannah District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended. The Final Integrated Feasibility Report and Environmental Assessment (IFR/EA) dated [DATE OF FINAL REPORT], for the Brunswick Harbor Modifications Study, evaluates alternatives that addresses opportunities and analyzes the feasibility of alternatives to reduce transportation cost inefficiencies in Brunswick Harbor, which is a deep draft navigation project in Glynn County, Georgia. This IFR/EA also addresses alternatives for operations and maintenance (O&M) of the existing Brunswick Harbor, Georgia Project, as well as for additional O&M that would result from the modifications, consistent with the 2020 South Atlantic Regional Biological Opinion (SARBO) for Dredging and Material Placement Activities in the Southeast United States. The final recommendation for the modification is contained in the Report of the Chief of Engineers, dated [DATE OF SIGNED CHIEF'S REPORT].

The Final IFR/EA, incorporated herein by reference, evaluated various alternatives that would reduce transportation inefficiencies and associated increased costs experienced by the largest ship type utilizing Brunswick Harbor. Alternative 8, the recommended plan, is the National Economic Development (NED) Plan and includes the following features:

- Expansion of the Cedar Hammock Range bend widener from stations 20+300 to 23+300. The bend widener will be expanded by a maximum of 321 feet on the north side and to a length of approximately 2,700 feet. The bend widener will be dredged to a depth of -38 feet MLLW (-36 feet MLLW plus 2 feet of allowable overdepth). Approximately 205,000 cubic yards of material will need to be dredged to expand the bend widener. All dredged material will be placed in the Andrews Island Dredged Material Containment Area (DMCA).
- Expansion of the turning basin at Colonel's Island Terminal along approximately 4,100 feet by increasing the width by a maximum of 395 feet along South Brunswick River from stations 0+900 to 5+300. The turning basin expansion will be dredged to a depth of -38 feet Mean Lower Low Water (MLLW) (-36 feet MLLW plus 2 feet of allowable overdepth). The turning basin expansion will require approximately 346,000 cubic yards of dredged material to be removed. All dredged material will be placed in the Andrews Island DMCA.
- Creation of a RO/RO vessel meeting area located at St. Simons Sound near the Brunswick Harbor entrance channel. No dredging is required since the area has

naturally deep water. Creation of a meeting area at St. Simons Sound will relocate the north toe of the existing channel approximately 800 feet to the north along a length of approximately 10,000 feet from stations -6+800 to 4+300. The existing channel centerline will not change.

In addition to a future without project (FWOP) plan, eight action alternatives were evaluated. The FWOP would mean continuing standard operations and maintenance at Brunswick Harbor with no improvements to the Federal navigation channel. The final array of alternatives, described and compared in Section 3.9 of this report, included: Alternative 2: expansion of the Cedar Hammock Range bend widener from stations 20+300 to 23+300; Alternative 3: expansion of the existing turning basin at the Colonel's Island Terminal along approximately 4,100 feet by increasing the width by a maximum of 395 feet along South Brunswick River from stations 0+900 to 5+300; Alternative 4: creation of a RO/RO vessel meeting area upstream (west) of the Sidney Lanier Bridge to the turning basin at the Colonel's Island Terminal (a distance of approximately 8,700 feet); Alternative 5: creation of a RO/RO vessel meeting area located at St. Simons Sound near the entrance channel to Brunswick Harbor; Alternative 6: combination of the bend widener (Alternative 2) and the turning basin expansion (Alternative 3); Alternative 7: combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), and meeting area west of the Sidney Lanier Bridge (Alternative 4); Alternative 8: combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), and meeting area at St. Simons Sound (Alternative 5); and Alternative 9: combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), meeting area west of the Sidney Lanier Bridge (Alternative 4), and meeting area at St. Simons Sound (Alternative 5).

The Final IFR/EA also evaluated various alternatives for continuing to conduct the congressionally-mandated operation and maintenance (O&M) of the Federal navigation project to provide a safe, reliable, and efficient navigation channel. In response to the issuance of the 2020 SARBO, which supersedes the 1997 SARBO, the Corps evaluated the effects of updating its O&M practices to comply with the 2020 SARBO. The preferred alternative for O&M of the current Brunswick Harbor Project and improvements is Alternative 4: Apply a risk assessment and management process to avoid and minimize impacts to species protected under the Endangered Species Act (ESA). This alternative includes implementation of the 2020 SARBO for the O&M of the Brunswick Harbor, Georgia Project, including:

- Replace the constraint of an environmental window for hopper dredging with the risk assessment and management process described in Section 2.9.2 of the 2020 SARBO.

In addition to a "no action plan" which would be to continue to conduct O&M dredging as was done under the now-superseded 1997 SARBO, the following four O&M action alternatives were evaluated: Alternative 1: Winter Hopper Dredge Window (which is a restrictive implementation of the 2020 SARBO); Alternative 2: Extended Winter Hopper Dredge Window; Alternative 3: Summer Hopper Dredge Window; and

Alternative 4: Apply a risk assessment and risk management process. The “no action” alternative differs from the four O&M action alternatives, as it assumes the Corps would continue O&M activities under the 1997 SARBO conditions, i.e. the Corps would implement Project Design Criteria (PDC) that are included in the 2020 SARBO. The four action alternatives would adhere to the appropriate 2020 SARBO PDCs.

SUMMARY OF POTENTIAL EFFECTS:

A summary assessment of the potential effects of the recommended plan and O&M preferred alternative are listed in Tables 1 and 2 below.

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Unaffected by action
Aesthetics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Air quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic resources/wetlands	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Invasive species	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fish and wildlife habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Threatened/Endangered species/critical habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Historic properties	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other cultural resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Floodplains	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hazardous, toxic & radioactive waste	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hydrology	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Navigation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Noise levels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Socio-economics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental justice	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tribal trust resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Water quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
* <i>Insignificant effects as a result of mitigation: For any resources that fall in this category, a description of the required mitigation is included in the paragraphs following this table</i>			

Table 2: Summary of Potential Effects of the O&M Preferred Alternative

	Insignificant effects	Insignificant effects as a result of mitigation*	Unaffected by action
Aesthetics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Air quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic resources/wetlands	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Invasive species	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fish and wildlife habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Threatened/Endangered species/critical habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Historic properties		<input type="checkbox"/>	
Other cultural resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Floodplains	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hazardous, toxic & radioactive waste	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hydrology	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Navigation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Noise levels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Socio-economics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental justice	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tribal trust resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Water quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>*Insignificant effects as a result of mitigation: For any resources that fall in this category, a description of the required mitigation is included in the paragraphs following this table</i>			

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan for the modifications. Best management practices (BMPs) as detailed throughout the final IFR/EA will be implemented, as appropriate, to minimize impacts.

The Corps proposes measures as part of the proposed modifications project and O&M activities to avoid and minimize impacts to threatened and endangered species listed under the 1973 Endangered Species Act (ESA), as amended. Section 2.7 of the IFR/EA describes the ESA-listed species that may occur in the study area. Routes of effect are evaluated in Section 5.5. Avoidance and minimization measures which have been identified through the section 7 consultation process for ESA, include, but are not limited to, the following:

- Adherence to the appropriate 2020 SARBO PDC (Section 5.5 of the IFR/EA and Appendix B of the 2020 SARBO). The PDC are “specific criteria, including the technical and engineering specifications, indicating how an individual project must be sited, constructed, or otherwise carried out both to be covered under this Opinion [2020 SARBO] and to avoid or minimize adverse effects to ESA-listed species or designated critical habitat” (2020 SARBO, page 13).
- In the event of an encounter with a West Indian manatee, contractors will observe BMPs and will remain informed of the civil and criminal penalties for harming, harassing, or killing species, which are protected under the ESA and/or the Marine Mammal Protection Act of 1972. A full listing of the West Indian manatee conditions can be found in section 5.5.2.

Mitigation for resources covered by section 106 of the National Historic Preservation Act of 1966 (NHPA) as amended, that includes, but is not limited to, the following:

- The Corps will follow the process described in the Programmatic Agreement (PA) to ensure compliance with Section 106 of the NHPA. Prior to initiating construction activities, the Corps will complete efforts to identify archaeological sites eligible for listing in the National Register of Historic Places (NRHP) within the direct Area of Potential Effect (APE) for the project and will provide SHPO opportunity to review and comment on the findings. If archaeological sites meeting the criteria for listing on the NRHP are identified, the Corps will coordinate with SHPO to determine practicable avoidance, minimization or mitigation measures needed to be completed prior to construction to ensure compliance with the NHPA.

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the O&M preferred alternative. All applicable PDCs in the 2020 SARBO would be followed. Additionally, the Corps proposes the following avoidance and minimization measure for impacts to threatened and endangered species that include, but are not limited to, the following:

- The Corps would continue to implement internal protocols during dredge events for monitoring of take and observance of ESA-listed species that would provide real-time management to minimize effects to ESA-listed species, as discussed in Section 4.8.
- In the event of an encounter with a West Indian manatee, contractors will observe BMPs and will remain informed of the civil and criminal penalties for harming, harassing, or killing species, which are protected under the ESA and/or the Marine Mammal Protection Act of 1972. A full listing of the West Indian manatee conditions can be found in section 5.5.2.
- The Corps will convene annually, for five years, a Georgia stakeholder session that presents lessons learned regarding implementation of the risk assessment

process under the 2020 SARBO, this session will also address EFH considerations.

COMPENSATORY MITIGATION:

No compensatory mitigation is required and, therefore, is not included as part of the recommended plan for channel modifications or the O&M preferred alternative.

PUBLIC REVIEW:

On June 9, 2020, the Corps released the draft IFR/EA for a 30-day comment period. No significant public comments were received. A copy of the comments received, as well as a summary matrix of the comments and Corps responses, can be found in Appendix F of the IFR/EA.

The Corps revised the draft IFR/EA to better analyze and describe the impacts of conducting routine O&M dredging in accordance with the 2020 SARBO. On June 21, 2021, the Corps released the revised draft IFR/EA and draft FONSI for a 30-day comment period. The Corps received over 900 comments from an apparent email campaign opposing the implementation of the 2020 SARBO that replaces application of a rigid environmental window for hopper dredging with a risk assessment and management process to reduce risk across all listed species. In addition to the emails, six letters with substantive comments were received from Federal and State resource agencies, as well as public and private stakeholders. A copy of the comments received, as well as a summary matrix of the comments and Corps responses, can be found in Appendix F.1 of the IFR/EA.

OTHER ENVIRONMENTAL AND CULTURAL COMPLIANCE REQUIREMENTS:

NEPA

Under NEPA, the Corps evaluated whether any effects associated with the alternatives under consideration are significant. Pursuant to the Council on Environmental Quality's (CEQ) 1978 regulations for implementing NEPA, USACE makes this Finding of No Significant Impact (FONSI) based on the evaluation of effects in the IFR/EA. Through the EA, the Corps has determined that the proposed action will not have a significant effect on the human environment; therefore, an EIS will not be prepared (40 C.F.R. § 1508.13). The 1978 CEQ regulations list criteria useful to assess whether the proposed action will "significantly" affect the human environment (40 C.F.R. § 1508.27). Those criteria include consideration of the intensity of the impacts (40 C.F.R. § 1508.27(b):

- 1) Impacts that may be both beneficial and adverse:
 - Modifications Recommended Plan: The recommended plan would have long-term beneficial effects to transportation efficiency, however given the scale

of the modifications in context with the entire Brunswick Harbor, Georgia Project, they would not be considered significant. Neither the beneficial, nor the adverse, impacts discussed in the IFR/EA were considered significant.

- O&M Preferred Alternative: Neither the beneficial, nor the adverse, impacts discussed in the IFR/EA were concluded to be significant

2) The Degree to which the Action Affects Public Health and Safety:

- Modifications Recommended Plan: The proposed modifications would continue to provide for a safe navigation channel. No violations of state water quality standards would occur. The recommended plan would not significantly affect public health and safety. On October 26, 2020, the Corps received a Clean Water Act (CWA) section 401 water quality certification (WQC) from the State of Georgia for the recommended plan (Appendix L).
- O&M Preferred Alternative: Continued O&M is needed to provide a safe and reliable Federal navigation channel. O&M dredging equipment must follow guidelines for the safe operation of the equipment and must employ best management practices to prevent spills from equipment. No violations of state water quality standards would occur. The CWA 401 WQC received from the State of Georgia on October 26, 2020 included the continued O&M activities (Appendix L). Therefore, no significant effects to public health and safety are anticipated.

3) Unique Characteristics of Geographical Area:

- Modifications Recommended Plan: The potential for cultural resource impacts has been identified through the Section 106 process for NHPA. The Corps would follow the process in the PA, as agreed upon by the GA SHPO for avoidance and minimization of effects to cultural resources, specifically archaeological resources (Appendix H). There are no unique characteristics of the geographic area, such as proximity to park lands, wetlands, or historic or cultural resources. Impacts to ecologically critical areas, such as Habitat Areas of Particular Concern, a subset of Essential Fish Habitat (EFH) regulated by the Magnuson-Stevens Fishery Conservation and Management Act, have been evaluated in the IFR/EA, and found to be insignificant. NMFS concurred with the evaluation of EFH effects in their letter dated July 8, 2020 (Appendix G).

O&M Preferred Alternative: O&M would occur within the already established and regularly maintained Federal navigation channel. There are no unique characteristics of the geographic area. Impacts to ecologically critical areas, such as Habitat Areas of Particular Concern have been evaluated in the IFR/EA, and found to be insignificant, as there is abundant adjacent habitat, and impacts would occur in the established Federal

navigation channel and dredged material placement sites. NMFS reviewed the revised IFR/EA and the effects analysis in the IFR/EA related to O&M activities and in a letter dated July 21, 2021 identified additional resources that should be considered, specifically highly migratory shark species (Appendix G). The Corps has updated the analysis in the IFR/EA in response to the NMFS letter and finds that O&M activities would not have a significant effect on these species. Additionally, NMFS provided a conservation recommendation that the Corps use an adaptive management process for obtaining and incorporating new information about environmental windows into a risk management framework for managing dredge operations. As this recommendation is consistent with the risk assessment process that would be followed in accordance with the 2020 SARBO. As this recommendation is consistent with the risk assessment process that would be followed in accordance with the 2020 SARBO, and the Corps would integrate EFH considerations into the risk assessment process, the Corps finds no significant effects to EFH (Appendix G).

4) Likelihood of Highly Controversial Effects on the Quality of the Human Environment:

- Modifications Recommended Plan: The effects of constructing the modifications described in the recommended plan are not likely to be controversial.
- O&M Preferred Alternative: There is disagreement, and therefore controversy, with the Corps implementing the 2020 SARBO as required and conducting a risk assessment to determine when and how to conduct O&M dredging instead of hopper dredging only during winter months (that is, within previously specified turtle windows). However, the Corps will be conducting O&M dredging in compliance with all applicable laws and policies. The effects evaluation for O&M in the IFR/EA focus on the impacts from hopper dredging on environmental resources, including ESA-listed species. Effects from hopper dredging are well known and documented. The Corps has been conducting hopper dredging for over 30 years in Federal navigation channels across the nation. The Corps, in coordination, with Federal and state resource agencies, has consistently and successfully applied an adaptive management approach to minimize effects, including design modifications for dredge equipment, pilot studies to understand effects outside traditional hopper dredge windows, and new technology for monitoring take of ESA-listed species. Disagreement lies in the amount of take of ESA-listed sea turtle species that may occur by shifting hopper dredging outside the traditional environmental (winter) window for hopper dredging. NMFS provides a thorough evaluation of the effects to water quality and ESA-listed species to which the risk assessment and risk management process would be applied in compliance with the 2020 SARBO. The evaluation of effects relied on numerous scientific studies, historic dredging data, and input from multiple Federal and state resource

agencies. Additionally, the Corps has a long standing practice of implementing internal procedures that minimize take during active dredge events, including halting dredging if take occurs to determine appropriate minimization measures, or as necessary, ceasing all dredging (see Section 4.8). Furthermore, the 2020 SARBO does not allow more lethal take of sea turtles than was allowed under the 1997 SARBO, which means that the preferred alternative would not result in any greater take of sea turtles than what was allowed previously. Therefore, it is the Corps' determination that implementation of the O&M preferred alternative will not result in significant adverse effects to ESA-listed species.

5) Highly Uncertain, Unique, or Unknown Risks:

- **Modifications Recommended Plan:** The Corps has a long history of conducting channel deepening and widening projects, and the risks and effects associated with these projects is well-known. There are no highly uncertain, unique or unknown risks related to the modifications recommended plan.
- **O&M Preferred Alternative:** The effects evaluation for O&M of the current project and improvements in the IFR/EA focuses on the impacts from hopper dredging on environmental resources, including ESA-listed species. Effects from hopper dredging are well-known and documented. Other dredging methods may be used for continued O&M of the navigation channel and, like hopper dredging effects, the effects from dredging using other methods (e.g., cutter dredges) are well-known and documented, given the Corps' long history of dredging. The Corps, in coordination with Federal and state resource agencies, has consistently and successfully applied an adaptive management approach to minimize effects from maintenance dredging. As addressed above, the Corps applies the risk assessment and management process throughout a dredge event and implements protocols to minimize risk at each step. Therefore, it is the Corps' determination that implementation of the O&M preferred alternative does not present a highly uncertain, unique or unknown risk.

6) Degree to which the action establishes precedent for future actions:

- **Modifications Recommended Plan:** This action requires Congressional authorization, and does not set a precedent for future actions, as any future modifications would require a similar level of analysis and authorization.
- **O&M Preferred Alternative:** The Corps has long-standing practice of applying adaptive management processes to its actions. This action does not set any precedent for use of a risk assessment and management process for Corps maintenance dredging. It does not set a precedent for evaluation of effects because any future actions, either conducted by Savannah District

or other Corps' districts, also must comply with NEPA and other applicable laws, and the Corps must analyze effects specific to that action.

7) Significant Cumulative Impacts:

- Modifications Recommended Plan: No significant cumulative effects were identified in the IFR/EA (Section 5.15).
- O&M Preferred Alternative: No significant cumulative effects were identified in the IFR/EA (Section 5.15).

8) National Register of Historic Places (NRHP) and Other Historical and Culturally Significant Places:

- Modifications Recommended Plan: The Corps completed Section 106 consultation as required by the NHPA. The modifications recommended plan was coordinated with the State Historic Preservation Office and consulting Indian Tribes (letter dated June 9, 2020). A PA was executed on October 21, 2020 (Appendix H). No recorded archaeological sites listed in or eligible for listing in the NRHP are within the APE. Prior to initiating construction activities, the Corps shall complete efforts to identify any archaeological sites within the APE and coordinate its report with the SHPO. If sites are identified, the Corps shall submit its assessment of effects to the SHPO and, if needed, the Corps and non-Federal sponsor will mitigate adverse effects. Therefore, no significant impacts to historic properties is expected.
- O&M Preferred Alternative: There are no known historic properties that may be impacted by O&M activities. Any inadvertent discoveries would be handled according to all applicable cultural resources' laws and regulations.

9) Endangered or Threatened Species or Critical Habitat:

- Modifications Recommended Plan: The Corps has consulted under Section 7 of the ESA with NMFS and the U.S. Fish and Wildlife Service (USFWS), for ESA-listed species under their purview. Consultation resulted in determinations of either no effect, or may affect, but not likely to adversely affect determinations. Concurrence from NMFS was received on May 24, 2021 (Appendix I). Concurrence from USFWS was received regarding Corps letter dated June 18, 2020 (Appendix K). This action would not have a significant adverse effect on ESA-listed species. This evaluation is included in Section 5.5 of the IFR/EA.
- O&M Preferred Alternative: The O&M preferred alternative will be conducted in compliance with the 2020 SARBO. The IFR/EA analyzes four action alternatives for incorporating the 2020 SARBO into continued O&M of the Federal navigation channel. The Corps would adhere to applicable PDCs

in the 2020 SARBO. The Corps has consulted with USFWS for species under their jurisdiction. This consultation resulted in either a may affect, but not likely to adversely affect or no effect determination. Concurrence was received from USFWS on September 10, 2021 (Appendix K). Therefore, there would be no significant effect to ESA-listed species. There is no critical habitat in the study area. This evaluation is included in Section 5.5 of the IFR/EA.

10) Violation of Federal, State and local law for protection of the environment:

- Modifications Recommended Plan: Compliance with environmental laws is discussed in Chapter 7.0 of the IFR/EA. The Corps is compliant with all applicable environmental laws.
- O&M Preferred Alternative: Compliance with environmental laws is discussed in Chapter 7.0 of the IFR/EA. The Corps is compliant with all applicable environmental laws.

ENDANGERED SPECIES ACT

Modifications Recommended Plan

Pursuant to Section 7 of the ESA, NMFS issued a Letter of Concurrence, dated May 24, 2021, that determined that the recommended plan for modifications to the project may affect, but is not likely to adversely affect the following ESA-listed species: sea turtles (Kemp's Ridley, green, and loggerhead), sturgeon (shortnose and Atlantic), and Giant manta ray. A no effect determination was made for leatherback and loggerhead sea turtles (Appendix I).

Pursuant to Section 7 of the ESA, the USFWS concurred with the Corps' effects determination, dated June 18, 2020, that the recommended plan may affect, but is not likely to adversely affect the West Indian manatee (Appendix K). A no effect determination was made for all other ESA-listed species with the potential to occur in the action area (Section 5.5 of the IFR/EA). There is no designated critical habitat in the project location.

O&M Preferred Alternative

Pursuant to Section 7 of the ESA, the NMFS issued the 2020 SARBO, dated July 30, 2020, that determined operations and maintenance dredging, which is a covered activity, will not jeopardize the continued existence of the NMFS-regulated ESA-listed species in the action area. The 2020 SARBO is a programmatic opinion that considers effects to the following species: sea turtles (Kemp's Ridley, green, hawksbill, leatherback, and loggerhead), sturgeon (shortnose and Atlantic), Nassau grouper, Giant manta ray, scalloped hammerhead shark, smalltooth sawfish, oceanic whitetip shark, whales (North Atlantic right, Blue, Fin, Sei, and Sperm), Johnson's seagrass, and corals (Boulder star, elkhorn, Lobed star, Mountainous star, Pillar, rough cactus, and

staghorn). The 2020 SARBO, which replaced the sea turtle centric 1997 SARBO, sets forth a multi-species approach that covers all dredging techniques in Federal waters in the Southeast from the North Carolina/Virginia border south to the U.S. Virgin Islands. As such, restrictions on the timing of actions reflect a balancing of the risk to all ESA-listed species. All project design criteria, terms and conditions, and reasonable and prudent measures in the 2020 SARBO shall be implemented in order to avoid and minimize effects on endangered species.

Pursuant to Section 7 of the ESA, the Corps has made a may affect, but not likely to adversely affect determination for the West Indian manatee for the O&M preferred alternative. USFWS concurred with the Corps determination on September 10, 2021 (Appendix K). A no effect determination was made for all other ESA-listed species with the potential to occur in the action area (Section 5.5 of the IFR/EA). There is no designated critical habitat in the project location.

NATIONAL HISTORIC PRESERVATION ACT

Modifications Recommended Plan

Pursuant to Section 106 of the NHPA, a PA between the Corps and the Georgia Historic Preservation Division was executed on October 21, 2020 for this project. Pursuant to 54 U.S.C. 306108, 36 CFR 800.4(b)(2), and 36 CFR 800.14(b)(1)(ii), the Corps is deferring final identification and evaluation of historic properties until after report approval and additional funding becomes available. The PA requires Phase I investigations to identify archaeological sites and shipwrecks in areas previously not surveyed where dredging will occur. Any resources found during the surveys will be evaluated for inclusion on the National Register of Historic Places. Mitigation would be required for NRHP-eligible resources if impacts from the project are unavoidable. Mitigation would be provided for previously recorded historic properties if avoidance is not possible. The two previously identified magnetic anomalies near the turning basin will be located. If they fall within the APE, then they will be investigated. The PA can be found in Appendix H of the IFR/EA.

O&M Preferred Alternative

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the O&M preferred alternative has no effect on historic properties because no historic resources listed or eligible for listing in the NRHP were identified within the APE of the Project. Any inadvertent discoveries would be handled according to all applicable cultural resources laws and regulations should they be discovered.

CLEAN WATER ACT SECTION 404(B)(1) COMPLIANCE

Modifications Recommended Plan

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with section 404(b)(1) guidelines. The Clean Water Act Section 404(b)(1) evaluation is found in Appendix L of the IFR/EA.

O&M Preferred Alternative

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the O&M preferred alternative has been found to be compliant with section 404(b)(1) guidelines. In 1998, the Corps issued a final EIS for the Brunswick Harbor deepening project. Enclosure C of the 1998 EIS provided a section 404(b)(1) evaluation, the Corps updated that evaluation in this IFR/EA (Appendix L) to include the modifications and update information regarding discharge of dredged material.

CLEAN WATER ACT SECTION 401 COMPLIANCE

Modifications Recommended Plan

A Water Quality Certification (WQC) pursuant to Section 401 was issued dated October 26, 2020, by the Georgia Department of Natural Resources, Environmental Protection Division. All conditions of the Water Quality Certification will be implemented to minimize adverse impacts to water quality (Appendix L).

O&M Preferred Alternative

Georgia Department of Natural Resources, Environmental Protection Division issued a new 401 WQC on October 26, 2020, which replaces the previously issued 1998 CWA 401 WQC (Appendix L). Terms and conditions of the October 2020 401 WQC would be followed for any O&M dredging. As stated in the October 2020 401 WQC, "In accordance with Section 401 of the Federal Clean Water Act, 33 U.S.C. § 1341, the State of Georgia has evaluated the Brunswick Harbor Modification Study Dredging project as an addition to the regular Operations and Maintenance dredging submitted by the U.S. Army Corps of Engineers, Savannah District (Corps), Planning Branch related to proposed activity in, on, or adjacent to the waters of the State of Georgia."

COASTAL ZONE MANAGEMENT ACT

Modifications Recommended Plan

On April 23, 2021, GADNR - Coastal Resources Division (CRD) provided conditional concurrence to the Corps' Coastal Zone Management Act (CZMA) consistency determination for the IFR/EA (Appendix J). The Corps found the conditions

unacceptable and determined GADNR-CRD's conditional occurrence to be an objection. The Corps did not accept the conditions and concluded that the proposed action is consistent with or, alternatively, consistent to the maximum extent practicable with the enforceable policies of the management program. On May 20, 2021, the Corps informed GADNR-CRD of the Corps decision, as required in 15 C.F.R. § 930.43(e), not to accept the conditions. However, the Corps identified conditions that it would nonetheless substantively comply with even though not as a required condition. Additional information can be found in Section 7 of the IFR/EA and the response is found in Appendix J.1.

O&M Preferred Alternative

The Federal consistency determination provided for this IFR/EA was inclusive of continued O&M of the Federal navigation channel. Compliance with CZMA as described above and in Section 7 and Appendices J and J.1 of the IFR/EA

OTHER APPLICABLE ENVIRONMENTAL COMPLIANCE

Pursuant to the Fish and Wildlife Coordination Act (FWCA) of 1934, on May 20, 2020, the USFWS provided the Corps with the final FWCA Evaluation for the harbor improvements, which has been incorporated into the IFR/EA. USFWS found no significant effects to species under their jurisdiction for the recommended plan for the proposed modifications. The FWCA Evaluation can be found in Appendix K of the IFR/EA. For the O&M preferred alternative, USFWS provided FWCA comments in their letter dated September 10, 2021, which is found in Appendix K. In their September 10, 2021 letter USFWS provided comments regarding the beneficial use of dredged material and opined that the new work material is likely to be of better quality for beneficial use than O&M material. Additionally, the FWCA comments provided suggestions on how beneficial use of new work material may be shown to meet the Federal Standard. The Corps will consider these comments in future stages of design for the new work and for future projects that may benefit from the use of O&M dredged material.

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), NMFS responded to the Corps by letter dated July 8, 2020 and provided no conservation recommendations (Appendix G). Therefore, the substantive requirements of the MSA have been met. The MSA correspondence letter can be found in Appendix I of the IFR/EA. For the O&M preferred alternative, NMFS provided a letter dated July 21, 2021 (Appendix G) that included a conservation recommendation for an adaptive management process for obtaining and incorporating new information about environmental windows into a risk management framework for managing dredge operations. The 2020 SARBO switches from a static environmental window to an adaptive management approach to ensure decisions are made scientifically, allowing ways to try to continue to reduce take to all species including fish species, while considering new research and data. This recommendation is consistent with the risk assessment process that would be followed for O&M dredging in accordance with the

process outlined in the 2020 SARBO, Section 2.9.2. The Corps would integrate EFH considerations into the risk assessment process for O&M dredging. Additionally, the process described in the reference in the NMFS letter includes a collaborative engagement with local stakeholders. The Corps will convene annually, for five years, a Georgia stakeholder session that presents lessons learned regarding implementation of the risk assessment process, including information gathered from by-catch monitoring of EFH. Therefore, the substantive requirements of the MSA have been met.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. This information can be found in Sections 7.0 and 8.0 of the IFR/EA.

Technical, environmental, economic, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and policies were considered in the evaluation of alternatives. Based on this report, the reviews of other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan for improvements and the O&M preferred alternative, which includes O&M of the improvements, would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an EIS is not required.

Date

Joseph R. Geary, PhD, PE
Colonel, U.S. Army
Commanding

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ACRONYMS

Acronyms	Definition
AAEQ	Average Annual Equivalent
ACHP	Advisory Council on Historic Preservation
AIWW	Atlantic Intercoastal Waterway
APE	Area of Potential Effects
BCR	Benefit-to-Cost Ratio
BMP	Best Management Practices
CAA	Clean Air Act
CAGR	Compound Average Growth Rate
CEQ	Council of Environmental Quality
CEU	Car-Equivalent Units
CFR	Code of Federal Regulations
CHL	Coastal and Hydraulics Lab
CIMC	Cleanups In My Community
CMPA	Coastal Marsh Protection Act
CO	Carbon Monoxide
CWA	Clean Water Act
DMCA	Dredged Material Containment Area
DO	Dissolved Oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
EPB	Environmental Protection Barrier
GADNR - EPD	Georgia Department of Natural Resources Environmental Protection Division
EQ	Environmental Quality
ER	Engineer Regulation
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCSA	Feasibility Cost Sharing Agreement
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
FWOP	Future Without Project Condition
GADNR - CRD	Georgia Department of Natural Resources Coastal Resources Division
GADNR-EPD	Georgia Department of Natural Resources Environmental Protection Division
GADNR	Georgia Department of Natural Resources
GADNR – WRD	Georgia Department of Natural Resources Wildlife Resource Division
GADOT	Georgia Department of Transportation

GADPH	Georgia Department of Public Health
GA HPD	Georgia Historic Preservation Division
GNAHRGIS	Georgia's Natural, Archaeological and Historic Resources GIS
GPA	Georgia Ports Authority
HAPC	Habitat Area of Particular Concern
HDD	Horizontal Directional Drilling
HERO	High Efficiency Roll-on/Roll-off
HTRW	Hazardous, Toxic, and Radioactive Waste
IFR	Integrated Feasibility Report
IPAC	Information, Planning, and Conservation System
IWR	Institute for Water Resources (USACE)
LCTC	Large Car and Truck Carriers
LER	Lands, Easements, and Rights-of-way
LERRD	Lands, Easements, Rights-of-way, Relocations and Disposal Areas
MCY	Million Cubic Yards
MHHW	Mean Higher High Water
MISLE	Marine Information for Safety and Law Enforcement (USCG)
MLLW	Mean Lower Low Water
MLW	Mean Low Water
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAA	No Action Alternative
NAAQS	National Ambient Air Quality Standards
NED	National Economic Development
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor
NHPA	National Historic Preservation Act
NMFS	U.S. Department of Commerce National Marine Fisheries Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWI	National Wetlands Inventory
O&M	Operation and Maintenance
OSE	Other Social Effects
PA	Programmatic Agreement
PAL	Planning Aid Letter
PAR	Planning Aid Report
PCTC	Pure car and truck carriers
PED	Preconstruction, Engineering, and Design
PPP	Previous Post-Panamax
RED	Regional Economic Development
RNA	Regulated Navigation Area
ROM	Rough Order of Magnitude
RO/RO	Roll-on/Roll-off
SAFMC	South Atlantic Fishery Management Council
SERIM	Southeast Regional Implementation Manual
SLC	Sea Level Change

SLR	Sea Level Rise
THPO	Tribal Historic Preservation Officer
TRI	Toxics Release Inventory
TSP	Tentatively Selected Plan
US	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WQC	Water Quality Certification
WRDA	Water Resources Development Act

Brunswick Harbor Modifications Study, Glynn County, Georgia

1. Introduction

The U.S. Army Corps of Engineers, Savannah District (the Corps) has prepared the Brunswick Harbor Modifications Study, Glynn County, Georgia Final Integrated Feasibility Report and Environmental Assessment (IFR/EA) to document the evaluation of navigation channel modifications to the Brunswick Harbor, Georgia Project from St. Simons Sound to the Colonel's Island Terminal. This report documents the planning process for navigation improvements consistent with Corps planning policy and with the Council on Environmental Quality (CEQ) implementing regulations for the National Environmental Policy Act (NEPA).

In this IFR/EA, the Corps is also updating its NEPA analysis for continued operation and maintenance of the existing Brunswick Harbor, Georgia Project consistent with the 2020 South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (2020 SARBO). The 2020 SARBO allows for replacement of the environmental window for hopper dredging constraint with a risk assessment and adaptive management process for dredging implementation to avoid and minimize impacts to ESA-listed species. Additionally, the 2020 SARBO includes Project Design Criteria (PDCs), which are specific criteria, including technical and engineering specifications, indicating how an individual project must be sited, constructed, or otherwise carried out both to be covered under the 2020 SARBO and to avoid or minimize adverse effects to ESA-listed species or designated critical habitat.

CEQ amended its regulations implementing NEPA on September 14, 2020. The amended regulations provided agencies with the discretion to apply the amended regulations to NEPA processes that started before September 14, 2020 (40 CFR § 1506.13). The Corps initiated its NEPA process on May 17, 2019 and solicited public comments on June 9, 2020 and June 21, 2021. The Corps has decided to apply prior CEQ regulations to this report.

1.1 Study Authority and Non-Federal Sponsor

The study authority for the Brunswick Harbor, Georgia Project improvements is Section 1201 of WRDA 2016, Public Law 114-33, which reads:

The Secretary is authorized to conduct a feasibility study for the following projects for water resources development and conservation and other purposes, as identified in the reports titled "Report to Congress on Future Water Resources Development" submitted to Congress on January 29, 2015, and January 29, 2016, respectively, pursuant to section 7001 of the Water Resources Reform and Development Act (33 U.S.C. 2282d) or otherwise reviewed by Congress:

(12) BRUNSWICK HARBOR, GEORGIA. — Project for navigation, Brunswick Harbor, Georgia.

The “Report to Congress on Future Water Resources Development (February 2016)” identified a need to study modifying the existing Federal navigation project in Brunswick Harbor, Georgia specifically at the bend widener and Colonel’s Island turning basin location for the purpose of improving navigation.

The GPA is the non-Federal Sponsor (NFS) and contributes 50 percent of the total feasibility study costs in the form of cash or in-kind contributions. A feasibility cost share agreement was executed on April 11, 2019.

1.2 Purpose and Need for Improvement Project

The goal of the proposed Brunswick Harbor, Georgia Project modifications is to improve navigation into and out of the Port of Brunswick for Roll-on/Roll-off (RO/RO) vessels to achieve transportation cost savings (increased economic efficiencies).

Harbor pilots and the Georgia Ports Authority (GPA) have identified navigational challenges in Brunswick Harbor. Inadequate channel width has been identified as a problem in the inner harbor portion of the Federal channel, but not in the outer harbor. Operational inefficiencies created by inadequate channel width result in economic inefficiencies that translate into costs for the national economy. Once RO/RO vessels navigate to the inner harbor they must wait for favorable tides in order to navigate the parts of the inner harbor with narrow channel widths. The economic analysis demonstrates National Economic Development (NED) benefits, e.g. reduced navigation costs with project improvement.

The purpose of the recommended plan is to improve transportation maneuverability for the RO/RO vessels that call on the Port of Brunswick. There is a need for harbor improvements since RO/RO vessels are experiencing transportation inefficiencies between St. Simons Sound and Colonel’s Island Terminal.

The Corps has developed a range of reasonable action alternatives and evaluated them in comparison to the No Action Alternative (NAA) and Future Without-Project (FWOP) condition alternatives. Action alternatives include a range of channel modifications.

1.3 Navigation Project Authority

Section 101 of the River and Harbor Act of 1950 (Public Law 81-516) originally authorized the Federal navigation project at Brunswick Harbor.

In 1998, a feasibility study was completed that recommended changing the authorized depth of the project from -30 feet below mean lower low water (MLLW) to -36 feet below MLLW within the inner harbor, and to -38 feet below MLLW within the entrance channel. This recommendation was authorized in Section 101 of the Water Resources

Development Act (WRDA) of 1999 (Public Law 106-53) and serves as the authorization for the current Federal navigation project including operation and maintenance (O&M) and the updated NEPA analysis presented in this report. Georgia Department of Transportation served as the non-Federal Sponsor for the Brunswick Harbor Federal navigation deepening project.

1.4 Purpose and Need for Operation and Maintenance of the Brunswick Harbor, Georgia Project

The purpose and need for O&M of the Brunswick Harbor, Georgia Project is to continue to provide a safe, reliable, efficient, and environmentally acceptable navigation channel in order to achieve the economic benefits upon which Federal participation was based and in accordance with Congressional authorizations. This environmental assessment updates prior NEPA analysis for continued O&M particularly in light of the 2020 SARBO. The 2020 SARBO allows for replacement of the constraint of an environmental window for hopper dredging with a risk assessment and adaptive management process.

1.5 Harbor Location and Study Area

Brunswick Harbor is located in the southeastern section of Glynn County, Georgia, adjacent to the City of Brunswick and includes the inner channels through St. Simons Sound, Brunswick River, Turtle River, and the East River to the Colonel's Island Terminal (Figure 1 and Figure 3). The inner channels are authorized to a depth of -36 feet MLLW plus 2 feet allowable overdepth and at a width of 400 feet. The entrance channel (outer channel) is authorized to a depth of -38 feet MLLW plus 2 feet allowable overdepth.

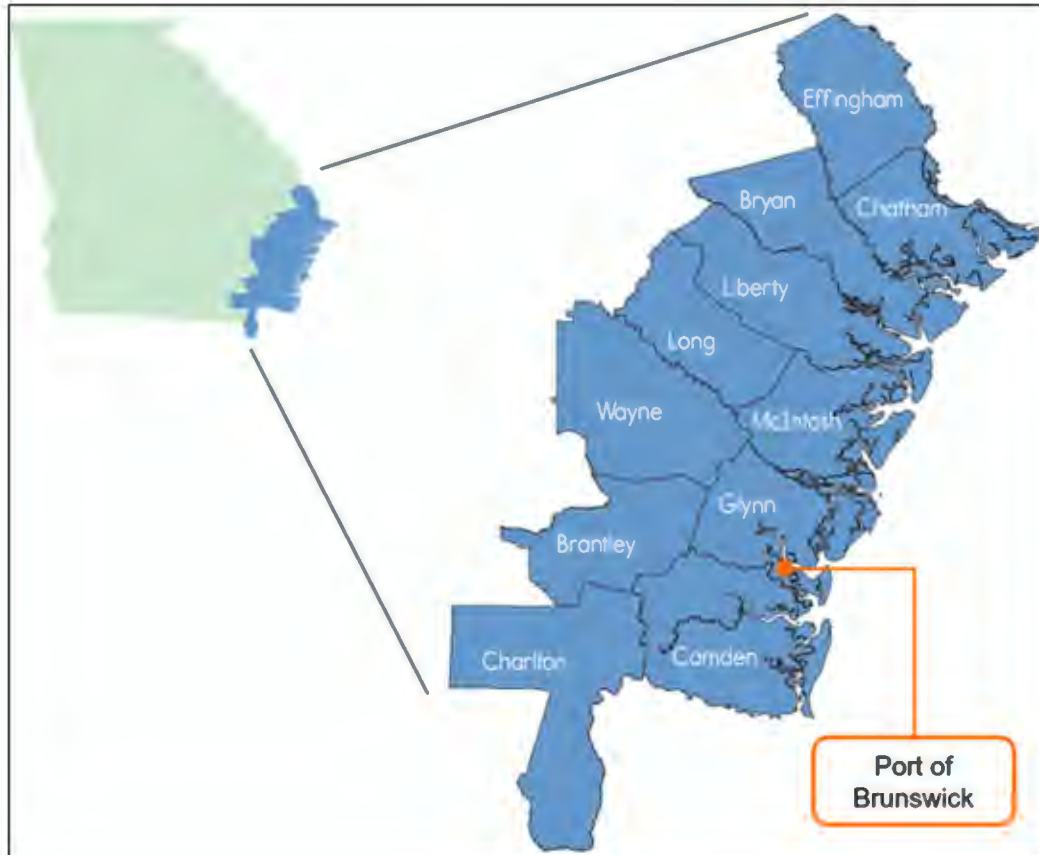


Figure 1. Port of Brunswick Location

As the westernmost port on the U.S. Eastern seaboard, the Port of Brunswick is a natural gateway to move cargo to the large population centers in the Southeast. Specifically, the Colonel's Island Terminal is within 2.5 miles of Interstate 95 (I-95) and is also served by two Class 1 railroads (Figure 2).



Figure 2. Port of Brunswick Railway Connections

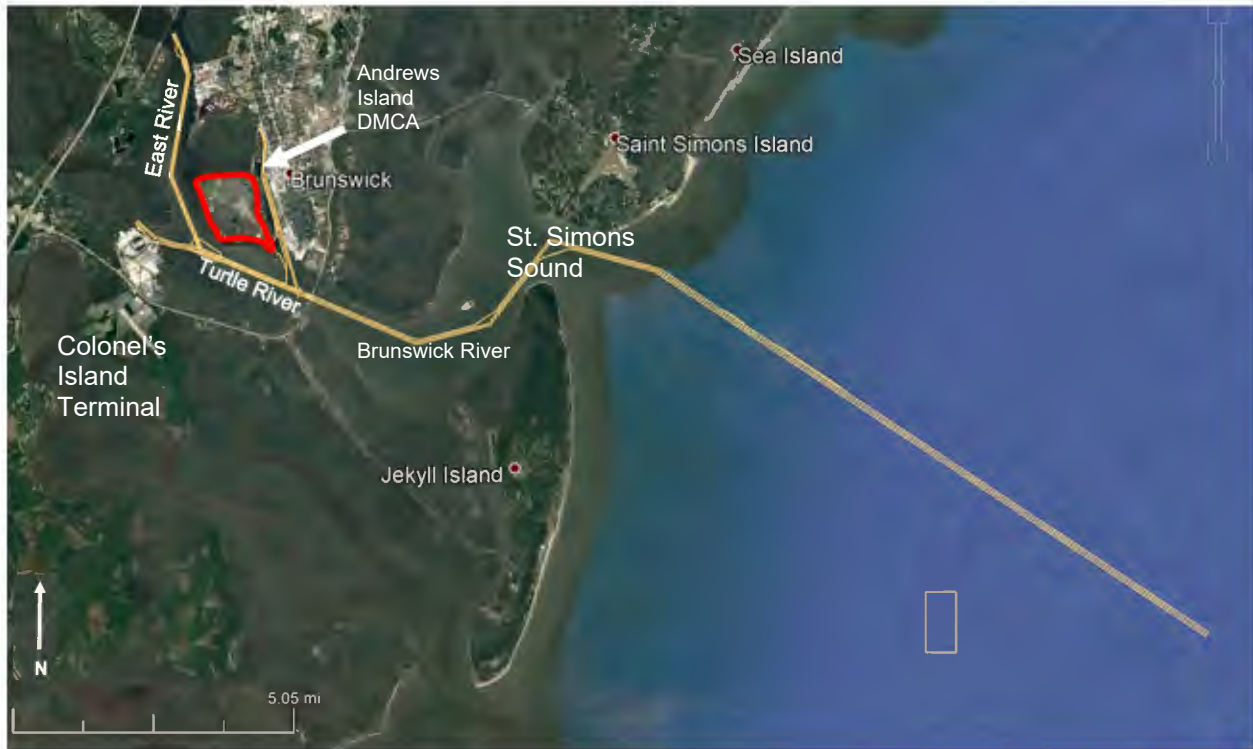


Figure 3. Brunswick Harbor: The Federal navigation channel is identified in yellow. Approved dredged material placement areas include Andrews Island DMCA outlined in red, and the ODMDS ocean placement area polygon outlined in yellow.

The study area for plan formulation to examine modifying the current footprint of the Federal channel is the Brunswick River and Turtle River located between St. Simons Sound and Colonel's Island Terminal, where RO/RO vessels transit and experience navigation difficulties (Figure 3). Portions of the Brunswick Harbor, Georgia Project located within the East River and Turtle River north of the turning basin were excluded from the plan formulation study area since transportation inefficiencies were not identified in areas that do not accommodate RO/RO vessels. The study area for the environmental assessment is the entire Brunswick Federal channel located in yellow on Figure 3.

The affected environment for the continued O&M of the Federal navigation channel includes the entire Federal navigation channel including the inner channels through St. Simons Sound, Brunswick River, Turtle River, and the East River to the Colonel's Islands Terminal, the outer harbor, and the Ocean Dredged Material Disposal Site (ODMDS).

1.6 Port Significance

Brunswick Harbor is a nationally significant port as it is the largest automobile port in the U.S. Two of the terminals, Mayor's Point and East River are located along the East River near downtown Brunswick. Smaller vessels (less than 40,000 dead weight tons)

service these two terminals. The Mayor's Point Terminal specializes in paper and pulp products. The main commodity shipped from the East River Terminal is wood pellets, while commodities received include fertilizers, salt from the Bahamas, perlite, kitty-litter, and bulk liquids.



Figure 4. Brunswick Harbor Terminals

Colonel's Island Terminal is the largest terminal in Brunswick Harbor and the largest automobile port in the nation, with 610 acres of paved open storage and an additional 478 acres permitted for development. It is a dedicated RO/RO facility and accommodates the largest vessels that call at the Port of Brunswick. It is the second busiest port in the U.S. for total RO/RO cargo and the busiest for RO/RO imports. It handles all of Brunswick Harbor's RO/RO traffic, which is wheeled non-containerized freight, such as automobiles and construction equipment. Colonel's Island Terminal is located along the Turtle River at the western end of the Brunswick Federal channel.

Improving access to Colonel's Island Terminal is the focus of the feasibility study, as commodities that transit through Colonel's Island are of primary interest and only the

largest vessels that use that terminal are experiencing navigation inefficiencies. In Fiscal Year 2018, over 629,000 combined auto/machinery units moved through the Colonel's Island Terminal for receipt or shipment (GPA, 2019). This translates into almost one million metric tons of vehicles and parts moved. With both auto manufacturing and sales experiencing, a difficult year in 2020 related to the pandemic, RO/RO cargo totaled over 600,000 units for the year at Colonel's Island, a decrease of 8 percent. However, momentum has increased in recent months, with RO/RO trade between August and December 2020 up 15,000 units compared to the same period in 2019.

Colonel's Island Terminal has an annual throughput capacity of over 800,000 Car-Equivalent Units (CEUs). Ongoing expansion projects at Colonel's Island Terminal are expected to add to this capacity with an additional berth and landside infrastructure improvements which are projected to be completed in the next ten years. Given forecasted vehicle growth during the study period, the Port of Brunswick is not expected to exceed future capacity estimates of approximately 1.5 million CEUs by the end of the 50-year period of analysis.

Currently, Colonel's Island Terminal offers three RO/RO berths with an overall length of 3,355 feet at a depth of 36 feet (Figure 5) and is served by nine steamship lines. The port services more than 60 automobile and heavy equipment manufacturers. Three on-terminal auto processors, seven automobile manufacturers, and two marine terminal operators reside on Colonel's Island Terminal.



Figure 5. Colonel's Island Terminal looking southwest.
Source: Georgia Ports Authority

Colonel's Island Terminal Expansion

The current capacity at Colonel's Island Terminal is 90,000 automobile parking spaces. Full build-out will provide 1,102 acres for automobile processing, an additional rail yard on the south side of the terminal, and a fourth RO/RO berth, for an annual capacity of approximately 1.5 million vehicles.

1.7 Existing Federal Navigation Project

The Brunswick Harbor, Georgia Project is identified in yellow in Figure 3. The authorized project consists of approximately 30 miles of Federally authorized channels. O&M activities occur on an annual basis depending on need and funding availability. The Federal navigation project is comprised of an inner harbor channel and entrance channel. The entrance channel is located in open water and extends to St. Simons Sound. The inner harbor extends west from St. Simons Sound upriver and is maintained to an authorized depth of -36 feet MLLW +2 feet allowable overdepth and at a width of 400 feet, except from station 46+400 to station 67+250 where the authorized depth is -30 feet MLLW and a width of 300 feet.

The currently authorized maintenance depth of the entrance channel -38 feet MLLW + 2 feet allowable overdepth. The entrance channel authorized widths are 500 feet wide from station -6+800 to station -55+550 and 400 feet wide from station 0+000 to station -6+200. Between station -6+200 and station -6+800, the channel width transitions from 400 to 500 feet at authorized depths (-36 feet MLLW + 2 feet allowable overdepth).

Currently, the average annual quantity of O&M material dredged for the Brunswick Harbor, Georgia Project is approximately 1.6 million cubic yards. This amount includes approximately 390,000 cubic yards in the inner harbor channel and 1,219,000 cubic yards in the entrance channel. Dredging methods used in the Brunswick Harbor, Georgia Project are described below. The general descriptions of the dredging methods and equipment are the same as those presented in the National Marine Fisheries Service (NMFS) 2020 SARBO and are presented here as they are used in the analysis of effects from dredging activities. Specific information for Brunswick Harbor has been added in the below descriptions.

Hydraulic Dredge Types

Hopper

The hopper dredge, or trailing suction hopper dredge, is a self-propelled ocean-going vessel with a section of the hull compartmented into 1 or more hoppers. Hopper dredges use suction to pump sediment from the surface of the seafloor through long intake pipes, called dragarms, and store it in the hoppers. When the vessel is full, dredging stops and the vessel sails to the dredged material placement site (2020 SARBO). In Brunswick Harbor, the placement site is the ODMDS. Dredged material is discarded from the bottom of the hopper dredge into the ODMDS.

Hopper dredges are well suited to dredging heavy sands but can also handle clays, silts, or gravel. They can work in relatively rough seas and because they are mobile, they can be used in high-traffic areas (2020 SARBO). For these reasons, hopper dredging is the preferred method of maintenance dredging in the entrance channel.

Hopper dredges also have several limitations. Considering their normal operating conditions, hopper dredges cannot dredge continuously unlike other dredge types that continue to work and transfer dredged material to another location. Hopper dredges must stop dredging while transporting materials to the final destination. The precision of hopper dredging is lower than other types of dredges; therefore, they have difficulty dredging steep side banks and cannot effectively dredge around structures (2020 SARBO). This makes hopper dredging impractical for a more confined channel with structures, such as the inner harbor.

The Corps currently uses several measures to minimize the risk of incidental take of Endangered Species Act (ESA) listed species during hopper dredging. These measures are identified in the 2020 SARBO, section 2.5.2.2. For example, hopper dredges use draghead deflectors, which produce a sand wave while the dragheads operate on the seafloor to move any species away from the draghead's suction. All pumps are disengaged when not on the seafloor to reduce species entrainment. Screens are placed on and around the dragheads and inflow boxes (where sediment enters the hopper) to also reduce entrainment (2020 SARBO, section 2.5.2.2.2). Protected species observers monitor hopper dredging at all times. The Corps has also developed the Operations and Dredging Endangered Species System (ODESS), a data collection and decision-making tool to measure impacts of hopper dredging activities to ESA-listed species and to assist other agencies in the evaluation of this data. In accordance with the 2020 SARBO, the Corps uses ODESS as its "primary reporting system...to store and monitor dredging project data including information associated with encounters with ESA-listed species." (2020 SARBO, p. 72).

Cutterhead

Cutterhead pipeline dredges are designed to handle a wide range of materials including clay, hardpan, silts, sands, gravel, and some types of rock formations without blasting. This makes them suitable for new work and maintenance in projects where suitable placement areas are available, operating in an almost continuous dredging cycle resulting in maximum production, economy, and efficiency (2020 SARBO).

A cutterhead is a mechanical device that has rotating blades or teeth to break up or loosen the bottom material so that it can be sucked through the dredge pipeline. Cutterhead pipeline dredges are rarely self-propelled, and typically must be transported to and from the dredge site where they are secured in place by special anchor pilings, called spuds. Cutterhead pipeline dredges are capable of dredging in shallow or deep water and have accurate bottom and side slope cutting capability. They require an extensive array of support equipment including pipeline (floating, shore, and submerged), boats (crew, work, survey), barges, and pipe handling equipment. Most cutterhead pipeline dredges have a cutterhead on the suction end.

Limitations of these dredges include relative lack of mobility, long mobilization and demobilization times, inability to work in high wave action and currents, and impracticality in high-traffic areas.

Cutterhead dredging is most suitable for both the proposed modifications and maintenance dredging in the inner harbor. The proximity of Andrews Island DMCA to reaches in the inner harbor make it possible to direct pump material through a pipeline into Andrews Island DMCA. Due to constraints for placement of dredged material in the ODMDS, any material from cutterhead dredging that is suitable for placement in the ODMDS require the cutterhead to pipe material into a scow/barge and then transport to the ODMDS for bottom dumping.

Mechanical Dredge Types

Mechanical dredges remove material by scooping it from the bottom and then placing it onto a waiting barge or scow, or directly into a placement area. Mechanical dredges work best in consolidated, or hard-packed materials and can be used to clear rocks and debris. Dredging buckets have difficulty retaining loose, fine materials, which can be washed from the bucket as it is raised. Special buckets have been designed for controlling the flow of water and material from buckets and are used when dredging contaminated sediments. Mechanical dredges are rugged and can work in tightly confined areas. They are mounted on a large barge and are towed to the dredging site and secured in place by anchors or spuds. They are often used in harbors, around docks and piers, and in relatively protected channels, but are not suited for areas of high traffic or rough seas. These dredges can generate relatively large amounts of turbidity as the bucket traverses the water column (2020 SARBO).

Clamshell

Clamshell (aka bucket) dredges, named for the scooping buckets they employ, are the most common type of mechanical dredge. A clamshell dredge begins the digging operation by dropping the bucket in an open position from a point above the sediment. The bucket falls through the water and penetrates into the bottom material. The sides of the bucket are then closed, and material is sheared from the bottom and contained in the bucket compartment. The bucket is raised above the water surface, swung to a point over the barge, and then released into the barge by opening the sides of the bucket. The barge then transports the material to the appropriate placement site. Clamshell dredging creates irregularities in the sediment bottom, and bed levelling is often required as final clean-up (2020 SARBO).

Bed-Levelling

A “bed-leveler” is considered to be any type of dragged device used to smooth sediment bottom irregularities left by a dredge. It is also referred to as a “mechanical leveling device or drag bar”. Typically, a bed-leveler consists of a large customized plow, I-beam, or old spud that is slowly dragged across the sediment. In Brunswick Harbor they are used to smooth out peaks and trenches during the final cleanup phase of the

dredging activity. Bed-leveling used during the final/clean up phase of dredging is done by dragging the drag bar to knock down and even out the bottom sediment caused by other forms of dredging. Special attention must be paid to the design of a bed-leveler, and how it connects to the chains used to drag it in order to not create pinch points where an animal can be impinged. The “Brunswick design” and other bed leveler designs create a “sand wave” which causes ESA-listed species to move away from the equipment and reduce risk of injury (2020 SARBO).

Brunswick Harbor Dredged Material Placement Sites

Andrews Island Dredged Material Containment Area (DMCA)

The Andrews Island DMCA is an existing confined placement area located in the southeastern section of Glynn County, Georgia. It is approximately 770 acres and surrounded by four miles of containment dikes and is actively used for placement of material from maintenance of the Federal navigation channel. Dredged material is periodically removed by local and state agencies for use as fill in construction and maintenance activities. The Glynn County Public Works Department has used the fill material as a base for roads and parking lots and as material to build up the shoulders of roads. Georgia Department of Transportation has also used the dredged material in its road construction and maintenance activities. The last dike improvement was performed by the Corps of Engineers in 2009 and the current remaining capacity is 15,568,347 cubic yards (CY), according to the most recent survey, performed in November 2019. The location of Andrews Island is shown in Figure 3.

Brunswick Ocean Dredged Material Disposal Site (ODMDS)

In 1989, the U.S. Environmental Protection Agency (EPA) designated the Brunswick ODMDS as an approved material placement site. The ODMDS encompasses an area of 2.0 square nautical miles (NM) within a 1.0 by 2.0 NM rectangular site. A site monitoring and management plan (SMMP) for Brunswick Harbor, pursuant to the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, was updated in 2013 and is effective for 10 years (EPA 2013). Current remaining capacity of the site is approximately 18 million cubic yards (MCY), according to survey conducted in April 2021. It is a dispersive site and even with an average placement of 1.2 MCY of material annually, average annual capacity loss is estimated at 400,000 CY. The Corps will update the SMMP again in 2023.



Figure 6. Location of Brunswick Harbor ODMDS. Source EPA 2013.

On average, approximately 1.0 - 1.5 MCY of dredged material from the entrance channel is placed at the ODMDS annually. Project sediments typically range from 2 to 72 percent fine-grained material depending on their location along the length of the channel. All placement of material in the ODMDS is done in accordance with section 103 of the MPRSA. The location of the ODMDS is shown in Figure 6.

1.8 Prior Reports and Studies

The following are relevant prior reports completed for the Brunswick Harbor, Georgia Project:

USACE, Final Environmental Impact Statement and Record of Decision, Brunswick Harbor Deepening Project, Brunswick, Georgia, March 1998

This Environmental Impact Statement (EIS) is the decision document for the previous Brunswick Harbor Deepening Project. The EIS described the formulation of alternatives and selection of the 6-foot deepening plan, which created an authorized depth of -36 feet MLLW in the inner harbor and -38 feet MLLW for the entrance channel. The project described in this EIS was constructed between 2004 and 2008, and this authorized depth continues to be maintained. The 1998 EIS addressed the impacts of O&M dredging activities in the Brunswick Harbor, Georgia Project. The 1998 EIS and appendices are incorporated by reference into this EA.

USACE, Letter Report for Small Navigation Projects CAP Section 107, Brunswick Harbor Improvements, July 21, 2011

This letter report documented problems identified by the Brunswick harbor pilots within two areas of Brunswick Harbor. At these locations, pilots expressed concern with navigating the largest RO/RO vessels due to channel width. Preliminary cost estimates identified a project that exceeded construction cost limits of the USACE Continuing Authorities Program (CAP). Therefore, the non-Federal sponsor submitted a proposal for authorization pursuant to Section 7001 of the WRDA 2014, Public Law 113-121.

1.9 Proposal for Federal Action to Modify the Brunswick Harbor, Georgia Project

The proposed Federal Action is navigation improvements to the Brunswick Harbor, Georgia Project that change the footprint of the current Federal channel. Navigation improvements include a range of channel modifications. Section 3.7 describes the alternative development process and Section 3.8 describes the alternatives that are analyzed in detail in this EA. The plan formulation process described in Chapter 3 concluded with the recommendation to implement Alternative 8, which includes widening the Federal channel at three locations and dredging approximately 551,600 cubic yards of material. Dredged material would be placed at the Andrews Island DMCA.

1.10 Proposal for Federal Action for Continued O&M of the Brunswick Harbor, Georgia Project

The Corps is also proposing to continue to operate and maintain the entirety of the 30 miles of the Brunswick Harbor, Georgia Project, in accordance with Congressional authorizations and consistent with the 2020 SARBO. The Corps is proposing to provide continued O&M dredging of the Federal navigation channel, regardless of the decision made for the proposed modifications also evaluated in this study.

Since the completion of the 1998 EIS, which addressed O&M of the deepened Federal navigation channel, the Corps has continued to operate and maintain the channel under the conditions of the 1997 SARBO and conditions outlined in the 1998 EIS. With the replacement of the 1997 SARBO with the 2020 SARBO, the Corps is proposing to

update its O&M practices to be consistent with the 2020 SARBO. The 2020 SARBO allows some flexibility in the timing of O&M dredging using a risk assessment and risk management process, outlined in Section 2.9.2 of the 2020 SARBO, and no longer includes seasonal restrictions for hopper dredging. Using this risk based decision-making process, hopper dredging would be allowed outside of the previously-established seasonal hopper dredging windows required in the 1997 SARBO as reflected in the 1998 EIS. The Corps is proposing to replace the seasonal restrictions with a risk-based management approach, consistent with the 2020 SARBO. In this EA, the Corps is evaluating alternatives and proposing to incorporate PDCs in the 2020 SARBO into its O&M practices. Chapter 4 describes O&M alternatives.

1.10.1 Documents Incorporated by Reference

As noted above, the Corps is incorporating by reference the 1998 EIS. The 1998 EIS provides an analysis of effects for O&M of the Congressionally authorized channel.

NOAA, 2020 South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (2020 SARBO), Issued March 27, 2020, revised July 30, 2020.

Under Section 7 of the ESA, Federal agencies must consult with National Marine Fisheries Service (NMFS) or U.S. Fish and Wildlife Services (USFWS) on activities that may affect ESA-listed species. In compliance with ESA Section 7 consultation requirements, the Corps is relying on the 2020 SARBO issued by NMFS on March 27, 2020 and revised July 30, 2020. The 2020 SARBO is a Biological Opinion for dredging and material placement activities under the jurisdiction of the Corps Civil Works and Regulatory Programs and dredging/sand mining in borrow sites in Federal waters under the jurisdiction of the Bureau of Ocean Energy Management (BOEM) Marine Minerals Program in the Southeast United States from the North Carolina/Virginia Border through and including Key West, Florida and the Islands of Puerto Rico and the U.S. Virgin Islands. Activities covered by the 2020 SARBO include dredging; dredge material placement, geotechnical and geophysical surveys conducted by the Corps, necessary to complete dredging and material placement projects, and monitoring for and handling of ESA-listed species. The 2020 SARBO concluded that the covered activities are not likely to jeopardize the continued existence of ESA-listed species or result in adverse effects to designated critical habitats considered in the Opinion. See Section 8 of the 2020 SARBO, beginning on page 377, and Section 9 at page 427. The Opinion includes an Incidental Take Statement in Section 10 on page 427. The 2020 SARBO also includes PDCs which are specific criteria, including the technical and engineering specifications, indicating how an individual project must be sited, constructed, or otherwise carried out both to be covered under the 2020 SARBO and to avoid or minimize adverse effects to ESA-listed species or designated critical habitat. The 2020 SARBO includes PDCs that were developed during consultation with the action agencies and NMFS to include the measures that NMFS believes are necessary or appropriate to avoid or minimize impacts to ESA-listed species and designated critical habitat. The PDCs are considered part of the proposed action and must be followed in order for an activity to be covered under the 2020 SARBO. The 2020 SARBO replaces

the 1997 SARBO and can be accessed at <https://www.fisheries.noaa.gov/content/endangered-species-act-section-7-biological-opinions-southeast> (last accessed July 02, 2021).

1.11 Overview of Integrated Report

This document is an Integrated Feasibility Report/Environmental Assessment (IFR/EA). The purpose of the feasibility report is to identify the harbor improvement plan that most reasonably maximizes the NED net benefits, is technically feasible, and is environmentally acceptable. The purpose of the EA portions of the report is to comply with NEPA requirements to identify and analyze environmental effects of the alternatives for harbor improvements, incorporate environmental concerns into the decision-making process, and to determine whether any environmental impacts are significant and warrant the preparation of an Environmental Impact Statement. The six steps of the Corps planning process each align with a NEPA requirement. The planning steps are listed below followed by the document chapter and NEPA element to which they relate:

Planning Step	NEPA Element and Document Chapter
Step 1: Problems and Opportunities	Purpose and Need for Action; Chapter 3
Step 2: Inventory and Forecast of Conditions	Affected Environment (or Existing/Future conditions); Chapter 2
Step 3: Formulate Alternative Plans	Alternatives including Proposed Action; Chapter 3
Step 4: Evaluate Effects of Alternative Plans	Environmental Consequences; Chapter 5
Step 5: Compare Alternative Plans	Alternatives including Proposed Action; Chapters 3 and 5
Step 6: Select Recommended Plan	Agency Preferred Alternative; Chapter 3 and 6

Additionally, this study provides an analysis of the O&M proposed action and identifies and analyzes the effects from the proposed action and alternatives. Section 1.4 provides the purpose and need; Section 1.10 describes the proposed action; Chapter 2 includes description of the affected environment; Chapter 4 is the description of the proposed action alternative, including identification of the preferred alternative; Chapter 5 describes the environmental consequences; and Chapter 7 summarizes environmental compliance.

The Corps has determined that an EA rather than an EIS is appropriate to address continued O&M. This determination was based on the following factors:

- The Corps has considered the degree to which the proposed action represents a significant change from the current practices for O&M that were evaluated in the 1998 EIS (Section 3.10.3, p.30):

- The average annual amount of maintenance material is not expected to increase, and the frequency and duration of annual maintenance dredging would not change. The amount of dredged material included in the 1998 EIS was 1.8 MCY. Current estimates range from 1.5 -1.8 MCY.
 - Proposed action does not require establishment of new dredged material placement sites and current placement sites provide sufficient capacity, therefore there are no proposed changes to the dredged material placement sites. The 1998 EIS evaluated effects from modifications to Andrews Island DMCA. Those actions are completed and no new changes to either the ODMDS or Andrews Island DMCA are proposed.
 - The Corps would continue to use standard dredging equipment, including the use of hydraulic (hopper and cutterhead) and mechanical dredging. These are described in Section 1.7, and section 3.10.3 of the 1998 EIS. Use of novel or new dredging techniques is not proposed. While relocation trawling was not specifically addressed in the 1998 EIS, relocation trawling is a standard practice throughout the southeast and is considered in this EA. Relocation trawling will not change the overall impacts of O&M dredging but could minimize unintended adverse impacts.
- The purpose of an EA is to aid an agency in making the decision on whether to prepare an EIS (40 CFR 1508.9). Based on the information contained in this EA, the Corps has decided that continued O&M dredging will not have a significant effect on the human environment.

2. Affected Environment

Existing conditions represent conditions at the time of report completion. Future conditions represent forecasted future without project conditions during the period of analysis, which is 50 years. The existing conditions descriptions contained in this section are the most relevant to the environmental evaluation of project alternatives. Section 5.0 contains an analysis of the impacts from the alternatives on the resources described in this Section.

The existing conditions description includes both periodic and routine O&M dredging throughout the 30 miles of Federally authorized channels. Currently, the average annual quantity of O&M material dredged for Brunswick Harbor is approximately 1.6 million cubic yards annually. This amount includes approximately 390,000 cubic yards in the inner harbor reach and 1,219,000 cubic yards in the outer harbor or entrance channel. Inner harbor dredged material is disposed of in the Andrews Island DMCA and outer harbor dredged material is disposed of in the Brunswick ODMDs. O&M dredging, using all dredge types including cutterhead, clamshell, and hopper dredges, will occur annually as needed based on shoaling rates. Environmental compliance for O&M dredging is documented in the 1998 Final Environmental Impact Statement and Record of Decision for the Brunswick Harbor Deepening Project. After March 27, 2020, the 2020 SARBO applies to O&M dredging. See Section 2.3.1.2 of the 2020 SARBO.

2.1 Planning Horizon

The planning horizon encompasses the study period, construction period, period of analysis, and project life for the modification alternatives. The study began on April 11, 2019 and is expected to be completed by March 11, 2022. Design of the recommended plan is estimated to begin on November 1, 2022 and be completed by October 31, 2023. The construction period is estimated to begin on November 1, 2024 and be completed by October 31, 2025. The period of analysis for the modifications is 50 years, from 2026 to 2075.

2.2 Navigation and Economic Conditions

Historic and Existing Commerce

The Port of Brunswick is the largest automobile port in the U.S. In fiscal year 2018, over 629,000 combined auto/machinery units moved through the port for import or export (GPA, 2019). This translated into almost 1 million metric tons of vehicles and parts moved. Figure 7 shows the total tonnage by major commodity between 2013 and 2018.

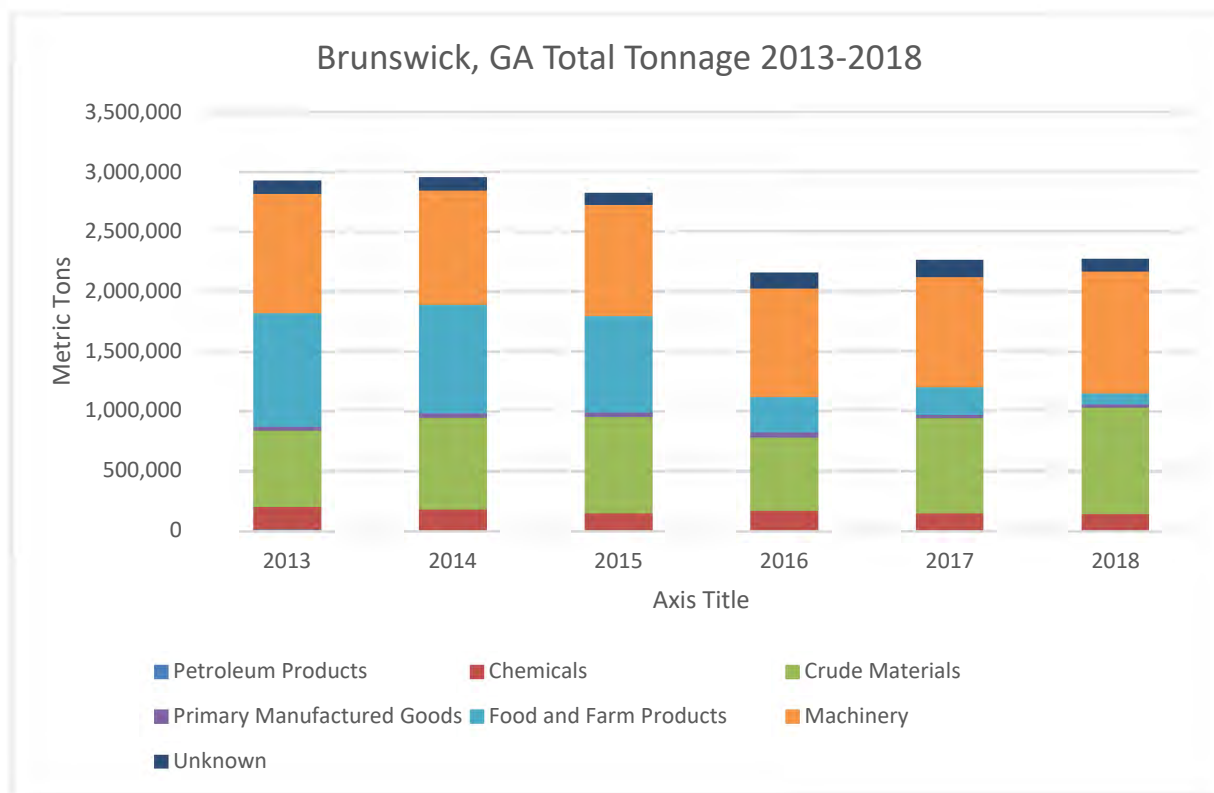


Figure 7. Brunswick Total Tonnage 2013-2018
(Source: Waterborne Commerce Statistics Center, 2019)

Port tonnage has decreased since 2014, mainly due to decreases in bulk grain tonnage through the port. The trades in bulk soybeans and corn have been traditionally very cyclical through Brunswick. Since 2013, the customers moving these goods have experienced issues with weather, vessel crews, railroad scheduling, and prices. These issues led to the gradual decline in bulk agricultural volumes. Therefore, most of the grain now is exported via the Mississippi River. This led to the closure of the grain loading facility at Colonel's Island Terminal after it was damaged by a storm in 2018. This facility was developed into more parking for vehicles and for high and heavy cargo used in RO/RO trades. On average, 2.3 million metric tons have moved annually between 2007 and 2017.

There has been an almost even split of the tonnage between imports and exports. Imports have averaged around 1 million metric tons per year since 2013, and exports have averaged around 1.4 million metric tons per year. As shown in Figure 8, vehicles make up about 60 percent of the total tonnage imported into Brunswick since 2013.

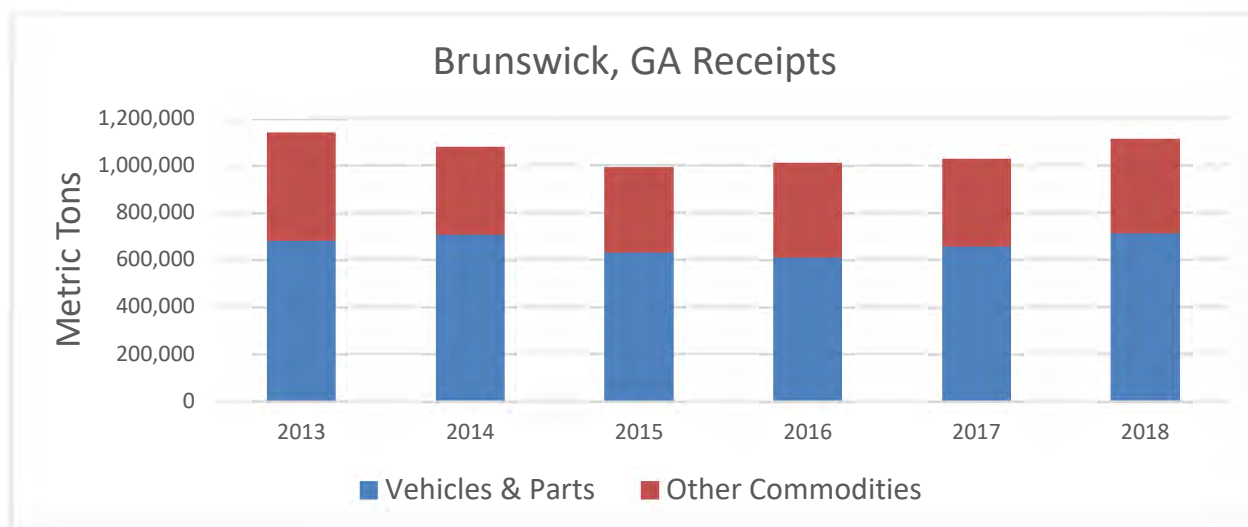


Figure 8. Brunswick, GA Import Tonnage 2013-2018
(Source: Waterborne Commerce Statistics Center, 2019)

Existing Vessel Traffic

The authorized Federal channel in Brunswick Harbor was designed in the 1990s for a RO/RO design vessel with dimensions of 660 feet long and 106 feet wide. Today, longer and wider vessels use the channel. Vessels up to 870 feet long or 134 feet wide have called on the Colonel's Island Terminal to move vehicles. The current fleet of RO/RO vessels are broken up into five different classes.

- **Pure car and truck carriers (PCTC)** are the oldest and most prolific class of RO/RO, having been used at least since 1995. They are approximately 660 feet in length and have a CEU capacity of 6,600. They provide flexible and efficient operations. This class was the previous study's design vessel.
- **Large car and truck carriers (LCTC)** are longer than a PCTC at around 750 feet long. These are a slightly newer class that entered use around 2000. They also have a higher loading ramp and deck capacity, expanding the range of cargo that can be transported. They have a CEU capacity of up to 7,900.
- **The Mk IV/Mk V classes** are heavy RO/RO vessels with extreme ramp and deck capacity—up to 500 tons. These were designed more specifically for the carriage of heavy equipment and breakbulk cargo while retaining significant car capacity (5,500-6,000 CEU). Mk IVs entered use around 2000, while Mk Vs entered around 2010. They can be between 800-870 feet long and 106 feet wide.
- **High Efficiency RO/RO (HERO)** carriers are the newest, most advanced RO/RO vessel, combining elements of all other vessel types. It is between 655-656 feet long and has the capacity of an LCTC (7,600 – 8,000 CEU) and capability similar to a Mk IV, all in a highly efficient design. Its width is designed for the expanded

locks of the Panama Canal and can be 114-134 feet wide. This class entered use in 2015.

Table 1 shows typical vessel characteristics of the five classes of RO/RO vessels that currently utilize the channel. The bottom four rows display how often each of the five classes of RO/RO vessels called on the port from 2015-2018.

Table 1. Brunswick Harbor Vessel Characteristics and Port Calls²

Class	PCTC	LCTC	Mk IV	Mk V	HERO
Length overall	650-671 ft	747-763 ft	789-803 ft	868-870 ft	655-656 ft
Beam	77-107 ft	105-107 ft	105-106 ft	105-107 ft	114-134 ft
2015 calls	393	65	5	1	2
2016 calls	315	69	4	9	35
2017 calls	299	60	1	5	39
2018 calls	325	68	0	0	53

PCTC are still the predominant class used in Brunswick, accounting for an average of 77 percent of RO/RO vessel calls between 2015 and 2018, but the number of HERO vessels is on the rise, accounting for an average of seven percent of RO/RO calls within the same time period and 12 percent in 2018.

Vehicle shippers employ a variety of routes to move goods around the world, and through Brunswick Harbor. Table 2 illustrates a single vessel voyage and shows the list of different ports a vessel may visit before and after their calls to Brunswick Harbor.

² Source: National Navigation Operation & Management Performance Evaluation & Assessment System, 2017

Table 2. Example RO/RO Vessel Route through Brunswick

PORT	DAY	ACTIVITY
Panama Canal	1	Transit
Manzanillo, PAN	2	Discharge & Load
Brunswick, GA	6	Discharge & Load
Savannah, GA	7	Discharge & Load
Newport News, VA	9	Discharge
Baltimore, MD	10	Discharge & Load
Philadelphia, PA	12	Discharge
New York, NY	13	Discharge & Load
Zeebrugge, BEL	23	Discharge
Bremerhaven, GER	25	Discharge & Load
Zeebrugge, BEL	26	Load & Discharge
Southampton, UK	27	Discharge & Load
Bristol, UK	29	Load & Discharge
Savannah, GA	39	Discharge & Load
Manzanillo, PAN	43	Discharge & Load
Panama Canal	44	Transit
Port Hueneme, CA	52	Discharge & Load
Tacoma, WA	56	Discharge & Load
Yokohama, JPN	69	Discharge
Tianjin, CHN	73	Discharge

As a result of this large network of pickups and deliveries, shippers rarely load or unload their full vehicle capacity at Brunswick. While many vessels have capacity for 6,000-8,000 CEUs, the maximum shipment seen in Brunswick Harbor in one time may be 2,000-2,500 CEUs. Offloading crews can move over 200 units an hour from the vessels to the parking areas, leading typical port calls to last between 4-8 hours.

Numerous vehicle services call on Brunswick Harbor which are operated by several carriers and have trade routes which originate in Asia, Europe, or Latin America. See Section 2.3.2 of the Economic Appendix for carriers and trade lanes included in this analysis. The nine services originating in Asia or Oceania which access the U.S. East Coast and Gulf Coast via the Panama Canal were combined into a single route group, “Trans-Pacific” (TP). The route group “Trans-Atlantic” (TA) represents eight different services which call Brunswick and other U.S. East Coast ports. These services connect to Europe, Africa, and the Middle East. The route group “Short Sea” (SS) represents four different services which call on Brunswick and other U.S. ports on either side of the Panama Canal. These services also connect Central and South America to other global ports.

Distances associated with each route group were not used as part of this analysis, since widening alternatives are being evaluated. There are no origin-to-destination benefits, so at-sea savings were not measured. Only efficiencies gained inside the port are measured due to widening alternatives, and no routes were considered.

Harbor Pilot Rules

Harbor pilots guide ships through the harbor and are expert ship handlers with extensive knowledge of local waterways. The Brunswick harbor pilots have guidelines for vessel operations depending on RO/RO vessel length and draft. For instance, traffic is one-way inside the channel since the channel is only 400 ft wide. This width does not allow for two RO/RO vessels to safely pass each other in typical weather conditions since RO/ROs are very susceptible to wind. Historically, there were two locations available where vessels could wait for oncoming traffic to pass if needed and if weather conditions allowed. The two locations are at the turning basin near Colonel's Island and in St. Simons Sound near the entrance to Brunswick Harbor. However, both locations are likely not available in the future. At the turning basin, construction of a new berth at Colonel's Island Terminal will limit available space and the maneuver will not be able to be completed. In St. Simons Sound, vessels can only pass if one vessel leaves the Federal channel. The harbor pilot must request and receive U.S. Coast Guard (USCG) permission to leave the Federal channel. The USCG has expressed that future requests for vessels to leave the Federal channel will be denied (A. McConnell, personal communication, Nov. 3, 2020).

Large tides and resulting strong currents can cause navigation issues for larger vessels transiting to and from Colonel's Island Terminal. Vessels greater than 768 feet long that are destined for Colonel's Island Terminal will have a tide and current restriction. They can only be inbound at slack water on a high tide. All RO/RO vessels are susceptible to the wind due to their tall sail area. Therefore, any RO/RO vessel heading to or from Colonel's Island Terminal may face delays when sustained winds are greater than 20 knots. While the pilots do not have a hard rule on maximum draft, due to fluctuating maintenance dredging requirements, vessels that exceed 32 feet of draft may experience delays due to waiting on high tide before beginning their transits.

Future Commerce

Using the commodity forecast for receipts and shipments and the average weight per CEU derived from historical CEU volumes provided by the GPA, a CEU forecast was developed. The long-term trade forecasted rates for the Brunswick Harbor study combined data obtained from IHS Global, Inc., USACE waterborne commerce databases, and the GPA. Volumes for the near-term (2019-2020) were held constant, based on industry and global economic dynamics. From 2021-2046, volumes were estimated to grow per the IHS rates. Commodity growth is held constant after 20 years following the base year (2026) due to the uncertainty surrounding such long-term forecasts. However, benefit levels remain constant through the remaining period of analysis as well. More detail on the commodity forecast can be found in Appendix A (Economics). Receipt CEUs are made up of primarily passenger vehicles, while shipment CEU's are primarily high and heavy cargo, like construction equipment; hence, the heavier weight per shipment CEU. Table 3 provides the receipt and shipment CEU forecast, along with the weight per CEU for the three route groups.

Table 3. Brunswick CEU Forecast – Receipt and Shipment

Route Group	Weight per Receipt CEU (metric tons)	2026	2036	2046
TP	1.5	188,331	255,569	336,384
TA	1.5	323,871	387,601	457,356
SS	1.5	29,428	39,934	52,562
Total Receipts		541,629	683,104	846,302
Route Group	Weight per Shipment CEU (metric tons)	2026	2036	2046
TP	2.3	76,563	109,032	149,878
TA	2.3	84,560	98,493	113,022
SS	2.3	13,137	18,893	26,200
Total Shipments		174,261	226,418	289,100

The total number of CEUs, by receipt and shipment, and route group are shown in Table 4. Receipt CEUs are forecasted to grow from 500,000 in 2026 to 850,000 in 2046. Shipment CEUs are forecasted to grow from 170,000 in 2026 to 290,000 in 2046, an increase of 70 percent. The Compound Average Growth Rate (CAGR) for each route represents the geometric average growth of receipts and shipments, which accounts for the effect of compounding over time. For the TA route, for example, receipts are projected to grow from 324,000 to 457,000 over the 20-year period at a CAGR of 1.7 percent per year.

Table 4. Brunswick Total CEU Forecast by Route for Receipts and Shipments

Total CEUs - Receipts	2026	2036	2046	CAGR
TP	188,331	255,569	336,384	2.9%
TA	323,871	387,601	457,356	1.7%
SS	29,428	39,934	52,562	2.9%
Total	541,629	683,104	846,302	2.2%
Total CEUs - Shipments	2026	2036	2046	CAGR
TP	76,563	109,032	149,878	3.4%
TA	84,560	98,493	113,022	1.5%
SS	13,137	18,893	26,200	3.3%
Total	174,261	226,418	289,100	2.5%
Total Overall CEUs	2026	2036	2046	CAGR
TP	264,894	364,600	486,262	3.0%
TA	408,431	486,094	570,378	1.7%
SS	42,565	58,827	78,762	3.0%
Total	715,890	909,522	1,135,402	2.3%

As seen in Table 4, the forecasted CEU trade is not expected to exceed port capacity of 1.5 million CEUs over the forecast period.

RO/RO Vessels Calling at Port of Brunswick

The study team developed a Brunswick-specific fleet forecast using an internal analysis of Port of Brunswick historical calls and the world RO/RO fleet snapshot in 2017. Table 5 shows the historical calls at Brunswick by class. Note that in 2018, Brunswick received 53 HERO calls, despite there being 15 HERO vessels currently in service. This means that all HERO vessels currently in service called on Brunswick multiple times over the year. The same is true for LCTC's. Examination of the pilot's logs from Brunswick confirm this to be true.

Table 5. Historical Vessel Calls at Port of Brunswick by Class, 2015-2018

Class	PCTC	LCTC	Mk IV	Mk V	HERO
2015 calls	393	65	5	1	2
2016 calls	315	69	4	9	35
2017 calls	299	60	1	5	39
2018 calls	325	68	0	0	53

The study team then used the historical fleet utilization as a baseline for forecasting the future fleet. Table 6 displays the percent cargo share by each vessel class for years 2015 to 2018.

Table 6. Percent Cargo by Vessel Class, 2015-2018

	2015	2016	2017	2018
Receipt				
PCTC	86%	57.5%	58.9%	64%
LCTC	12%	23%	20%	16%
Mk IV	1.8%	0.5%	0.1%	0%
Mk V	0.01%	3%	1%	0%
HERO	0%	16%	20%	20%
Shipment				
PCTC	95%	80%	73.9%	72%
LCTC	5%	13%	13%	12%
Mk IV	0.2%	0%	0%	0%
Mk V	0%	0.9%	0.1%	0%
HERO	0%	6%	13%	16%
Total				
PCTC	90%	63%	64%	66%
LCTC	9%	19%	17%	15%
Mk IV	1%	0.3%	0%	0%
Mk V	0.01%	2.3%	0.6%	0%
HERO	0%	15%	18%	18%

Total cargo movements on Previous Post-Panamax (PPP) (LCTC or larger) RO/RO's grew from 10 percent in 2015 to 33 percent in 2018, a significant trend.

Based on inputs from shippers and car manufacturers, shipping capacity will have stabilized to match reduced vehicle production by around 2023. At that point, shipbuilding is expected to rebound by the base year of 2026, based on the anticipated cycle of automotive production growth. During the last shipbuilding increase from 2012-2015, an average of 20 vehicle carriers were built per year, and 10 were scrapped. Given their higher average age (27 years), it is assumed that PCTC's are retired during this time. Given their emissions and capacity advantages, HEROs are expected to be added to the fleet. These new HEROs will continue the trend of more fuel-efficient design and incorporate new low-emissions technologies such as exhaust gas scrubbers, engines designed for lower-sulfur fuel, or even LNG-powered engines (Cross 2019)

It is assumed that HEROs will continue to be the high end of the spectrum of large PPP vehicle carriers over the forecast period. HEROs are the most fuel efficient and cost-effective option to ship vehicles in the fleet. Shipper feedback has been very positive on the performance of the HERO class over the last 2 years, citing better than expected performance in carrying capacity and fuel economy. Consistent with economic production theory, shipping firms will seek to maximize profits by lowering costs. Therefore, shifting cargo share to HERO vessels is consistent with that rationale. With an additional 10-20 HERO vessels in the world fleet by 2026, HEROs would be poised to take a larger share of the cargo moving at Brunswick. As Table 6 shows, HERO cargo share is about 18 percent already. With this projected fleet shift, a cargo share of 25 percent is likely by 2026, and an ultimate share of 30 percent is likely by the end of the forecast period, 2046, as shown in Table 7 and Figure 9.

Table 7. Historical and Forecasted Cargo Share by Class at Brunswick

	2015	2016	2017	2026	2036	2046
Receipt						
PCTC	86.00%	57.50%	58.90%	58.00%	53.00%	53.00%
LCTC	12.00%	23.00%	20.00%	17.00%	17.00%	17.00%
Mk IV	1.80%	0.50%	0.10%	0.00%	0.00%	0.00%
Mk V	0.01%	3.00%	1.00%	0.00%	0.00%	0.00%
HERO	0.00%	16.00%	20.00%	25.00%	30.00%	30.00%
Shipment						
PCTC	95.00%	80.00%	73.90%	63.00%	58.00%	58.00%
LCTC	5.00%	13.00%	13.00%	12.00%	12.00%	12.00%
Mk IV	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%
Mk V	0.00%	0.90%	0.10%	0.00%	0.00%	0.00%
HERO	0.00%	6.00%	13.00%	25.00%	30.00%	30.00%
Total						
PCTC	90.00%	63.00%	64.00%	60.00%	55.00%	55.00%
LCTC	9.00%	19.00%	17.00%	15.00%	15.00%	15.00%
Mk IV	1.00%	0.30%	0.00%	0.00%	0.00%	0.00%
Mk V	0.01%	2.30%	0.60%	0.00%	0.00%	0.00%
HERO	0.00%	15.00%	18.00%	25.00%	30.00%	30.00%

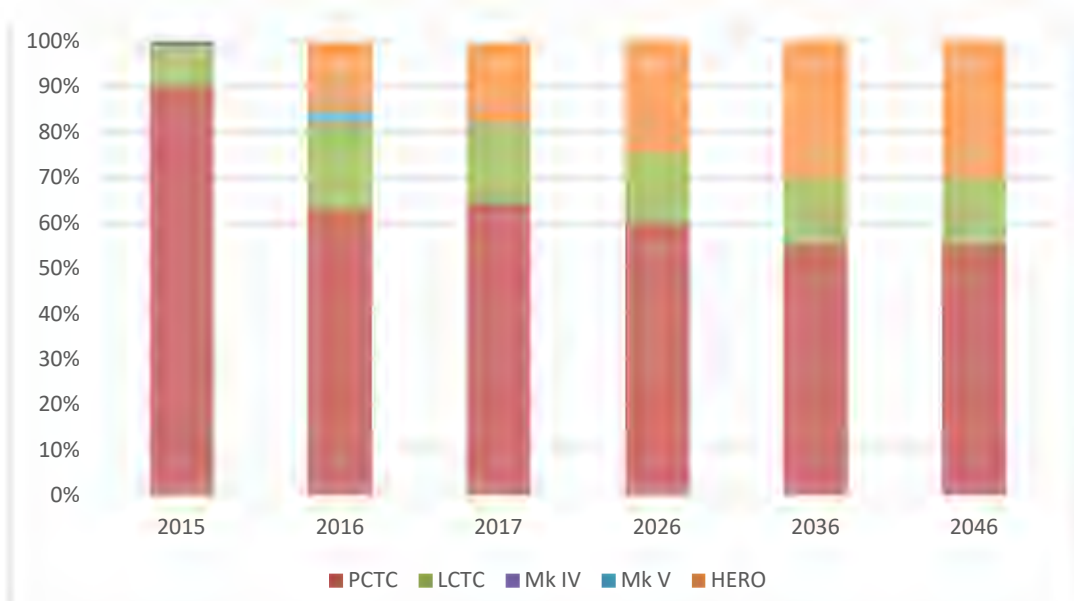


Figure 9. Historical and Forecasted Cargo Share by Class at Brunswick

This increase in cargo share, given today's loading practices, would result in substantial increases in calls from HERO vessels in Brunswick. As mentioned before, all PPP RO/RO vessels (LCTC and HERO) in the world fleet would call on Brunswick multiple

times each year. The projected number of vessel calls through 2019, based on partial year's data from GPA, and the initial forecast of RO/RO vessels through the year 2046 is depicted in Table 8. PPP RO/RO vessels will make up about 50 percent of the vessel calls through 2046. Since pilot restrictions only apply to LCTC and HERO vessels, there would be a larger potential for increased delays in the future without-project condition than in the future with-project condition.

Table 8. Historic and Baseline Vessel Call Forecast for Port of Brunswick by Year
(Source: GPA, 2019)

Vessel Class	2018	2019 (Projected)	2026	2036	2046
PCTC	318	285	301	353	444
LCTC	67	87	78	99	125
HERO	52	60	143	219	277
Total	437	432	522	671	845

2.3 Hydrology and Floodplains

Brunswick Harbor is located on the Turtle, East, and Brunswick Rivers in the Lower Satilla River Basin. The Satilla River Basin is approximately 3,940 square miles of coastal plain composed primarily of the Satilla River, Little Satilla River, and Turtle River. The Satilla River Basin extends from the headwaters in Ben Hill County, Georgia to the Atlantic Ocean in Brunswick, Georgia. Figure 10 shows the location of Brunswick Harbor within the Satilla River Basin.

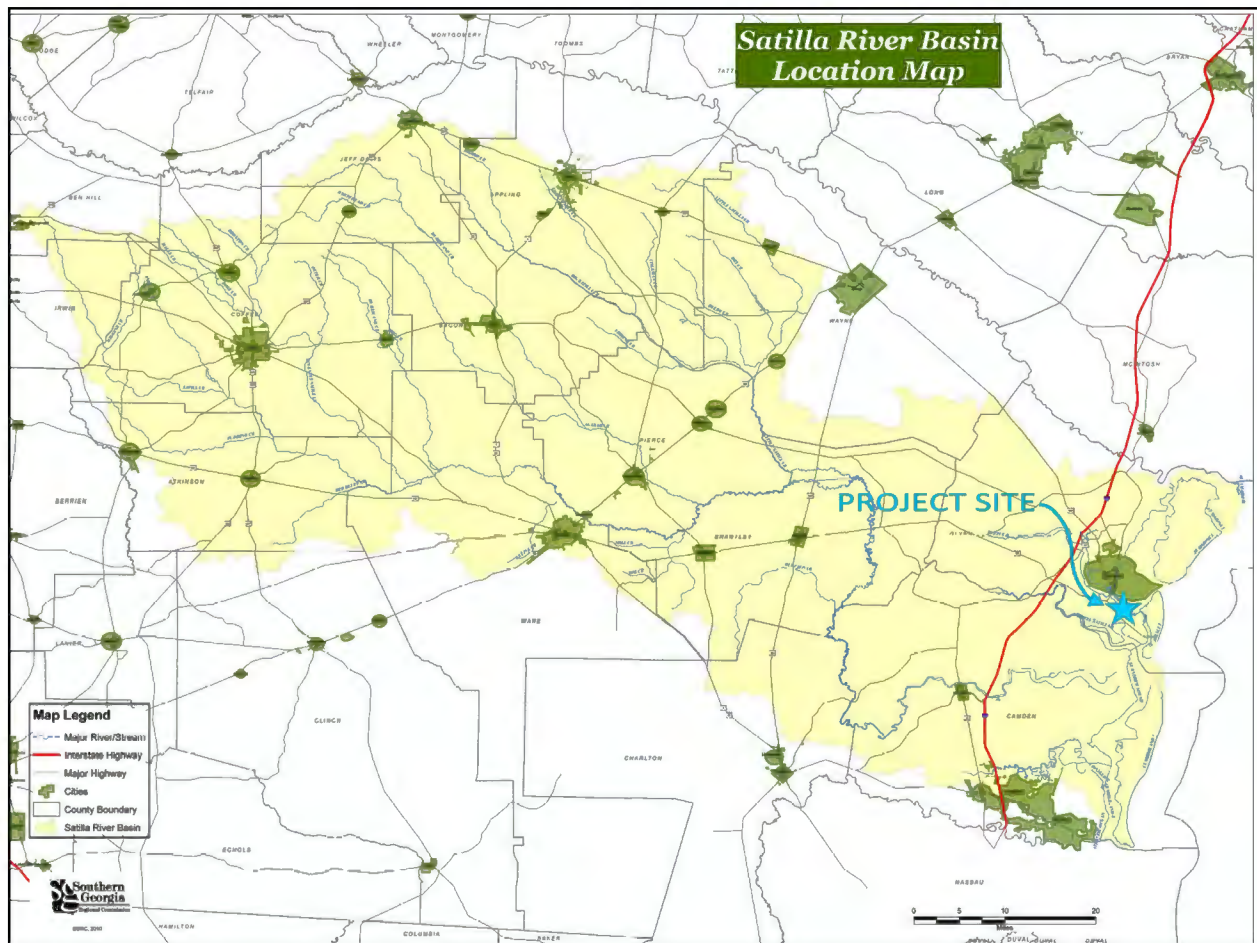


Figure 10. Location of Brunswick Harbor (listed as Project Site) Within Satilla River Watershed

(Source: Satilla Riverkeeper, 2019)

The major drainage in the project vicinity includes the Turtle River and the South Brunswick River, which merge just east of Colonel's Island Terminal and flow through Brunswick Harbor to St. Simons Sound. The East River is oriented in a roughly north/south direction, passing along the east side of Andrews Island before discharging into the Brunswick River just upstream of the Sidney Lanier Bridge (US Highway 17). In addition to these main streams, a complex network of small streams, creeks, and tidal sloughs dissect the entire estuarine complex (USACE, 1998).

Tides in the study area are semidiurnal (two equally proportioned high and low tides every lunar day). The mean tide range in Brunswick Harbor is approximately 6.5 feet near St. Simons Sound and 7.3 feet in the East River. Maximum ebb velocities usually range from 1.5 to 3.0 feet per second during mean tide conditions (USACE, 1998).

The USACE regulation for implementing Executive Order (EO) 11988 (ER 1165-2-26) defines the base floodplain as the 100-year or one percent chance floodplain. Extensive floodplain swamps are located throughout the Lower Satilla Basin adjacent to the tidally influenced riverine systems.

Brunswick Harbor's climate is generally pleasant with short mild winters and hot, humid summers. The temperate to subtropical climate of the coastal ocean from North Carolina to Florida is influenced by the location of the Azores high-pressure system. The southern extent of this high pressure is located offshore during winter months resulting in contact between polar and tropical air masses. The result is strong winter storms with gusty winds. Rainfall in the Brunswick area is typically 50 inches per year with the highest rainfall normally in August and September. Other precipitation types are rare. Hurricane season generally extends from late May to late October with the coastal region of Georgia ranked as a moderately high-risk zone.

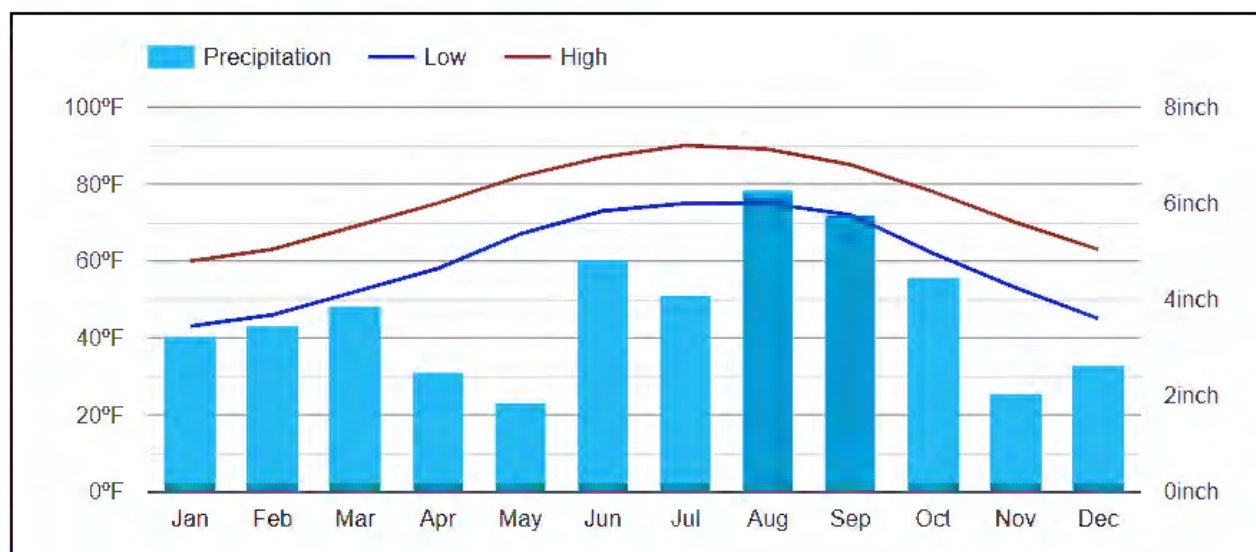


Figure 11. Average Annual Rainfall and Temperatures for Brunswick, GA (US Climate Data, 2020)

2.4 Aquatic Resources, Habitat, and Substrate

The study area within the lower Brunswick River, which includes the inner channels through St. Simons Sound, Brunswick River, South Brunswick River, and Turtle River, as well as the oceanic portion of the outer harbor entrance channel and the ODMDS placement area, supports an abundant and diverse fish and invertebrate community. Habitats within the project site consist of submerged unconsolidated estuarine bottom, intertidal flats, and estuarine emergent marsh. Most of the study area is open water that receives semi-diurnal tidal flushing from St. Simons Sound. As a result, the salinity levels tend to be approximately 25 parts per thousand (ppt), depending on tide stage. The water in the Harbor is well-mixed with a relatively uniform salinity (GPA, 2015).

Common fish species include American shad and striped mullet. Other species found within the study area include diadromous fish (those fish that spend portions of their life cycles partially in fresh water and partially in saltwater) such as striped bass, blueback herring, and shortnose and Atlantic sturgeon. Other important recreational fish include southern kingfish, spot, red drum, black drum, tarpon, and flounder. Sharks also frequent the subtidal and intertidal zones between Brunswick, St. Simons Island, and

Jekyll Island. Common shark species include bonnet head, bull shark, Atlantic black tip, sandbar, tiger, nurse, and lemon.

Benthic assemblages are an important foraging resource for fish species inhabiting the marine subtidal zone. Polychaetes were most often cited as the principal infaunal taxa present in studies from both the Gulf of Mexico and Atlantic coasts of the U.S. The polychaetes, *Prionospio cristata*, *Nephtys incisa*, *N. picta*, and *Spiophanes bombyx*, were the only dominant taxa found in both the Gulf of Mexico and the east coast of the U.S. (Brooks et al. 2006). Polychaetes of the Family Spionidae are tube-building surface deposit feeders while polychaetes of the Family Nephtyidae are free-living predators consuming mollusks, crustaceans and other polychaetes (Fauchald and Jumars 1979).

Macrobenthic invertebrate species that could be in the study area range from shrimp, crabs, oysters, and clams, to other species such as polychaetes, mollusks, and other less well known species which make up the remainder of the food chain. Open water areas are populated by a variety of species of phytoplankton and zooplankton (USACE, 1998).

Other aquatic species that could be in or nearby the study area include North Atlantic right whale, humpback whale, fin whale, West Indian manatee, loggerhead sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and green sea turtle. These species and their occurrence are described in Section 2.7.

The introduction of non-native or invasive species can have detrimental effects on an ecosystem. As defined by EO 13751 (December 8, 2016), an invasive species is a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health. EO 13751 charges the Federal Government with duties to refrain from authorizing, funding, or implementing actions that are likely to cause or promote the introduction, establishment, or spread of invasive species in the U.S. unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. No invasive plant species have been identified within the existing Federal project footprint.

The Georgia Invasive Species Advisory Committee has identified 101 aquatic nuisance species that currently exist in Georgia or have a high probability of being introduced into Georgia. This list includes 28 plant species, 52 animal species (mollusks, amphibians, and crustaceans) and 21 disease causing organisms (GANSMP). Several invasive species have been documented within the lower Brunswick River area. These include the green mussel (*Perna viridis*) and the giant tiger prawn (*Penaeus monodon*). The green mussel is a native of the Indo-Pacific region. It is believed the mussel was introduced to Georgia from boats and equipment being transferred between coasts without adequate cleaning of attached organisms and draining of bilge water. The giant

tiger prawn is a non-native species introduced through accidental release from aquaculture facilities and have been documented from Georgia to Texas.

Macrobenthic invertebrate species are highly dependent on the quality and composition of substrata. The following summaries represent the physical characteristics from which “Macrobenthos” rely on, each serving as estimates of what type of sediment can be expected to be found in the project focus areas (bend widener, turning basin, and the meeting area west of the Sidney Lanier Bridge). See Chapter 3 for a description of the project alternatives and identification of the recommend plan.

The substrata data was characterized from both historical and recent sediment borings, with the initial phase consisting of a historical data review from existing borings, which were collected in 1999 during the previous Brunswick Harbor Deepening, as well as the more recent geotechnical investigations that were conducted in late 2020 to further evaluate material characteristics in the proposed dredging locations. The more recent sediment boring investigations focused on the locations of the proposed new work (turning basin near Colonel’s Islands Terminal and the bend widener located in Cedar Hammock range near buoy 24). Appendix B contains detailed information about the results of the 2020 geotechnical sampling and additional description of the regional geology and materials characteristics.

Bend Widener:

Sediment near the bend widener generally consists of very loose to medium dense sand, silty sand, clayey sand with shell and rock fragments, and very weak weathered limestone down to the boring termination elevations of approximately -51.0 feet MLLW. Based on the historical boring logs and laboratory analysis in this vicinity, the sediment also includes clay with high and low plasticity, silt with high and low plasticity, poorly-graded and well-graded sand, clayey sand with silt, poorly-graded gravel, silty gravel, and clayey gravel.

Turning Basin:

Sediment near the turning basin generally consists of very loose to loose sand, silty sand, and clayey sand with shell fragments down to approximate elevations of -24 feet MLLW. These materials are underlain by very loose to medium dense sand, silty sand, clayey sand with shell and rock fragments, and moderate to highly weathered limestone to approximately -52 feet MLLW. Based on the historical boring logs and laboratory analysis in this vicinity, the sediment also includes clay with high and low plasticity, silt with low plasticity, poorly-graded and well-graded sand, clayey sand with silt, and poorly-graded gravel.

Meeting area west of the Sidney Lanier Bridge:

Based on the historical boring logs for this area, the sediment consists of clay with high and low plasticity, silt with high and low plasticity, poorly-graded and well-graded sand, silty sand, clayey sand, clayey sand with silt, poorly-graded gravel, silty gravel, and clayey gravel. Moderately to highly weathered, moderately hard to hard, highly porous limestone was also noted in this reach. As described in Chapter 3, this area was

screened from further analysis therefore no geotechnical samples were collected in this area during the 2020 sampling effort.

Entrance Channel:

Project sediments typically range from 2 to 72 percent fine-grained material depending on the location along the length of the channel.

2.5 Essential Fish Habitat

Essential fish habitat (EFH) is defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1802(10)) of 1996 as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The MSA is the primary law responsible for governing marine fisheries management in U.S. Federal waters and aims to promote conservation, reduce bycatch, and rebuild overfished industries. The South Atlantic Fishery Management Council (SAFMC) is responsible for the conservation and management of fish stocks within the Federal 200-mile limit of the Atlantic Ocean off the coasts of North Carolina, South Carolina, Georgia and east Florida. The SAFMC consists of 17 members made up of 13 voting members and four non-voting members which includes the Southeast Regional Administrator of the National Marine Fisheries Service, directors or designees of the four South Atlantic state marine resource management agencies, and eight citizens (two per state) of the southeastern states. Non-voting members include representatives of the U.S. Fish and Wildlife Service, U.S. Coast Guard, State Department, and Atlantic States Marine Fisheries Commission. The SAFMC manages the following species occurring in the Lower Brunswick River area: shrimp (brown, white, and pink), gag grouper, gray snapper, black sea bass, Spanish mackerel, summer flounder, and several shark species.

High priorities for EFH conservation are called Habitat Areas of Particular Concern (HAPC) and merit special attention from the National Oceanic and Atmospheric Administration (NOAA) Fisheries. An EFH is considered a HAPC if it serves major ecological functions, is sensitive to declines, is stressed from development, is rare habitat or is especially vulnerable to anthropogenic (or human impact) degradation. The HAPCs, as currently designated by the SAFMC and NOAA include coastal inlets under the fishery management plans for shrimp complex and the snapper grouper complex. For grouper, the post larval and juvenile stages of this fish will typically be found within the coastal inlet EFH while the adult, egg, and larval stage remain out to sea. For shrimp species, the post larval, juvenile, and sub-adult juveniles can be found throughout this EFH while the adult, egg, nauplius, and protozoa stages remain out to sea (Sanger and Parker 2016). The oyster reef and coastal inlets that are located within and adjacent to the study area are considered EFH-HAPC.

The following EFH habitat occurs within the Brunswick River complex:

- Estuaries (Estuarine Emergent Wetlands & Estuarine Water Column)
- Oyster Reefs & Shell Banks
- Unconsolidated Bottom

- Coastal inlets
- Tidal creeks
- Marine Water Column

Table 9 depicts the EFH occurring in the study area or immediate area. Potential effects from the project are described in Section 4.3. More information on the designation of these habitats can be found in “*Users Guide to Essential Fish Habitat Designations by the South Atlantic Fishery Management Council*” (SAFMC, 2020).

Specifically, the following EFH habitat occurs in each of the proposed modification areas:

- Proposed Bend Widener: Coastal Inlets
- Proposed Turning Basin: Unconsolidated bottom and tidal creeks
- Proposed Channel Widener/St. Simons Meeting Area: Coastal inlets
- Proposed Channel Widener/Meeting Area West of Sidney Lanier Bridge: Unconsolidated bottom and tidal creeks

The entrance channel and ODMDS are located within marine water column and coastal inlets. The Atlantic HMS FMP designated EFH in the proposed project area includes coastal inlets and estuaries for bull sharks (*Carcharhinus leucas*), finetooth sharks (*C. isodon*), blacktip sharks (*C. limbatus*), sandbar sharks (*C. plumbeus*), scalloped hammerhead sharks (*Sphyrna lewini*), bonnethead sharks (*S. tiburo*), and Atlantic sharpnose shark (*Rhizoprionodon terraenovae*). Georgia estuaries have specifically been identified as primary and secondary nursery habitats for many coastal sharks with pregnant females entering estuaries to pup during spring through early summer and then neonates and juveniles using these areas as nursery habitats until exiting in the fall (NMFS, 2021).

Table 9. Essential Fish Habitat

Essential Fish Habitat	Potential Presence	
	In/Near Project Vicinity	Potential Project Effect
Estuarine Emergent Wetlands	Yes	No
Estuarine Scrub/ Shrub Mangroves	No	No
Submerged Aquatic Vegetation	No	No
Oyster Reefs & Shell Banks	Yes	No
Subtidal/Intertidal Non-vegetated Flats	No	No
Palustrine Emergent & Forested Wetlands	No	No
Aquatic Beds	No	No
Unconsolidated Bottom	Yes	Yes

Estuarine Water Column	Yes	Yes
Coastal Inlets	Yes	Yes
Live/Hard Bottoms	No	No
Coral & Coral Reefs	No	No
Artificial/ Manmade Reefs	No	No
Sargassum	No	No
Tidal Creeks	Yes	Yes
Marine Water Column	Yes	Yes
Council designated Artificial Reef Special Management Areas	No	No
Hermatypic Coral Habitats & Reefs	No	No
Hoyt Hills	No	No
Sargassum Habitat	No	No
State Designated Areas of Importance of Managed Species	No	No
Submerged Aquatic Vegetation	No	No
Gray's Reef	No	No

2.6 Wetlands

Brunswick Harbor is located in the lower Atlantic Coastal Plain of Georgia. Extensive expanses of salt marsh and barrier islands separate Glynn County from the Atlantic Ocean. Tidal creeks and inlets separate the barrier islands. The majority of the habitat within the project site consists of submerged unconsolidated estuarine bottom and intertidal flats.

Diverse wetland communities occur throughout Glynn County and include 74,000 acres of saltwater and brackish marsh, 4,700 acres of freshwater marsh, 4,700 acres of tidal swamps, and 29,500 acres of open water (Latham River/Jekyll Creek Environmental Restoration Project EIS, 1999). The lower East River area is industrialized. The eastern shore is nearly entirely developed, primarily with docks serving marine shippers or commercial fisherman. Wetlands are located along a narrow band on the western shoreline, between the river and a dike, which defines a portion of the Andrews Island DMCA. The salt marshes in the general area are of varying salinity and are vegetated in the lower elevations by smooth cordgrass (*Spartina alterniflora*). Higher marsh elevations are dominated by less abundant species, such as salt meadow cordgrass, glassworts, black needlerush, salt grass and sea ox-eye. Wetlands located adjacent to East River are primarily smooth cordgrass marshes existing along the river.

Wetland Mapping

A recent National Wetlands Inventory (NWI) Map for the study area confirms the classes of wetland and open water throughout the study area as described above (Figure 12).



February 4, 2020

Wetlands

	Estuarine and Marine Deepwater		Freshwater Emergent Wetland		Lake
	Estuarine and Marine Wetland		Freshwater Forested/Shrub Wetland		Other
			Freshwater Pond		Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Figure 12. National Wetlands Inventory for Brunswick Harbor
From (<https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/>)

2.7 Protected Species

Regulations for Protected Species

ESA

The Endangered Species Act (ESA) of 1973 (16 USC 1531 *et. seq.*) regulates activities affecting plants and animals Federally classified as endangered or threatened, as well as the designated critical habitat of such species.

MBTA/ BGEPA

The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703 *et. seq.*) prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service. The Bald and Golden Eagle Protection Act (BGEPA) of 1940 (16 U.S.C. 668-668c) prohibits anyone from "taking" bald eagles, including their parts, nests or eggs without a permit issued by the Secretary of the Interior. Under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, 51 species of birds have been identified within the study area, including the American bald eagle.

MMPA

The Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. §1361 *et. seq.*) established a national policy to prevent marine mammal species and population stocks from declining beyond the point where they ceased to be significant functioning elements of the ecosystems of which they are a part. It must be noted that all marine mammals are protected under the MMPA and some additionally are protected under the ESA. Three Federal entities share responsibility for implementing the MMPA:

- **NOAA National Marine Fisheries Service**—responsible for the protection of whales, dolphins, porpoises, seals, and sea lions.
- **U.S. Fish and Wildlife Service**—responsible for the protection of walrus, manatees, sea otters, and polar bears.
- **Marine Mammal Commission**—provides independent, science-based oversight of domestic and international policies and actions of Federal agencies addressing human impacts on marine mammals and their ecosystems (NOAA MMPA).

Table 10 identifies the species that have been ESA-listed by the USFWS and the NMFS as occurring or possibly occurring within Glynn County, as well as species that may be listed within the study area or within the proximity to the study area. This section provides a summary of the NMFS species in the study area, with more detail in Section 4 of the 2020 SARBO.

Table 10. Federally Listed species occurring within Glynn County

U.S. Fish and Wildlife Service Jurisdiction		
Common Name	Scientific Name	Status
West Indian manatee	<u><i>Trichechus manatus</i></u>	Threatened
Piping plover*	<u><i>Charadrius melodus</i></u>	Threatened
Red Knot	<u><i>Calidris canutus rufa</i></u>	Threatened
Eastern black rail	<u><i>Laterallus jamaicensis</i></u>	Threatened
Wood stork	<u><i>Mycteria americana</i></u>	Threatened
Eastern Indigo snake	<u><i>Drymarshon corais couperi</i></u>	Threatened
Gopher tortoise	<u><i>Gopherus polyphemus</i></u>	Candidate
Loggerhead sea turtle ⁺	<u><i>Caretta caretta</i></u>	Threatened
Leatherback sea turtle ⁺	<u><i>Dermochelys coriacea</i></u>	Endangered
Green sea turtle ⁺	<u><i>Chelonia mydas</i></u>	Threatened
Altamaha Spiny mussel	<u><i>Elliptio spinosa</i></u>	Endangered
Hairy Rattleweed	<u><i>Baptisia arachnifera</i></u>	Endangered
National Marine Fisheries Service Jurisdiction		
North Atlantic Right whale*	<u><i>Eubalaena glacialis</i></u>	Endangered
Sei whale	<u><i>Balenoptera borealis</i></u>	Endangered
Blue whale	<u><i>Balaenoptera musculus</i></u>	Endangered
Sperm whale	<u><i>Physeter macrocephalus</i></u>	Endangered
Fin whale	<u><i>Balaenoptera physalus</i></u>	Endangered
Kemp's Ridley sea turtle	<u><i>Lepidochelys kempii</i></u>	Endangered
Hawksbill sea turtle	<u><i>Eretmochelys imbricata</i></u>	Endangered
Loggerhead sea turtle ⁺	<u><i>Caretta caretta</i></u>	Threatened
Leatherback sea turtle ⁺	<u><i>Dermochelys coriacea</i></u>	Endangered
Green sea turtle ⁺	<u><i>Chelonia mydas</i></u>	Threatened
Oceanic Whitetip shark	<u><i>Carcharhinus longimanus</i></u>	Threatened
Giant manta ray	<u><i>Manta birostris</i></u>	Threatened
Atlantic Sturgeon	<u><i>Acipenser oxyrinchus oxyrinchus</i></u>	Endangered
Shortnose sturgeon	<u><i>Acipenser brevirostrum</i></u>	Endangered
<p>*Critical Habitat for this species found within Glynn county or adjacent coastal waters.</p> <p>⁺Species under both U.S. Fish and Wildlife and National Marine Fisheries Service Jurisdiction that nest in Georgia.</p> <p>NOTE: List developed by the USFWS, Information for Planning and Consultation (IPaC) Website, June 2019 and the NOAA Fisheries Southeast Region Protected Resources Division, Threatened and Endangered Species Directory for Georgia, Southeast U.S.</p>		

Federally-Listed Species Occurrence

West Indian manatee

Between October and April, manatees appear to concentrate in areas of warmer water. During the remainder of the year, manatees appear to choose areas with an adequate food supply and water depth, often in close proximity to a source of fresh water. Manatees primarily consume submergent, emergent, and floating vegetation.

Manatees are found in Georgia mainly during warmer months of the year. Records in Georgia are primarily random sightings and carcass finds and are not the result of systematic research. The Georgia population is primarily migratory in nature and therefore fluctuates with season. Manatees are most frequently sighted in Georgia waters from April through October in the waters of Camden, Glynn, and McIntosh counties. Because of their preferred habitat, manatees would most likely occur in the inner harbor if they were present. It is unlikely that a manatee would occur in the open ocean area of the entrance channel and ODMDS.

North Atlantic right whale

North Atlantic right whales (NARW) typically inhabit coastal waters along coastal Georgia each winter, often close to shore. According to the NOAA species directory website, each fall, some right whales travel more than 1,000 miles from North Atlantic feeding grounds to the shallow, coastal waters of South Carolina, Georgia, and northeastern Florida. These waters in the southern U.S. are the only known calving area for the species. The North Atlantic right whale migration and calving season is November 1 through April 30. The migration to and from calving areas follows a typical pattern, but can vary. This offshore location, considered critical habitat for calving, is between the Federal navigation channel and the offshore placement area (ODMDS). These whales remain near the surface with their new calves and are hard to spot in the water making them susceptible to vessel strikes, which is one of the leading causes of death for this species. There were 2 NARW deaths that occurred in 2021, both of which occurred in the area covered by the 2020 SARBO - with one death caused by a vessel strike in St. Augustine, Florida and the other death off Myrtle Beach, South Carolina from a long-term entanglement.

This endangered species is of particular concern to NMFS due to its critically low population numbers, low calving rates including no calves born in 2018, and an unusual mortality event where 50 individuals of an estimated population of less than 400 died between 2017 and 2021. This approximately 10% loss of population is a significant setback to the recovery of the population especially since there was also a decrease in calves during the same timeframe (<https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2021-north-atlantic-right-whale-unusual-mortality-event>).

Blue, fin, sei, and sperm whales

Blue, fin, sei, and sperm whales typically reside offshore in deep waters. They are not anticipated to be present in the study area and are not discussed in detail in this assessment.

Wood stork

The wood stork is a large, bald-headed wading bird that stands more than 3 feet tall, has a 5-foot wing spread, and weighs 4 to 6 pounds. It is the only stork species that breeds in the U.S. The species eats primarily fish, foraging in a variety of open, shallow freshwater and estuarine wetlands. Preferred habitat includes areas with falling water levels where fish and other prey are likely to be more concentrated in pools. The wood stork is a highly colonial species usually nesting in large rookeries and feeding in flocks. After breeding, wood storks in Georgia generally disperse away from the nesting colonies. Wood Storks may be found throughout the Southeastern U.S. where suitable foraging freshwater and estuarine wetland habitat are located (Georgia EDGES 2019). There are no known wood stork rookeries in the study area.

Piping plover

The piping plover is a small, stocky shorebird that resembles a sandpiper. The piping plover was listed by the USFWS as threatened and endangered on December 11, 1985. The Great Lakes population is listed as endangered, whereas the Atlantic Coast and Great Plains populations are listed as threatened. Preferred habitats for the species are sandy beaches along the ocean and inland lakes, bare areas in dredge material placement sites, and natural alluvial islands in rivers. Shorelines with little vegetation are preferred for both nesting and feeding. These plovers feed primarily on fly larvae, beetles, crustaceans, mollusks, and other invertebrates that they pluck from the sand (Bent, 1929). Breeding grounds along the Atlantic Coast range from Newfoundland to North Carolina. Wintering areas on the Atlantic Coast are from North Carolina southward through Florida and in the Bahamas and West Indies. Designated critical habitats are located on the south ends of Jekyll Island and St. Simons Island.

Red knot

The red knot is a migratory shorebird endemic to North America. In the Western Hemisphere the red knot breeds in the mid to high arctic tundra of Alaska, Canada, and Greenland. Most breeding habitats are near coastal areas, often on islands. Nest sites are generally on dry, sunny, and slightly elevated areas of tundra, frequently on open gravel ridges or slopes. During migration this species switches to coastal beaches usually at or near the mouth of bays, estuaries, or tidal inlets. Staging sites (locations where large numbers of birds congregate) are associated with high wave-energy coastal areas. Wintering sites are generally intertidal habitats such as beaches with significant wave action or currents. Red knots can be found on any Georgia barrier beach within the winter spring events. Red knots have been seen on Little Tybee, Wassaw, St. Catherines, Blackbeard, Sapelo, Little St. Simons, and Cumberland Islands, as well as St. Catherines Island Bar most often during those timeframes, while Wolf Island, Little Egg Island Bar, and Little St. Simons Island at the mouth of the Altamaha River support the only known late summer and fall staging site on the east coast of the U.S., attracting as many as 12,000 knots at one time (BATES USACE 2019).

Eastern black rail

The Eastern black rail is a small, secretive marsh bird with slate gray plumage and red eyes. The Eastern black rail typically occupies emergent wetlands with “overhead cover”, with little to no view of bare ground and require wetlands with minimal water coverage during the breeding season. Although the existing marsh area adjacent to the project area is considered part of their historical range, no Eastern black rails have been identified on the Georgia coast during the 2017 and 2018 Eastern black rail surveys conducted in cooperation with USFWS.

Green, Kemp’s ridley, hawksbill, leatherback, and loggerhead sea turtles

Green, Kemp’s ridley, hawksbill, leatherback, and loggerhead sea turtles may be found in the study area. Sea turtle nesting in Georgia is primarily by loggerhead sea turtles occurring from late May to mid-August with infrequent nesting by green, Kemp’s ridley, and leatherback sea turtles. Hawksbill turtles do not nest in Georgia and are rarely found in Georgia coastal waters. Sea turtle nesting data for the study area is available at www.seaturtle.org.

Loggerhead turtles are a focus for conservation efforts in the study area due to their relative abundance and are a focus of GADNR-Coastal Resource Division (CRD) conservation efforts. This threatened species was divided into nine Distinct Population Segments (DPS) in 2011 with all loggerhead sea turtles in the United States along the Atlantic Coast and Gulf of Mexico in the Northwest Atlantic DPS (76 FR 58868, Publication Date September 22, 2011). While the loggerhead sea turtle Recovery Plan identified nesting populations smaller than the DPS based on genetics, it classified loggerhead sea turtles in the study area as part of the Northern Recovery Unit spanning from the Florida/Georgia border north through southern Virginia. Female loggerhead sea turtles regularly nest along the beaches of St. Simons Island and Jekyll Island from April/May through August. The 2019 sea turtle nesting data indicated that for St. Simons Island, there were six loggerhead nests and for Jekyll Island, there were 199 loggerhead nests (GADNR-CRD Sea Turtle Conservation Program).

Adult loggerheads are common in and around the inner harbor ship channel from Cedar Hammock Range to the ocean. Juvenile loggerheads, greens, and Kemp’s ridley are common throughout the estuary year-round, but are more abundant in March through November. The abundance of juveniles is several orders of magnitude higher than adults. Very few adult greens or Kemps are found in Georgia (Dodd-2020).

A study released in 2020 used genetics to determine that the majority (84.4%) of female loggerhead sea turtles nesting in North Carolina, South Carolina, and Georgia migrate north to foraging areas north of North Carolina after nesting each summer. However, not all turtles migrate, leaving a smaller resident population that moves shorter distances to forage and overwinter. The 2020 study also concluded that these turtles then migrate back south to wintering areas from Cape Hatteras, North Carolina to West Palm Beach in Florida, “where they can enter warmer waters adjacent to the Gulf Stream while minimizing the migratory distance, time and energy required to return to their northern foraging sites when water temperatures rise in the spring.” (Pfaller, et al. 2020).

Atlantic and shortnose sturgeon

Atlantic sturgeon inhabits coastal, estuarine, and riverine environments on the Atlantic coast. Five separate DPSs of Atlantic sturgeon were listed in 2012 with the study area located within the South Atlantic DPS (77 FR 5880 and 5914, Publication Date February 6, 2012). Atlantic sturgeon commonly occur in the study area. Adults migrate into spawning rivers, in the spring and likely fall. Within the inner harbor, adults are typically observed traveling during the spawning season from August to December and juvenile/sub-adults are observed year-round. For the shortnose sturgeon, sub-adult to adult stages may be observed from late winter to early spring (Post- SCDNR).

The largest and most undisturbed river system available to Atlantic Sturgeon within the South Atlantic DPS is the Altamaha River, approximately 14 miles north of the project area. Ingram (2016) conducted a study using telemetry data to better understand the spatial and temporal dynamics of the species' spawning migration in the Altamaha system. The data indicated that adults exercise two patterns of migration for spawning within that river's designated critical habitat. About one-third of the population exhibit a two-step migration entering the river from April to May, initiating the upstream migration in the spring/early summer, mid-river staging through the summer, and resuming the migration upstream in the fall, late August/early September. The remaining two-thirds migrate using a one-step pattern directly to the spawning habitat in the Ocmulgee and Oconee tributaries that begins in late August/early September. Regardless of the pattern used, all fish returned downstream and left the Altamaha River system by early January.

Studies in the Savannah River, another Georgia sturgeon river with critical habitat designation, report similar movement patterns that find Atlantic sturgeon in nearshore waters in the colder months. Rogers (2000) suggested that sturgeon are probably inhabiting important foraging areas during cooler seasons when the growth rates of juvenile Atlantic, and probably shortnose, sturgeon are low. These areas appear to include the freshwater/saltwater boundary of the lower Savannah River (pre-Savannah Harbor Expansion Project - SHEP) (Hall 1991) for both species and, for Atlantic sturgeon, the nearshore continental shelf and shipping channels (Rogers et al., 1994). Trawling relocation data support this. In 2018, 79 Atlantic sturgeon were relocated from Brunswick Harbor's entrance channel between January 31 and March 15. In Savannah, during the 3 years (2016, 2017, 2018) of winter dredging (December - March) in the entrance channel for the SHEP, 17, 78 and 41 Atlantic sturgeon were relocated, respectively.

Shortnose sturgeon, unlike Atlantic sturgeon, tend to spend relatively little time in the ocean, according to the NOAA species directory website. When they do enter marine waters, they generally stay close to shore. In the spring, adults move far upstream and away from saltwater to spawn. While sturgeons are known to occur within the study area, there is no designated critical habitat.

Oceanic white tip shark

The oceanic white tip shark is a deep water, open ocean species that would not be expected to occur within the study area.

Giant manta ray

The giant manta ray inhabits coastal and offshore waters and is frequently observed in nearshore coastal waters and feeding at inlets along the east coast of Florida (see Section 4 of the 2020 SARBO). This species migrates up the coast in warmer months and is expected to occur within the study area.

Additional Species

Although Eastern indigo snake, gopher tortoise, Altamaha spiny mussel and hairy rattlesnake are noted under the USFWS listed species list for Glynn county, none of these species are expected to be found within the study area.

FWCA

The Fish and Wildlife Coordination Act (FWCA) of 1934 (16 USC 661 *et. seq.*) ensures fish and wildlife resources receive equal consideration to other features of water resource development projects. The FWCA requires Federal agencies involved with such projects to first consult with the USFWS and the respective state fish and wildlife agencies regarding the potential impacts of the project on fish and wildlife resources. Whenever the waters or channel of a body of water are modified by a Federal agency, or by any other entity where a Federal permit is required, adequate consideration must be made for the conservation, maintenance, and management of wildlife resources and habitat. The use of the waters, land, or interests for wildlife conservation must be in accordance with plans approved jointly by the Secretary; of the Interior and the head of the state agency exercising administration of the wildlife resources.

Table 11 identifies GA state-listed species as occurring or possibly occurring within Glynn County (GADNR-WRD).

Table 11. Georgia's State Listed Species (Glynn County)

Animal/ Plant	Common Name	Scientific Name	State Status	Habitat	U.S. Listing
Animal	American Oystercatcher	<i>Haematopus palliatus</i>	Rare	Sandy beaches; tidal flats; salt marshes, shell rakes, sand bars	No
Animal	Atlantic Sturgeon	<i>Acipenser oxyrinchus oxyrinchus</i>	Endangered	Open ocean, estuaries; lower end of large rivers in deep pools with soft substrates; spawn as far inland as Macon, GA on the Ocmulgee	Listed Endangered
Animal	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened (GA)	Edges of lakes and large rivers; seacoasts	Bald and Golden Eagle Protection Act/the Migratory Bird Treaty Act
Animal	Black Skimmer	<i>Rynchops niger</i>	Rare	Tidal creeks and tidal ponds; sandy beaches, spits and dredge islands	No
Animal	Diamondback Terrapin	<i>Malaclemys terrapin</i>	Unusual	Entire coast, estuarine and marine edge; All saltmarsh, beaches	No
Animal	Eastern Indigo Snake	<i>Drymarchon couperi</i>	Threatened	Sandhills; pine flatwoods; dry hammocks; summer habitat includes wetlands	Listed Threatened
Animal	Gopher Tortoise	<i>Gopherus polyphemus</i>	Threatened	Sandhills; dry hammocks; longleaf pine-turkey oak woods; old fields	Candidate
Animal	Green Sea Turtle	<i>Chelonia mydas</i>	Threatened	Open ocean; sounds; coastal rivers; beaches	Listed Threatened
Animal	Gull-billed Tern	<i>Gelochelidon nilotica</i>	Threatened	Salt marshes; fields; sandy beaches, interdune, dredge islands	No
Animal	Henslow's Sparrow	<i>Ammodramus henslowii</i>	Rare	Grassy areas, especially wet grasslands, pitcher plant bogs, pine flatwoods, power line corridors in CP. Requires open veg at ground level with grass canopy above	No
Animal	Kemp's Ridley	<i>Lepidochelys kempii</i>	Endangered	Open ocean; sounds; coastal rivers; beaches	Listed Endangered

Animal/ Plant	Common Name	Scientific Name	State Status	Habitat	U.S. Listing
Animal	Least Tern	<i>Sternula antillarum</i>	Rare	Sandy beaches; sandbars, dredge islands	No
Animal	Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered	Open ocean; sounds; coastal beaches	Listed Endangered
Animal	Loggerhead Sea Turtle	<i>Caretta caretta</i>	Endangered	Open ocean; sounds; coastal rivers; beaches	Listed Threatened
Animal	Northern Atlantic Right Whale	<i>Eubalaena glacialis</i>	Endangered	Inshore and offshore ocean waters	Listed Endangered
Animal	Piping Plover	<i>Charadrius melodus</i>	Threatened	Sandy beaches; tidal flats, inlets	Listed Threatened
Animal	Rafinesque's Big-eared Bat	<i>Corynorhinus rafinesquii</i>	Rare	Pine forests; hardwood forests; caves; abandoned buildings; bridges; bottomland hardwood forests and cypress-gum swamps	No
Animal	Red Knot	<i>Calidris canutus</i>	Threatened	Beaches and exposed mudflats	Listed Threatened
Animal	Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	Endangered	Estuaries; lower end of large rivers in deep pools with soft substrates	Listed Endangered
Animal	Spotted Turtle	<i>Clemmys guttata</i>	Unusual	Heavily vegetated swamps, marshes, bogs, small ponds, and tidally influence freshwater wetlands; nest and possibly hibernate in surrounding uplands	No
Animal	Swallow-tailed Kite	<i>Elanoides forficatus</i>	Rare	River swamps; marshes, open pine and bottomland forest with super canopy pines.	
Animal	West Indian Manatee	<i>Trichechus manatus</i>	Endangered	Estuaries; tidal rivers, nearshore ocean waters	Listed Threatened
Animal	Wilson's Plover	<i>Charadrius wilsonia</i>	Threatened	Sandy beaches; tidal flats	No
Animal	Wood Stork	<i>Mycteria americana</i>	Endangered	Cypress/gum ponds; impounded wetlands with islands or emergent cypress; marshes; river swamps; bays	Listed Threatened
Plant	Ciliate-leaf Tickseed	<i>Coreopsis integrifolia</i>	Threatened	Floodplain forests, streambanks	No

Animal/ Plant	Common Name	Scientific Name	State Status	Habitat	U.S. Listing
Plant	Climbing Buckthorn	<i>Sageretia minutiflora</i>	Threatened	Calcareous bluff forests; maritime forests over shell mounds	No
Plant	Corkwood	<i>Leitneria floridana</i>	Threatened	Swamps; sawgrass-cabbage palmetto marshes	No
Plant	Florida Wild Privet	<i>Forestiera segregata</i>	Rare	Shell mounds on barrier islands in scrub or maritime forests	No
Plant	Greenfly Orchid	<i>Epidendrum magnoliae</i>	Unusual	Epiphytic on limbs of evergreen hardwoods; also in crevices of Altamaha Grit outcrops	No
Plant	Hooded Pitcherplant	<i>Sarracenia minor</i> var. <i>minor</i>	Unusual	Wet savannas, pitcherplant bogs	No
Plant	Pond Spice	<i>Litsea aestivalis</i>	Rare	Cypress ponds; swamp margins	No
Plant	Rosemary	<i>Ceratiola ericoides</i>	Threatened	Ohoopee Dunes; deep sandridges	No
Plant	Soapberry	<i>Sapindus marginatus</i>	Rare	Coastal shell mounds	No

2.8 Air Quality

The Clean Air Act (CAA), as amended (42 U.S.C §7401 *et. seq.*), requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA established two types of national ambient air quality standards- primary and secondary. Primary standards are levels established by the EPA to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards are levels established to protect the public welfare, including protection from decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA has set six NAAQS that regulate six pollutants: carbon monoxide (CO), lead (Pb), nitrogen oxide (NO_x), ozone (O₃), sulfur dioxide (SO₂), and particulate matter (PM_{2.5} and PM₁₀). Geographic areas have been officially designated by EPA as being in attainment or non-attainment for air quality based on an area's compliance with the NAAQS. Glynn County, Georgia is currently in attainment for the NAAQS for all criteria pollutants (EPA Nonattainment Areas for Criteria Pollutants (Green Book, 2021)). Therefore, the study area is under no Federal or State restrictions for the purpose of improving air quality to meet any air quality standards.

2.9 Water Quality

The State of Georgia assesses its water bodies for compliance with water quality standards established for their designated uses as required by the Federal Clean Water Act (CWA) (33 U.S.C § 1251 *et. seq.*). Water quality standards are found in Georgia's Rules and Regulations for Water Quality Control (Chapter 391-3-6-.03). All waters in Georgia are classified into categories which have different standards depending on the designated use of the water body. These uses include: (a) Drinking Water Supplies; (b) Recreation; (c) Fishing, Propagation of Fish, Shellfish, Game and Other Aquatic Life; (d) Wild River; (e) Scenic River; and (f) Coastal Fishing. Recreation designation is assigned if the water supports general recreational activities such as water skiing, boating, or swimming. The littoral waters on the ocean side of Jekyll and St. Simons Islands are classified as Recreational. All waters within the Brunswick Harbor have the water use classification of Fishing.

Assessed water bodies are placed into one of three categories, supporting designated use, not supporting designated use, or assessment pending, depending on water quality assessment results. These water bodies are found on Georgia's 2020 305(b) list, which is a list of impaired waters in the state of Georgia. The subset of the water bodies that do not meet designated uses on the 305(b) list are also assigned to Georgia's 303(d) list. Although the 305(b) and 303(d) lists are two distinct requirements under the CWA, Georgia reports both lists in one combined format called the Integrated 305(b)/303(d) List

The 2020 Integrated 305(b)/303(d) list identifies the following sounds and harbors within the study area:

- St. Simons Sound: Assessment pending for the designated use of fishing (Category 3). A Total Maximum Daily Load (TMDL) evaluation for dissolved oxygen (DO) was completed in 2001 and revised in 2019. Arsenic has been found in the tissue of some fish collected from this waterbody. It is currently unknown what fraction of the arsenic in fish tissue is in the more toxic inorganic form. In order to be conservative and protective of human health, fish consumption guidelines have been issued for this water body. However, until a study has been completed to determine what fraction of the arsenic is in the inorganic form, the water will remain in Category 3 (insufficient data or other information to make a determination as to whether or not the designated use(s) is being supported) for 305b/303d purposes.

The 2020 Integrated 305(b)/303(d) list identifies the following coastal streams within the study area:

- East River (Academy Creek to the Brunswick River): Assessed as Category 1 (water quality data that indicate the designated use(s) are being met). Supports the designated use of fishing.
- Turtle River System (Brunswick: Turtle River, Buffalo River, and South Brunswick River): Not supporting the designated use of fishing. Assessed as Category 4a (TMDL developed to address pollutants in violation of water quality standards) for DO, and polychlorinated biphenyl (PCB) contamination in fish tissue. Shell fishing is banned within the water body.
- South Brunswick River (South Brunswick River to the St. Simons Sound): Not supporting the designated use of fishing. Assessed as Category 5 (required to have a TMDL evaluation for the water quality constituent(s) in violation of the water quality standard). The cause is identified as selenium and arsenic contamination in fish tissue, and the source as non-point source and urban runoff. GADNR-EPD needs to determine the "natural DO" for the area before it can be determined whether the dissolved oxygen criteria are being met.

Georgia's Rules and Regulations for Water Quality Control, Rule 391-3-6-.03(5)(d) states that all waters shall be free from turbidity which results in a substantial visual contrast in a water body due to a man-made activity.

Turbidity levels at the study area are influenced by the East River and Turtle River to the west, the Brunswick River to the southwest and St. Simons Sound, and by waves and tidal action. The two reported major sources of turbidity in coastal areas are very fine organic particulate matter and sand-sized sediments that are re-suspended around the seabed by local waves and currents (Dompe and Haynes 1993). Higher turbidity levels are typically expected around inlet areas, and particularly in estuarine areas, due to high nutrient and entrained sediment levels. Although some colloidal materials remain

suspended in the water column upon disturbance, high turbidity episodes usually return to background conditions within several days to several weeks, depending on the duration of the disturbance (storm event, dredging, etc. or other) and on the volume of suspended fines.

2.10 Cultural Resources

The management of cultural resources is regulated under Federal laws such as the National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. §300101 *et seq.*), the Archaeological and Historic Preservation Act of 1974 (54 U.S.C. §§312501- 312508), the American Indian Religious Freedom Act of 1978 (42 U.S.C. §§1996 and 1996a), the Archeological Resource Protection Act of 1979 (16 U.S.C. §§470aa-470mm), NEPA (42 U.S.C. §4321 *et seq.*), the Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. §3001 *et seq.*), the Abandoned Shipwreck Act of 1987 (43 U.S.C. §§2101-2106), and the Sunken Military Craft Act of 2004 (10 U.S.C. § 113 *et seq.*).

Cultural resources considered in this study are those defined by the NHPA as properties listed, or eligible for listing, on the National Register of Historic Places (NRHP) and are referred to as historic properties. Historic properties include buildings, structures, sites, districts, objects, cultural items, Indian sacred sites, archaeological artifact collections, and archaeological resources (36 CFR 800.16(l)(1)). Cultural resources also include resources with unknown NRHP eligibility status.

Archaeological and Historic Setting

The archival research presented here is taken from an earlier Panamerican Consultants, Inc., investigation of the same area (Tuttle and James 1999) and from a report prepared by LG2 Environmental Services, Inc., and Tidewater Atlantic Research in 2017 for survey work conducted of portions of the Little Satilla River in Camden County, Georgia (Watts et al. 2017). The previous archival research was conducted in several Brunswick area repositories, such as the Museum of Coastal History and the Coastal Georgia Historical Society, both on St. Simons Island, and the collections at the Brunswick Glynn County Library. Records examined included Annual Chief of Engineers Reports of the U.S. Army Corps of Engineers, and previous archaeological studies of the Brunswick Harbor area and of other harbors of similar context were also reviewed and synthesized as part of this research. The archival research identified numerous vessel losses in and around Brunswick. These data enabled the researcher to determine the types of resources lost within the project area, allowing a more accurate interpretation of any that might be encountered. Furthermore, past surveys of the Brunswick Harbor Federal channel are described in the *Final Environmental Impact Statement, Brunswick Harbor Deepening Project, Brunswick, Georgia, March 1998*.

Prehistoric cultural resources in Georgia range from PaleoIndian Period (10,000 – 8,000 BCE) through the Archaic Period (8000 – 1000 BCE), Woodland Period (1000 BCE – 1000 CE, and Mississippian Period 1000 – 1500 CE. The Paleoindian period is usually associated with the earliest securely documented period of human occupation in the

New World. In Georgia, the Paleoindian period is typically divided into three broad temporal stages (early, middle, late) based on the occurrence of specific point types. During the Archaic Period, new settlement and subsistence patterns emerged, and regional technological innovations were developed. Overall, the Archaic Period was the longest period of prehistoric cultural development in Georgia, with major cultural differences separating the early subperiod from the late. Most research in Georgia has centered on the central Savannah River Valley, where much has been learned, especially regarding the Late Archaic. In general, the Woodland Period is characterized by a greater emphasis on horticulture, sedentism, and the manufacture and use of pottery. In Georgia, distinct changes in ceramic technology differentiate Woodland Period assemblages from those associated with Late Archaic occupations. The Mississippian Period in Georgia is characterized by the emergence of chiefdom-level societies in the southeastern United States that occurred approximately eleven hundred years ago.

The town of Brunswick was established on 383 acres in 1771. Brunswick's population growth greatly increased following the Civil War and when numerous railroads connected the city with other interior regions of the state as well as Florida. Port facilities were built up, and in 1876 the Corps proposed the construction of a jetty to aid in maintaining the port, which was completed by 1883 (U.S. Army 1876, 1883). Also at this time, the U.S. Army Engineers sponsored dredging to establish and maintain a channel at 15 feet (U.S. Army 1880).

Inventory of Resources in the Study Area

A review of Georgia's Natural, Archaeological, and Historic Resources Geographic Information System (GNAHRGIS) database shows that investigations within the Federal navigation project are limited to the existing channel, associated features, and Bird Island, and that there are no recorded historic properties in the Area of Potential Effects (APE). The APE is defined as the areas that will be widened, including the side slopes of the channel (300-foot buffer), within the Federal Navigation Project. The APE also includes areas for dredged material placement. Staging areas and access roads for construction would also be within the APE. A GNAHRGIS query showed that there are several cultural resources recorded within a 1 km radius of the study area. While no prehistoric sites are known within the proposed project area, several have been found outside the APE and are described in Table 12. These site types are indicative of the resources that may be found within the APE during terrestrial and remote sensing surveys.

Table 12. Cultural Resources recorded outside the Area of Potential Effects

Site Type	NRHP Status	Comments	In APE?
Mound and village	Unknown	excavated by Holder 1937/38	No
Prehistoric	Unknown		

Site Type	NRHP Status	Comments	In APE?
Early Woodland - Historic Contact/ Historic occupation 1810-1850	Eligible	mitigated	No
Shell Midden/Late Archaic/Mississippian	Unknown		No
Oyster Middens	Unknown		No
Shell Scatter w/intact subsurface midden	Unknown	Additional testing recommended	No
Shell Scatter w/intact subsurface midden	Unknown	Additional testing recommended	No
late 18th-20th Century	Unknown	Razed	No
18th century British fort	Eligible		No
Archaeological site	Unknown		No
J.A. Jones Construction Company Brunswick Shipyard	Eligible District	Historic Resources Report prepared due to future development near district	No

Surveys of the existing navigation channel conducted prior to 1997 resulted in the identification of anomalies in the channel, wideners, and bends that were attributed to modern debris and no further investigations of the anomalies were recommended. A survey of the South River turning basin (existing turning basin) conducted in 1997 located two anomalies that had signatures indicative of submerged cultural resources. These were recommended for diver investigation, but no further work was conducted.

In 2002, Gordon Watts located 17 anomalies in the area where the Bird Island was created. Diver investigations determined that none of the identified anomalies in the area of the Bird Island were significant cultural resources. A detailed discussion and inventory of previous investigations in the Federal channel and vicinity is found in the enclosure (Brunswick Harbor Modifications Study Glynn County, Georgia, Section 106 Determination of Effects) that was sent to the Georgia State Historic Preservation Officer and the Tribal Historic Preservation Officers initiating Section 106 that is included in Appendix H.

Potential for Unidentified Cultural Resources

The potential for encountering sunken watercraft in the APE during remote sensing surveys is high due to the use of the area by European inhabitants for over two hundred years. Research conducted for previous surveys of the channel and in the vicinity has compiled lists documenting the losses of vessels in the Brunswick area that date back to the colonial era. Garrison (1980) notes that 40 vessels were lost in the Brunswick area. The majority of losses are in the East River Channel, Disposal Area K, and the Brunswick River Channel. Garrison notes that there should be archaeological surveys conducted in the regions of St. Simons and Jekyll Islands if future construction is planned.

An Espy, Huston & Associates, Inc. (1991) report contains the names of 32 vessels with their dates of loss along with 12 unidentified vessels. A majority of the unidentified vessels are considered to have been lost during the struggles between Great Britain and Spain. Nine of the 12 unidentified vessels date to the Battle of Bloody Marsh in 1742.

As seen in Table 13, Panamerican Consultants created a list of potential wreck sites when they conducted a survey that included the turning basin in the East River (James 2008). The list was derived from the personal research conducted by Judy Wood, former Savannah District archaeologist (Wood n.d.), Garrison and Evans (1980), the NOAA charts, and an 1888 navigation chart. Tidewater Atlantic Research (TAR 1992) lists 35 named vessels, two unnamed vessels, and a less definite number of vessels from the Battle of Bloody Marsh era.

Table 13. Potential shipwreck sites within the APE.

Name	Type	Date Lost	Comments
<i>Annie</i>	schooner	1906	15 tons, stranded
<i>Dixie</i>	gas screw	8/21/1918	built 1906, burned
<i>Dorthy</i>	side-wheeler	12/15/1915	built 1891, 74 tons, foundered
<i>Dragoon</i>	gas screw	9/30/1907	none
<i>Green Ocean</i>	diesel screw	12/1/1961	built 1938, fishing vessel, foundered
<i>Joseph W</i>	gas screw	9/20/1948	built 1918, fishing vessel, foundered
<i>Lelia E. Rowley</i>	sloop	1/1/1907	none
<i>MaryH.</i>	schooner	9/23/1913	built 1909, 21 tons, foundered
<i>Massosit</i>	gas screw	8/25/1919	fishing vessel, burned
<i>May Garner</i>	steam screw	7/10/1921	built 1893, 101 tons, burned
<i>7Messenger</i>	gas screw	11/11/1910	built 1909, 13 tons, burned
<i>Pope Catlin</i>	side-wheeler	8/28/1899	built 1853, burned and removed

<i>R.L Mabey</i>	side-wheeler	2/3/1897	built 1854, 82 tons, burned
<i>Redwing</i>	steamer	10/3/1908	19 tons, burned
<i>Roamer</i>	gas-yawl	12/1/1930	built 1902, burned
<i>Samuel Winpenny</i>	steamer	4/3/1889	none
<i>Tee Cee 0</i>	diesel screw	3/23/1975	built 1956, fishing vessel, burned
<i>Unknown</i>	dredge	8/27/1881	none

Field surveys for the identification and evaluation of cultural resources for the Selected Plan will be conducted during the Preconstruction Engineering and Design (PED) phase of this project, if the plan is approved and funded. Due to the lack of detailed project designs during the current feasibility stage, it will not be practicable to conduct fieldwork to identify and evaluate cultural resources or to determine the effects of the selected plan on historic properties. Pursuant to 54 U.S.C. 306108 and 36 CFR§ 800.4(b)(2), the Corps is deferring final identification and evaluation of historic properties until PED. A Programmatic Agreement (PA) between the Corps and the Georgia Historic Preservation Division (GA HPD) was executed on October 21, 2020 for this project (Appendix H). This agreement includes Phase I investigations to identify archaeological sites and shipwrecks in areas previously not surveyed where dredging will occur, including a buffer for mooring and anchoring and side-slopes. Any resources found during the surveys will be evaluated for inclusion on the NRHP.

2.11 Recreation

Recreational boaters access the ocean via the Brunswick River and St. Simons Sound from upriver marinas. Most of the waterway is accessible to recreational boaters therefore they can access the ocean without impeding the navigation channel. Boats also use the Atlantic Intracoastal Waterway (AIWW), which crosses St. Simons Sound and the Brunswick River. Also, the Mayor's Point terminal in downtown Brunswick hosts a small cruise ship line that docks monthly during the summer. Coastal Georgia is also an important tourist area, with visitors coming to enjoy the beaches and coastal resources, including enjoyment of marine life, such as sea turtles and dolphins.

2.12 Aesthetics

The lower part of the basin within the study area is characterized by a meandering course with several joining tributaries and confluences. The natural beauty of the Lower Brunswick River has been preserved by a number of factors. Among these are: (1) the preserved *Spartina* saltmarshes are generally intact, (they have not been protected per Georgia's Coastal Marshlands Protection Act (CMPA) of 1970); (2) the major uses of the area, that of recreation (hunting, fishing, and boating), have had little permanent effect on the natural environment; and (3) commerce via the Brunswick River area is largely confined to designated areas to avoid impacts to adjacent marsh and land areas.

The study area consists of estuarine open water habitat abutted by estuarine emergent marsh and is located adjacent to the Colonel's Island Terminal as well as the City of Brunswick.

There are no parks, national or historical monuments, national seashores, wilderness areas, research sites, or preserves within the project site or in the immediate vicinity of the study area.

2.13 Environmental Justice

Environmental justice (EJ) is addressing, as appropriate, disproportionately high and adverse human health or environmental effects of Federal programs, policies, and activities on minority and/or low-income populations. The Executive Order (EO) 12898 on EJ requires an analysis of environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority and/or low-income communities, when such analysis is required by the NEPA. The intent of EJ is that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies. This section uses the EJSCREEN tool to determine whether minority, low income, and Native American Tribal populations exist within the project area of potential effect. Section 5.11 evaluates whether the environmental impacts of each alternative would result in a disproportionately high and adverse impact on EJ communities (EO 12898, February 11, 1994).

EJSCREEN is an environmental justice mapping and screening tool developed by the EPA that provides demographic and environmental information for a given area. Glynn County is considered the geographic area of interest for this project and was the input to the EJSCREEN tool. Figure 13 displays the results for Glynn County in terms of six demographic indicators and a demographic index. The demographic indicators shown on the graph are: Low-income (the percent of an area's population in households where the household income is less than or equal to twice the Federal poverty level), minority population (the percent of individuals in an area who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino), less than high school education (percent of people age 25 or older in an area whose education is short of a high school diploma), linguistic isolation (percent of people in households in which all members age 14 years and over speak a non-English language and also speak English less than "very well"), individuals under age 5, and individuals over age 64.

As shown in Figure 13, Glynn County's minority population is at the 43rd percentile in the state, meaning that the region's percentage of minority population is equal to or higher than 43 percent of the state. When compared with the U.S., the County is at the 56th percentile. The county is in the 56th percentile in the state in terms of low income population (65th in the national percentile); it is in the 65th percentile in the state in terms of linguistically isolated population (57th in the national percentile); it is in the 52nd percentile in terms of population with less than a high school education (59th in the national percentile); 51st in population under the age of five (53rd in the national percentile); and 81st in population over age 64 (71st in the national percentile). The demographic index, which is based on the average of two demographic indicators:

percent low-income and percent minority, shows that county is in the 49th percentile when compared to the state and 60th percentile in the nation.

The EJSCREEN demographic indicators for Glynn county did not identify a specific need for further review, given that the Minority and Low-Income Population indicators were near or below the median for the state of Georgia. The Census block groups surrounding the project area, block group 131270010001 and 130390101002 were screened for potential EJ concerns as well, and it was found that the indicators for these geographic areas were lower than that of Glynn County when compared to the State and the U.S.

Given the screening described in this section, no minority or low-income populations have been identified that would be adversely impacted by the proposed project as determined above. Therefore, in accordance with the provisions of E.O. 12898 and FHWA Order 6640.23A, no further EJ analysis is required.

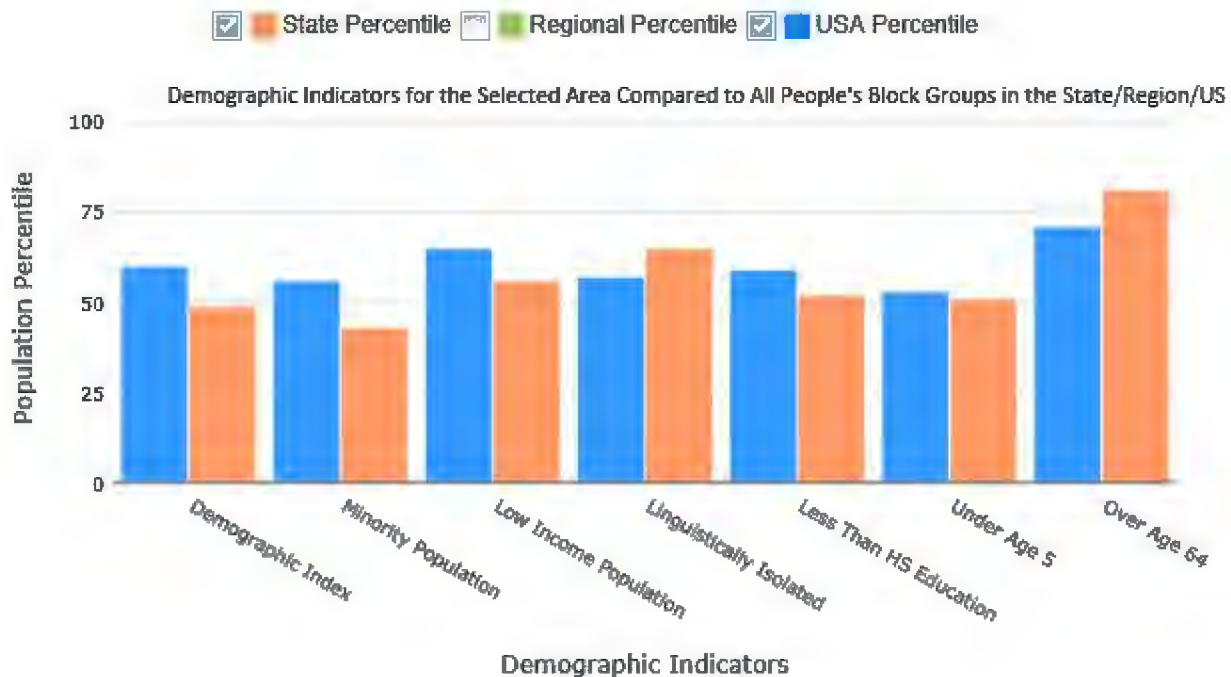


Figure 13. Environmental Justice Demographic Indicators for Glynn County as compared against the national and state demographic indicators.

2.14 Noise

Ambient noise levels in Glynn County are quiet to moderate and are typical of recreational environments. The major noise producers on the Lower Brunswick River include recreational boating/maritime activities, beach goers, adjacent commercial and residential areas, boat and nearby vehicular traffic. The study area within the Lower Brunswick River is not densely populated or heavily industrialized, though watershed noises associated with minor industrial, maritime activities from large vessels, and

airport activities are the predominant sources of noise in the study area. Naturally occurring noises (bird calls, etc.) are also common within the study area. Noise producers in the oceanic portion of the study area include wave action, boating activities, and passage of large vessels, noise produced by wave action being the most prominent.

2.15 Hazardous, Toxic, and Radioactive Waste (HTRW)

Spills

The Corps requested data on spills that could have impacted channel sediments in the vicinity of Brunswick Harbor from the USCG Marine Information for Safety and Law Enforcement System (MISLE) System. That database records information on spills determined to be significant in nature or 100 gallons or more. MISLE is used to schedule and record operational activities such as vessel boardings, marine casualty investigations, and law enforcement and pollution response actions. MISLE is only available to authorized USCG personnel via the USCG intranet but information may be requested by other Federal and state agencies. The Corps as part of determining suitability for sediments to be placed in the ODMDS submitted a Tier III sediment evaluation to EPA, this evaluation describes the physical and chemical characteristics of sediment that is proposed for placement in the ODMDS, and includes any known sources of contamination. Table 14 lists incidents since the last reported spills in the 2016 Tier III Sediment Evaluation (report submitted to EPA August 2016, concurrence on findings received September 2016). The last entry, Golden Ray MV, is described in detail in the next section.

Table 14. Spills in the Vicinity of Brunswick Harbor

Incident Date	Source	Location	Discharge Type	Discharge Amount (gallons)	Response
02 Oct. 2017	Storage Tank	Terry Creek	Sodium Hypochlorite (diluted)	430	A vacuum truck collected spilled product and soil was remediated
27 Nov. 2018	Fishing Vessel	Brunswick River	Diesel	50	Contractor contained and removed product
09 Jan. 2019	Fishing Vessel	Darien River	Diesel	100	Discharge collected and removed
<u>08 Sep. 2019</u>	Golden Ray MV (RO/RO vessel)	St. Simons Sound	Oil and Diesel	Unknown	Discharge collection, containment, and removal ongoing

The USCG reported that all appropriate safety procedures were followed after each spill (deployment of containment booms and skimmers, recovery of fuel/oil from leaking containers, monitoring of sheens on waterways, etc.). Since these contaminants tend to remain on the water's surface, no significant impacts to channel sediments are expected to have occurred from these incidents.

U.S. Coast Guard National Response Center Database:

A USCG National Response Center (<http://nrc.uscg.mil>) query for incidents in Brunswick Harbor was conducted. This query revealed approximately 13 incidents that were reported to the National Response Center since the 2016 Tier III sediment testing event (not including the Golden Ray incident which is described in the next paragraph). Of these, only one incident involved a release over 100 gallons. This event occurred in 2018 and involved a release of ~500 gallons of sewage into the Altamaha Canal. The release was contained. The others were 10 gallons or less. The incident summaries indicate that the primary chemicals that were released consisted mostly of diesel fuel, hydraulic oil, and lubricating oils. Since these contaminants tend to remain on the water's surface, and due to the distance, the events occurred from the project area, no significant impacts to the proposed dredged sediments are expected to have occurred.

The Golden Ray

At approximately 1:45 am local time on September 8, 2019, the MV Golden Ray listed to port and ran aground while transiting St. Simons Sound outbound from Brunswick, Georgia. The vessel remains grounded on the south side of the sound between St. Simons Island and Jekyll Island (Figure 14). The Golden Ray's approximate location is 31° 07.68 N, 081° 24.23 W at the entrance to St. Simons Sound and near the Federal navigation channel. The vessel's current heading is 146.9°, and she has 100.16° heel to port, with 0.36° trim by the stern (Siri Marine, 2020).

An Emergency Order Concurrence was issued from the State of Georgia from November 1, 2019 through December 31, 2020, to allow entities and organizations working under the direction of or on behalf of the Saint Simons Sound Incident Unified Command to participate in all salvage, operations, restoration, and monitoring activities associated with the St. Simons Sound Incident. On February 4, 2020, the Corps issued both a 408 (impacts to a Federal project) and CWA 404/10 (Nationwide Permit 22) permit to remove the wrecked MV Golden Ray.

The ongoing clean-up efforts to capture and remove fuel, oil, and any other pollutants is independent of this study and is anticipated to be completed prior to the commencement of project construction. No adverse impacts to the sediments in the study area are expected.



Figure 14. Location of MV Golden Ray (St. Simons Sound, Brunswick Harbor)

Cleanups in My Community Inventory Data

Several queries were made on the EPA EnviroFacts database (EnviroFacts). A search of the Cleanups in My Community (CIMC) database found 44 sites listed in Glynn County.

The CIMC database lists sites that have the following characteristics: *“Accidents, spills, leaks, and past improper disposal and handling of hazardous materials and wastes ... that have contaminated our land, water (groundwater and surface water), and air (indoor and outdoor). These contaminated sites can threaten human health as well as the environment”*. Of the 44 sites in Glynn County, 32 were Brownfields Sites and five had links to responses. All the incidents were prior to 2016 and there are ongoing investigations of 6 superfund sites. There were no new releases listed since the 2016 Tier III testing that could have adversely impacted Brunswick Harbor channel sediments.

A search of the Toxics Release Inventory (TRI) database found 8 sites in the general vicinity of Brunswick Harbor. The TRI database lists sites that have the following characteristics: *“The Toxics Release Inventory (TRI) contains information about more than 650 toxic chemicals that are being used, manufactured, treated, transported, or released into the environment. Manufacturers of these chemicals are required to report the locations and quantities of chemicals stored on-site to state and local governments. EPA compiles this data in an on-line, publicly accessible national computerized database ... which tabulate air emissions, surface water discharges, releases to land,*

underground injections, and transfers to off-site locations.” None of the sites listed in this database were considered to have significant adverse effects to Brunswick Harbor or the navigation channel.

Other Databases

The National Institute of Health’s TOXMAP database (<http://toxmap-classic.nlm.nih.gov/toxmap/home/welcome.do>) was searched and no new sites or releases were identified beyond those contained in EPA’s EnviroFacts database.

Results of Previous Sediment Testing

Sediment analyses were conducted for the 1998 EIS. Although sediment testing indicated varied results both above and below Federal limits per the CWA, the results above Federal limits appeared to be localized and although present within Brunswick Harbor, were found in the East River.

Brunswick Harbor entrance channel O&M sediments were tested for suitability for ocean placement in 2016. The testing results reviewed for this evaluation are contained in the August 2016 *MPRSA Section 103 Sediment Evaluation for Brunswick Harbor Navigation Project, Brunswick, GA., ANAMAR Environmental Consulting, Inc.* This work was performed in accordance with the EPA /USACE joint publication, *Evaluation of Dredged Material Proposed for Ocean Disposal - (Testing Manual)*, dated February 1991, referred to as the 1991 “Green Book” and the *Southeast Regional Implementation Manual (SERIM)*, dated August 2008. A portion of this testing included Cedar Hammock Range which is located inside the inner harbor and most represents sediment suitability for surrounding inner harbor O&M sediments. Sediment chemistry for metals, total organic carbon (TOC), total solids, ammonia, organotins, pesticides, polycyclic aromatic hydrocarbons (PAH) and PCB varied, but sediments in the Cedar Hammock Range, as well as those in the entrance channel were found suitable for ocean placement by the EPA.

A summary of the results from the 1997 and 2016 sediment testing events were shared with the resource agencies and can be found in Appendix L.

No significant changes have been made in Brunswick Harbor since the last major sediment evaluation that would impact channel sediments. No new berths or terminals have been added. The majority of changes in the harbor have been minor to moderate improvements to existing docks, infrastructure, and parking facilities.

2020 Brunswick Harbor Modifications Study (BHMS) Project Sediment Testing

In November 2020, sediment, surface water, and elutriate samples were collected from the proposed turning basin and bend widener to characterize the sediment to be dredged, and as a condition of the 401 Water Quality Certification (WQC) issued by GADNR-EPD in October 2020. Samples were analyzed for metals, pesticides, PCBs, PAHs, and dioxins and furans along with grain size and other physical parameters. Results were compared with applicable screening criteria. The concentrations of pesticides, PCBs, and PAHs in sediment, surface water, and elutriates were found to be

below screening values at all locations. Metals in sediment, surface water, and elutriates were found to be below screening values in all locations with the exception of a slight exceedance for arsenic in sediment at one location. Dioxins and furans were found in relatively low levels throughout the testing area and are thought to be ubiquitous in low levels in an industrial harbor. In general, analyte concentrations from the 2020 sampling event were similar to those from other locations in the inner harbor that were sampled during 1997 new work sediment testing (USACE, 1997) and earlier O&M inner harbor and entrance channel sediment testing in 1992 (SIO, 1992), 1993 (USACE, 1993), and 1995 (GSRC, 1996; USACE, 1996). Based on these results, the Corps does not anticipate that the placement of dredged material from the proposed turning basin and bend widener into Andrews Island DMCA will result in any release which may cause or contribute to a violation of state water quality standards. The full report of sediment testing results from 2020 (Ardaman & Associates, Inc., 2021a) can be found in Appendix L.

2.16 Climate Change

The main climate change assessment is the potential of impacts from future Sea Level Change (SLC). The SLC in Brunswick Harbor is forecasted to be a Sea Level Rise (SLR). Inland hydrology is not expected to affect Brunswick Harbor because it is the outlet of the drainage area. The assessment of the watershed vulnerability assessment did not categorize any navigation lines in Hydrologic Unit 0307 (Altamaha–St. Marys Subregion) as vulnerable. There is strong agreement from the literature review that temperatures in the Southeast will increase over the next century. Projections for precipitation events and hydrology are less certain than temperature projections for the Southeast Region.

Sea levels around Brunswick Harbor are expected to rise, depending on the projected rates of rise for low, intermediate, and high scenarios. The estimated relative SLC from 2026 to 2125 was calculated with the USACE SLC Curve Calculator at two NOAA tide gauges: Fernandina Beach, Florida, located 30 miles south of Brunswick Harbor and Fort Pulaski, Georgia located 60 miles to the north of Brunswick Harbor. The SLR projections for the three scenarios for both tide gauges are shown below in feet NAVD88 for the 100-year adaptation horizon.

Table 15. Sea Level Rise projections in feet NAVD88 for low, intermediate, and high scenarios at the end of the 50-year period of analysis (2075) and the 100-year adaptation horizon (2125).

USACE SLC Curve Calculator Scenario	Year 2075		Year 2125	
	Fernandina Beach, FL (NOAA Gauge 8720030)	Fort Pulaski, GA (NOAA Gauge 8670870)	Fernandina Beach, FL (NOAA Gauge 8720030)	Fort Pulaski, GA (NOAA Gauge 8670870)
Low	0.06	0.68	0.41	1.22
Intermediate	0.67	1.29	1.98	2.80
High	2.61	3.23	6.97	7.78

Figure 15 below shows the NOAA SLR viewer. The NOAA SLR viewer was used to preliminarily understand what the effects of SLR would look like at the port and the placement area. Figure 21 shows inundated areas in blue, with dark blue being deeper and lighter blue being shallower. Areas in green are low-lying areas. Based on this preliminary analysis, the placement area remains unflooded at the low, intermediate, and high SLC projections. The Port appears to see inundation at a SLR around 3 feet, or the intermediate projected curve at the end of the 100-year adaptation horizon (2125) or the high projected curve at the end of the 50-year planning horizon (2075).

The NOAA sea level rise viewer is only able to show SLR increments of one foot. The intermediate USACE curve at the Fort Pulaski tide gauge shows an increase in SLR of approximately 2.6 feet from year 2025 to year 2125. The mean higher high water (MHHW; epoch 1983-2001) plus 3 feet of SLR most closely represents the SLR condition of year 2125 on the intermediate USACE curve at the Fort Pulaski, Georgia tide gauge.

The existing dock heights at the existing GPA terminals are 14.5 feet MLW (GPA, 2020), which is approximately 18.8 feet NAVD88. The tidal range of Brunswick Harbor is approximately 7.6 feet (GPA, 2020). The estimated SLR for the 50-year period of economic analysis ranges between 0.06 feet NAVD88 and 3.23 feet NAVD88 between the years of 2026 and 2075 (up to an additional 0.53 feet of SLR could occur between the 1992 epoch to the 2025 year of construction). It is unlikely that SLR will affect the dock operations within the 50-year economic period of analysis. Preliminary qualitative analysis indicates that there could be flooding on the north and south ends of Colonel's Island within the 50-year period of analysis, which may require modification within Colonel's Island terminal. Further analysis with higher resolution elevation data and SLR models would be needed to develop further conclusions on flooding due to SLR.

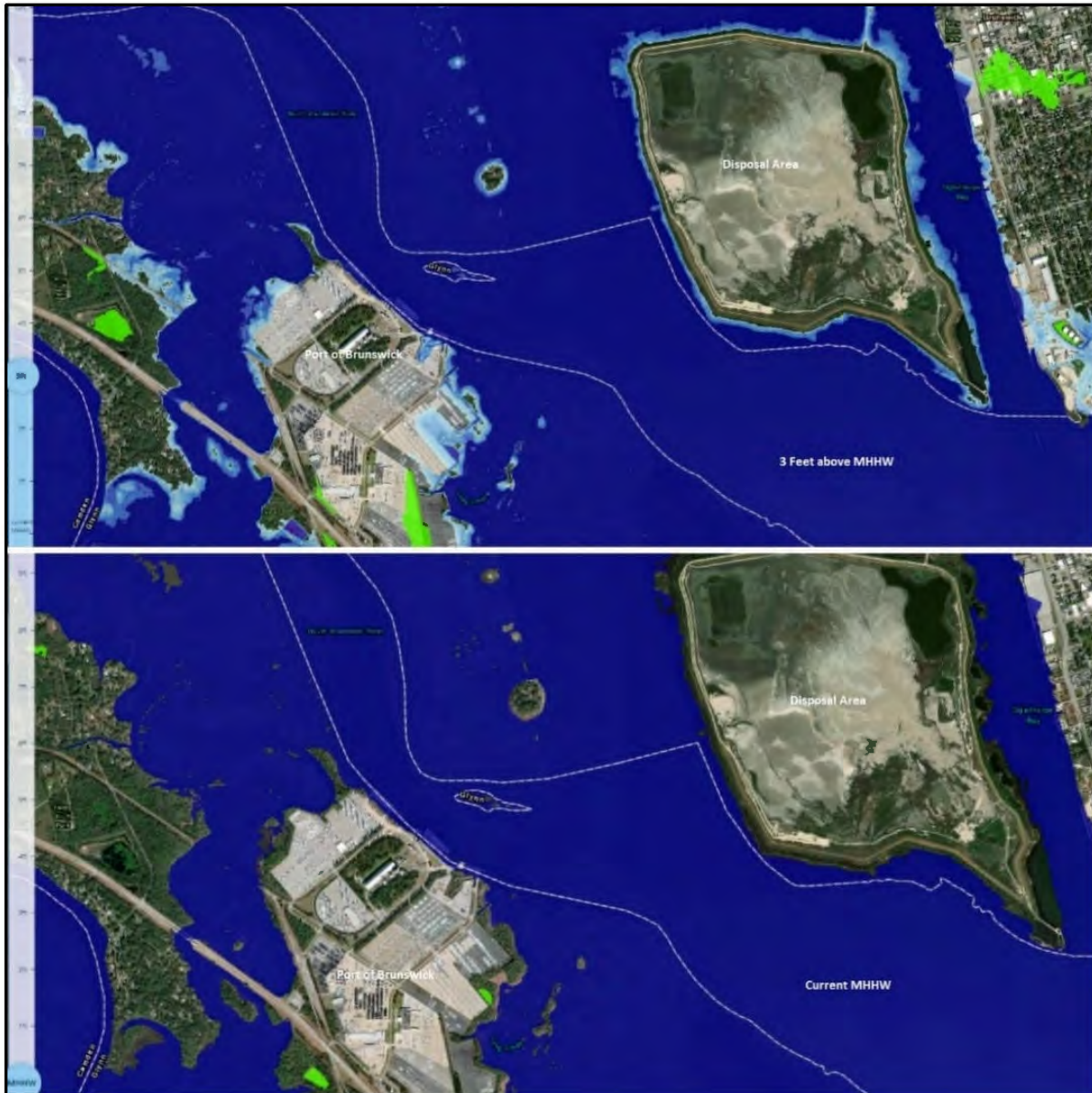


Figure 15. SLR Viewer of Brunswick Harbor and Andrews Island Placement Area (NOAA, 2020. Top: Future MHHW Conditions with +3 feet of SLR represents year 2125 for the USACE intermediate curve at the Fort Pulaski, GA NOAA tide gauge. Bottom: Existing MHHW Conditions (epoch 1983-2001).

Modifications as part of normal O&M will need to be assessed as sea levels rise. As part of normal maintenance of placement areas, erosion and toe protection would be evaluated as needed. It is expected that more tidal alerts would occur with SLR.

The air draft under the Sidney Lanier Bridge will need to be assessed with rising sea levels. Currently there is 185 feet of clearance at MHW. Currently the tallest vessels are around 150 feet. In addition, the tidal range of the Brunswick Harbor is larger than 3 feet, therefore with the addition of 3 feet of SLR, the vessels could choose to sail at a lower tide level.

3. Formulation of Alternative Plans

The guidance for conducting civil works planning studies, Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook, requires the systematic formulation of alternative plans that contribute to the Federal objective. To ensure sound decisions are made with respect to development of alternatives, and with respect to plan selection, the plan formulation process requires a systematic and repeatable approach. This chapter presents the results of the plan formulation process.

3.1 Problems and Opportunities

Newer RO/RO vessels have increased in length and width since the last design of the Brunswick Harbor, Georgia Project. Several locations within the Federal channel present maneuverability challenges and restrictions to large RO/RO vessels. Two areas in particular, the Cedar Hammock Range bend widener, and the turning basin at Colonel's Island Terminal are most problematic. Furthermore, Brunswick Harbor is limited to one-way RO/RO traffic.

Brunswick harbor pilots have self-imposed transportation safety restrictions in place such as waiting for suitable weather, favorable tides, and using tugboat assistance earlier in the berthing process. Larger RO/RO vessels are experiencing transportation cost inefficiencies due to these restrictions at targeted areas within the existing Federal channel. As PPP, LCTC, and HERO vessels call more frequently over the 50-year period of analysis, there would be an increase in the number of calls delayed.

Opportunities include:

- Increase maneuverability for large vessels within the Brunswick Harbor, Georgia Project
- Provide beneficial use of dredged material from modifying the Brunswick Harbor, Georgia Project

3.2 Objectives and Constraints

The primary objective of the modification to the Federal project is to improve the efficiency of the Brunswick Harbor, Georgia Project deep draft navigation system and contribute to National Economic Development by reducing the transportation cost of existing and anticipated future cargo volumes to and from Brunswick Harbor in an environmentally acceptable and sustainable manner during the 50-year period of analysis, from 2026 to 2075.

Planning constraints include avoiding impacts to the existing bridge alignment and clearance of the Sidney Lanier Bridge (vertical clearance of 185 feet Mean High Water) during the 50-year period of analysis, from 2026-2075.

3.3 Future Without-Project Conditions

The FWOP condition is the condition expected to occur in the project area in the future should no action be taken by the Federal government to modify the existing Brunswick Harbor, Georgia Project. The FWOP condition is compared to the with-project conditions (study alternatives) to identify project benefits. A 50-year period of analysis is used from the time the project modifications are operational and begin to accrue benefits. The FWOP is used for the modifications to the Federal project and distinct from the NEPA no action alternative described in Chapter 4.

In the FWOP it is assumed that the Port of Brunswick will continue to operate. The FWOP assumes that the existing channel would be maintained at the authorized depth of -36 feet MLLW fully compliant with all applicable laws and regulations. One-way vessel traffic within the inner harbor is expected along with continued tidal delays. The construction of an additional berth (Berth 0) at Colonel's Island Terminal is included in the FWOP. Vessel traffic in the FWOP is expected to increase over the period of analysis. The quantitative analysis for transportation costs for the FWOP is located in the Economics Appendix.

3.4 Management Measures and Screening for Project Improvements

Management measures are features or activities that can be implemented at a specific geographic location to address one or more planning objectives and avoid constraints. A preliminary list of structural and non-structural management measures to improve navigation efficiency and how they apply to Brunswick Harbor is included below:

Structural Measures

- Channel deepening – Increasing the authorized depth in a Federal channel.
- Channel widening – Increasing the width of the authorized Federal channel.
- Turning basins – Provides for radical change of vessel direction. Usually located at or near the upper end of the interior channel and possibly at one or more intermediate points.
- Anchorages – Provides a location for a vessel to stand by, load, or unload.
- Breakwaters and Jetties – Breakwaters and jetties provide obstruction to littoral drift, control entrance currents, prevent or reduce shoaling in the entrance channel, maintain channel alignment, and/or provide protection from wind and waves.

Non-structural Measures

- Use of tide – Delaying vessel movement until favorable tide conditions.
- Light-loading – Purposely not filling a vessel to capacity (from its point of origin) to accommodate depth conditions at the destination.
- Lightering – The loading or unloading of a vessel by means of lighter or barge. Sometimes used to permit the vessel to proceed in a light-loaded condition

through a channel of limited depth. Typically, lightering occurs once a ship is close to its destination.

- Traffic management – Consists of traffic regulations such as speed limits, traffic separation schemes, vessel traffic systems, and other guidelines or restrictions.
- Tug assists –Provides towing services during the vessel berthing process.

Screening

Screening is the process of eliminating, based on planning criteria, those measures that will not to be carried forward for further analysis. Criteria are derived for the specific planning study based on the planning objectives and constraints of the study and study area. Criteria used to screen measures as well as qualitative metrics associated with each criterion include the following:

- Is the measure already being carried out by a non-Federal entity? (Yes/No); measure is screened out from further analysis if response is “Yes”.
- Does the measure meet the primary planning objective? “Improve the efficiency of the Brunswick Harbor deep draft navigation system.” (Yes/No); measure is screened out from further analysis if response is “No”.
- Can the measure be designed to avoid or minimize the impacts outlined in the planning constraints? (Yes/No); measure is screened out from further analysis if response is “No”.

Based on site-specific conditions, is the measure applicable to the project site as a navigation improvement measure? (Yes/No); measure is screened out from further analysis if response is “No”.

Table 16. Measures Screened Out from Further Analysis and Cause for Screening

Measures Screened Out from Further Analysis					
Measures	Already carried out by non-Federal entity?	Meets primary planning objective?	Avoid planning constraints?	Applicable to project site?	Carried forward to alternative development?
Structural					
Channel Deepening	No	No	Yes	Yes	No
Channel Widening	No	Yes	Yes	Yes	Yes
Turning Basin	No	Yes	Yes	Yes	Yes
Anchorage	No	No	Yes	No	No
Breakwaters	No	No	Yes	No	No
Jetties	No	No	Yes	No	No
Non-Structural					
Use of tide	Yes	Yes	Yes	No	No
Light loading	No	No	Yes	No	No
Lightering	No	No	Yes	No	No

Traffic Management	Yes	Yes	Yes	No	No
Tug assists	Yes	Yes	Yes	No	No

Based on the screening summarized above in Table 16, use of tide, traffic management, and tug assists were screened out from further analysis because they are already carried out by a non-Federal entity and would not achieve significant transportation cost savings to meet the primary planning objective. This is because they are already accounted for in the existing condition. Channel deepening, light-loading, lightering, anchorages, breakwaters, and jetties were screened out from further analysis since they would not meet the primary planning objectives to reduce transportation inefficiencies. This is because transportation inefficiencies currently occur due to the increased width and length of RO/RO vessels. Authorized channel depth is not a problem for the current fleet therefore deepening would not be warranted. There are numerous locations for RO/RO vessels to anchor in and around the harbor so additional anchorages would not be beneficial. RO/RO vessels face greater delays due to ocean and harbor currents and not wave action. Breakwaters and jetties are beneficial to reduce wave action but would not address issues with harbor currents and would not address the planning objectives.

Therefore, the following management measures were carried forward for additional analysis:

- Channel widening
- Turning basin expansion

All the management measures carried forward for additional analysis meet the primary planning objective of the study, are likely to reduce transportation inefficiencies, avoid planning constraints, are not being implemented by a non-Federal entity, and are applicable to the project site. The channel widening and turning basin expansion management measures carried forward can be designed to avoid or minimize impacts outlined in the planning constraints.

3.5 Formulation Assumptions

Alternatives are a set of one or more management measures functioning together to address one or more planning objectives. Through the use of harbor pilot information coupled with Savannah District engineering and operations professional judgment, an initial array of alternative plans was formulated. Several assumptions were made in the development of the initial alternatives and are described in the section below.

Design Vessel Assumptions

Design vessel identification assists with informing design parameters for alternatives. For deep draft navigation projects, the design vessel was selected based on economic studies of the types and sizes of the vessel fleet expected to use the proposed channel over the project life. The design vessel is typically the maximum or near maximum size ship in the forecasted fleet. The current Federal channel was deepened in the 1990s for

a RO/RO design vessel with dimensions of 660 feet long and 106 feet wide. Since then, RO/ROs have increased in length or width. There are five distinct classes of RO/RO vessels that use Brunswick Harbor. The classes are grouped by ship length and ship width.

The economics and coastal hydraulics teams recommended a HERO vehicle carrier as the design vessel. This vessel class entered into use in 2015. The typical HERO is about 660 feet long and ranges from 114 to 134 feet wide. They are the widest ships to call on Brunswick Harbor and have an average capacity of approximately 7,600 to 8,000 CEU. These vessels have increased in use at Brunswick Harbor and the call frequency for Colonel's Island Terminal is expected to increase during the period of analysis (see Appendix A for more information). The HERO class is the primary design vessel for the Brunswick Harbor Modifications Study.

Channel Width Assumptions

Proposed channel widths for each alternative were determined based on existing bathymetry, expert elicitation from harbor pilots, feasibility-level ship simulation, and in conjunction with guidance from Engineer Manual (EM) 1110-2-1613 (Hydraulic Design of Deep Draft Navigation Projects). Channel widths range from approximately 100 feet (additional turning basin width) to 1,200 feet (meeting area in St. Simons Sound) within the alternatives.

Local Facility Assumptions

Local facilities include terminals, docks, berthing areas, and local access routes. In recent years, port improvements occurred at the Colonel's Island Terminal. Specifically, 610 acres have been developed for vehicle processing and a further 478 remain permitted for future development. Per GPA, 26 dockside acres have been redeveloped for RO/RO use. GPA completed permitting for a fourth RO/RO berth (termed "Berth 0") in 2019 and Berth 2 is undergoing upgrades to accommodate larger post-Panamax vessels. Other recent upgrades include increasing automobile parking spots from 60,000 to 90,000 units, road improvements, and funding received for future rail expansion design. While there have been improvements since the 1998 EIS, there are no local service facilities other than the local service facilities identified in the 1998 EIS that are required to support the proposed improvements. Pursuant to the terms of the April 5, 2002 Project Cooperation Agreement between the United States and the Georgia Department of Transportation (GDOT), the GDOT will continue to maintain the local service facilities.

Currently, the GDOT is required to maintain the Mayor's Point Terminal located in East River, Marine Point Terminals Incorporated located in East River, and Colonel's Island Terminal located in South Brunswick River as generally described in the 1998 EIS. These facilities are necessary to realize the benefits of the existing general navigation features and proposed improvements.

Beneficial Use of Dredged Material Assumptions

The PDT considered beneficial use of dredged material associated with proposed project improvements for all alternatives and worked with stakeholders to identify sites that would meet the Federal Standard for dredged material placement and/or provide the opportunity for beneficial use of dredged material. The Federal Standard for dredged material placement is defined in Corps regulations as the least costly dredged material placement alternative identified that is consistent with sound engineering practices and meets all Federal environmental requirements.

If beneficial use is selected for dredged material placement and that beneficial use happens to be (or be part of) the Federal Standard or base plan option for the project (because it is the least costly alternative that is consistent with sound engineering practices and meets all Federal environmental requirements), the costs of that beneficial use are assigned to the navigational purposes of the project and are shared with the non-Federal sponsor according to the navigation project depth.

Beneficial use project costs exceeding the Federal Standard option become either a shared Federal and non-Federal responsibility, or entirely a non-Federal responsibility, depending on the type of beneficial use.

3.6 Initial Array of Alternatives for Project Improvements

Channel widening and turning basin expansion were carried forward from the screening of measures and formulated into an initial array of alternatives. The PDT considered input from the May 2019 Planning Charette and factored in assumptions related to design, channel width, local facilities and beneficial use of dredged material as described in the previous section. The BHMS Project Delivery Team (PDT) first developed alternatives focused on two distinct problem locations within Brunswick Harbor where harbor pilots had reported maneuverability issues with large RO/ROs. The first location was in the vicinity of USCG Buoy 24 at the intersection of the Cedar Hammock Range and the Brunswick Point Cut Range, known as Widener 13. The second problem area was the width of the South Brunswick River turning basin near Colonel's Island Terminal. In 2011, the Corps prepared a CAP Section 107 Letter Report that first identified these two problem areas. The CAP Section 107 project was terminated due to the anticipated construction costs exceeding the authorized per-project limit.

Upon further discussions with the harbor pilots, it was discovered that an additional problem was a lack of a meeting area within the harbor. For clarification, vessel meeting is defined as two vessels transiting past one another in opposite directions. This maneuver is different from passing, which is when one vessel overtakes a second vessel transiting in the same direction. At the time, harbor pilots were able to utilize the area just north of the Federal channel in St. Simons Sound as an unofficial meeting area since the area has naturally deep water. However, to complete the maneuver, the harbor pilots would have to transit outside of the Federal channel and receive USCG permission to do so. The harbor pilots identified the area between the Colonel's Island

Terminal and the Sidney Lanier Bridge as a possible location for channel widening to create a designated vessel meeting area. A meeting area in this location would be beneficial since vessels would be protected from extreme wind while passing each other and vessels leaving Colonel's Island would not have to wait for incoming vessels to arrive. Furthermore, this is the general area where the tugboats meet up with the RO/ROs to assist with docking at Colonel's Island.

The initial array of alternatives was presented to the Corps' Vertical Team at the Alternative Milestone Meeting held on July 15, 2019 and included:

- Alt. 1: Expand the bend widener in the Cedar Hammock Range near Coast Guard buoy 14
- Alt. 2: Expand the turning basin near Colonel's Island Terminal.
- Alt. 3: Widen the Federal channel between the Sidney Lanier Bridge and the Colonel's Island Terminal to create a RO/RO vessel meeting area
- Alt 4: Combination of Alt. 1 and 2 (expand the bend widener and turning basin)
- Alt 5: Combination of Alt. 1, 2, and 3 (expand bend widener, turning basin, and create meeting area.

The above improvements were initially evaluated along with dredged material placement options identified for the project including beneficial use. Stakeholders identified five potential beneficial use opportunities as part of the study. Beneficial use sites that were further from the project area than the Andrews Island DMCA were screened from further consideration. This left two beneficial use options for consideration:

- Restore Bird Island at St. Simons Sound: Restore area impacted by erosion on Bird Island. This would require approximately 36,000 cubic yards of material.
- Construct a new Bird Island in Brunswick Harbor south of the intersection of Cedar Hammock and Brunswick Point Cut ranges. This would require approximately 200,000+ cubic yards of dredged material.

3.7 Initial Evaluation of Alternatives for Project Improvements

In early September 2019, as the PDT was preparing to conduct a ship simulation study on the initial array of alternatives, the 656-ft-long RO/RO vessel Golden Ray capsized in Brunswick Harbor. The Golden Ray had departed from Colonel's Island Terminal and capsized just outside of the Federal navigation channel near St. Simons Sound (Figure 14 from Section 2.15). The cause of the accident is currently under investigation. The vessel removal process is underway and is likely to be complete by the end of 2021.

In response to the Golden Ray event, the USCG issued a Regulated Navigation Area (RNA) order to provide a safe working area for response crews working on the Golden Ray removal. The RNA requires all vessels over 500 gross tons to seek prior approval from the USCG at least 24 hours prior to transiting within the Port of Brunswick and requires one-way vessel traffic at all times. In response to the RNA, the harbor pilots submitted a request to the Corps to temporarily widen the channel at St. Simons Sound

to create additional maneuverability space around the Golden Ray so the harbor pilots would be able to safely use St. Simons Sound as a meeting area. The harbor pilots' request to widen the Federal channel caused the BHMS PDT to reexamine the St. Simons Sound Area for inclusion in the study.

Prior to this incident, the harbor pilots used the naturally deep water (deeper than -38 feet MLLW) as a vessel meeting area, but it required them to navigate outside the channel after receiving USCG permission to execute the maneuver. While the RNA is temporary and will be lifted once the Golden Ray is removed, USCG has stated they intend to no longer allow vessels to leave the Federal channel (A. McConnell, personal communication, 2020). Therefore, the PDT decided to include an alternative to widen the Federal channel at St. Simons Sound to create a vessel meeting area. This area was included in the Feasibility-level ship simulation effort.

Feasibility-Level Ship Simulation

Feasibility-level ship simulation was conducted at the USACE Engineer Research and Development Center (ERDC) Coastal Hydraulics Lab (CHL) in Vicksburg, MS from December 2-6, 2019. Two Brunswick harbor pilots completed 44 simulated runs under a variety of environmental conditions (including extreme conditions), with data collected on transit time, run difficulty, and run safety. Ship simulation testing focused on configuring channel widening or realignment dimensions at four locations within Brunswick Harbor. The four locations (Figure 16) are:

- Meeting area at St. Simons Sound
- Meeting area west of Sidney Lanier Bridge
- Bend widener near USCG buoy 24 along the Cedar Hammock Range
- Turning basin expansion (4 options)



Figure 16. Proposed Brunswick Harbor modification areas

Ship simulation results showed that the proposed meeting area in St. Simons Sound is sufficient for vessels. Also, the proposed passing area located between the turning basin and the Sidney Lanier Bridge was found to be acceptable for two design vessels to safely pass. The full length of the tested area (from the Sidney Lanier bridge to the turning basin) is likely a necessity, as a shorter area would make timing difficult. The harbor pilots showed little difficulty with the proposed bend widener and the proposed design was found adequate.

Currently, Colonel's Island Terminal has three RO/RO berths available (Berths 1-3), with a fourth berth (Berth 0) permitted for construction (Figure 17). The GPA is undertaking this development project for Berth 0 independent of the BHMS (i.e., not a Local Service Facility).

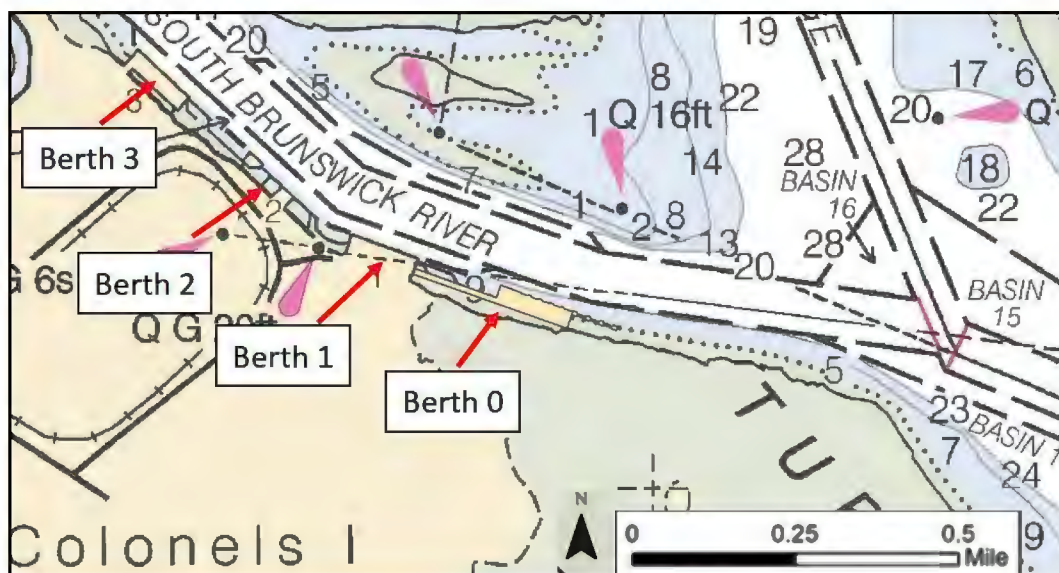


Figure 17. General Berth Location at Colonel's Island

The proposed berth was included in all ship simulation runs where applicable since its location impacts the turning basin design. Four different turning basin configurations were evaluated during ship simulation. The first two configurations were developed during the CAP Section 107 study in 2011. Upon expert elicitation with Brunswick harbor pilots, these two turning basin configurations were screened as they would not provide the needed additional maneuvering space near or upstream of the planned Berth 0. A third turning basin configuration was refined further during ship simulation to create turning basin option four. Turning basin option four incorporates less total width than turning basin option three but has greater upstream length. Ship simulation showed that the increase in vessel maneuverability near Berth 0 from the narrower and longer turning basin configuration was important especially in stronger environmental conditions such as strong winds or strong currents. Turning basin option four was carried forward into the final array of alternatives. Appendix B contains further discussion on turning basin design and configuration development.

The PDT recognized early in the plan formulation process that there was high risk of beneficial use exceeding costs for the base plan for the modification study. This is because the most likely beneficial use scenario is restoring Bird Island, however, only 36,000 cubic yards of material would be required for this action. Expanding the bend widener was likely to require placement of much more than 36,000 cubic yards of material. This would mean that one navigation feature would have two placement locations raising construction costs. A limiting factor for placing dredged material at Bird Island is that the elevation cannot be increased since the island is in the flight path of a local airport and there are Federal Aviation Administration (FAA) concerns about congregating birds. The PDT continued to consider beneficial use throughout the planning process as new information and data was collected over the course of the study. Please see Section 6.1 for the final description of the recommended plan and Section 6.3 for additional discussion on beneficial use.

3.8 Final Array of Alternatives for Project Improvements

With the data from ship simulation plus the firsthand user knowledge provided by the harbor pilots, the PDT developed the final array of alternatives carried forward for evaluation. The final array of alternative includes nine alternatives (a future without project condition and eight action alternatives). These are described below.

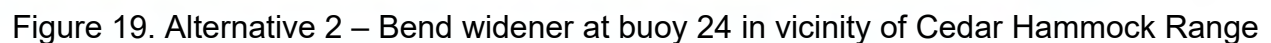
Alternative 1: Future Without Project Condition/ No Action Alternative

The FWOP condition, analyzed for comparison with the action alternatives, is the continuing current operations and restrictions within the Brunswick Harbor, Georgia Project with no navigation improvements. For purposes of NEPA it represents the no action alternative (NAA) for the proposed modifications. All physical conditions at the time of this analysis are assumed to remain. The planned berth (Berth 0) at Colonel's Island Terminal and terminal expansion are included in the FWOP. The FWOP assumes one-way RO/RO traffic within Brunswick Harbor; however, vessels do occasionally meet in two locations: (1) St. Simons Sound and (2) the Colonel's Island Terminal turning basin. Vessels rarely meet in the turning basin as conditions must be ideal for the maneuver to take place and both pilots must agree to it. Furthermore, it is unlikely that this maneuver will be able to continue once Berth 0 is constructed. Vessel meeting in the St. Simons Sound would occur outside of the Federal channel with USCG permission. However, since the Golden Ray incident, USCG has stated they intend to no longer allow vessels to leave the Federal channel (A. McConnell, personal communication, 2020). Therefore, it is reasonable to assume that the harbor pilots would abide by the USCG direction into the foreseeable future, and it is reasonable to assume one-way vessel traffic within the harbor. Golden Ray salvage operations are expected to be complete prior to project implementation (Figure 18).



Figure 18. Alternative 1 –Future Without-Project Condition

Alternative 2 would expand the Cedar Hammock Range bend widener located between stations 20+300 to 23+300. The bend widener would be expanded by a maximum of 321 feet on the north side and at a length of approximately 2,700 feet. The bend widener would be dredged to a depth of -38 feet MLLW (-36 feet MLLW plus 2 feet of allowable over-depth). Approximately 205,000 cubic yards of material would be dredged to expand the bend widener. A cutterhead dredge is the most likely dredging method for this alternative. The dredged material would be placed in the Andrews Island DMCA.



Alternative 3: Turning Basin Expansion

Alternative 3 would expand the existing turning basin at Colonel's Island Terminal along approximately 4,100 feet and increase the width by a maximum of 395 feet along South Brunswick River from stations 0+900 to 5+300. The turning basin expansion would be dredged to a depth of -38 feet MLLW (-36 feet MLLW plus 2 feet of allowable over-depth). Approximately 346,000 cubic yards of dredged material would be removed. A cutterhead dredge is the most likely dredging method for this alternative. All dredged material would be placed in the Andrews Island DMCA.

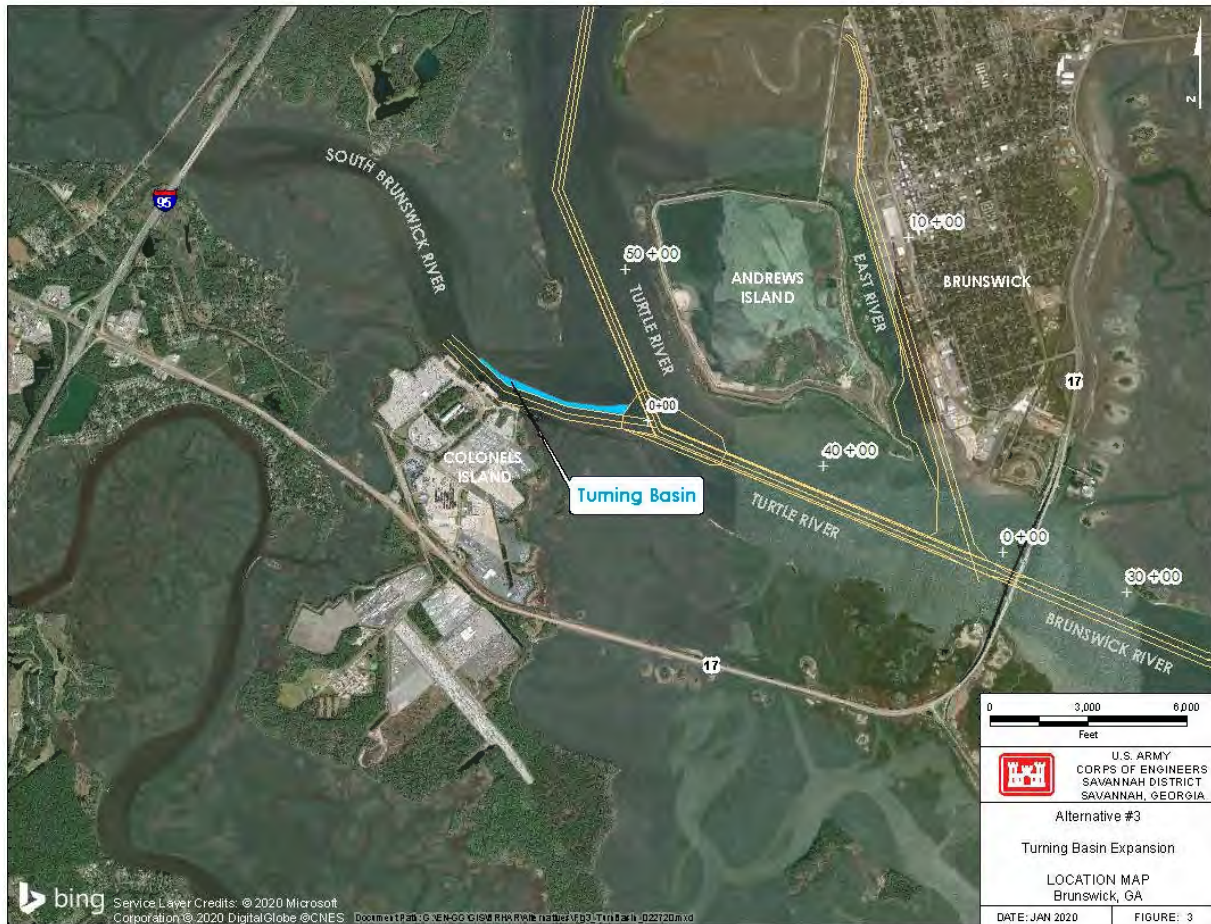


Figure 20. Alternative 3 – Turning basin expansion near Colonel's Island Terminal

Alternative 4: Meeting Area West of Sidney Lanier Bridge

Alternative 4 would create a RO/RO vessel meeting area upstream of the Sidney Lanier Bridge to the turning basin at Colonel's Island Terminal (a distance of approximately 8,700 feet). This part of the Federal channel is currently 400 feet wide. The Federal channel would be expanded by approximately 200 feet on both the north and south side of the channel to create a new channel width of 800 feet from stations 34+200 to 43+200. The meeting area would be dredged to a depth of -38 feet MLLW (-36 feet MLLW plus 2 feet of allowable over-depth). Approximately 800,000 cubic yards of material would be dredged mostly likely with a cutterhead dredge. All dredged material would be placed in the Andrews Island DMCA.



Figure 21. Alternative 4 – Meeting area west of the Sidney Lanier Bridge

Alternative 5: Meeting Area at St. Simons Sound

Alternative 5 would create a RO/RO vessel meeting area located at St. Simons Sound near the Brunswick Harbor entrance channel. No dredging is required for this alternative since the area has naturally deep water. Creating a meeting area at St. Simons Sound would move the northern boundary of the existing channel approximately 800 feet to the north along a length of approximately 10,000 feet from stations -6+800 to 4+300. The existing channel centerline would not change. Costs for this alternative are associated with cultural resource preservation surveys and associated engineering work to update the channel design. There are no physical modifications required for this alternative. Alternative 5 removes the requirement for USCG approval for meeting since the Federal channel would be widened enough for two RO/RO vessels to meet and transit past each other. Therefore, the harbor pilots would not need to transit outside the channel.



Figure 22. Alternative 5 – Meeting area at St. Simons Sound

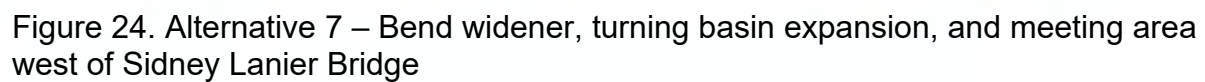
Alternative 6: Bend Widener and Turning Basin Expansion

Alternative 6 is a combination of the bend widener (Alternative 2) and the turning basin expansion (Alternative 3). A cutterhead dredge is the most likely dredging method for this alternative and dredged material would be disposed of in Andrews Island DMCA.



Figure 23. Alternative 6 – Bend widener and turning basin expansion

Alternative 7 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), and meeting area west of the Sidney Lanier Bridge (Alternative 4).



Alternative 8: Bend Widener, Turning Basin Expansion, and Meeting Area at St. Simons Sound.

Alternative 8 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), and meeting area at St. Simons Sound (Alternative 5). A cutterhead dredge is the most likely dredging method for this alternative and dredged material would be disposed of in Andrews Island DMCA.



Figure 25. Alternative 8 – Bend widener, turning basin expansion, and meeting area at St. Simons Sound

Alternative 9: Bend Widener, Turning Basin Expansion, Meeting Area West of Sidney Lanier Bridge and Meeting Area at St. Simons Sound.

Alternative 9 is a combination of the bend widener (Alternative 2), turning basin expansion (Alternative 3), meeting area west of the Sidney Lanier Bridge (Alternative 4), and meeting area at St. Simons Sound (Alternative 5).



Figure 26. Alternative 9 – Bend widener, turning basin expansion, meeting area west of the Sidney Lanier Bridge, and meeting area at St. Simons Sound

3.9 Evaluation and Comparison of Final Array of Alternatives for Project Improvements

Alternatives related to the proposed modifications of the Brunswick Harbor, Georgia Project were evaluated under the Principles and Guidelines formulation criteria, the four accounts evaluation framework, risks and uncertainties were examined, and achievement of objectives and avoidance of constraints.

Completeness, Effectiveness, Efficiency, and Acceptability

The developed alternatives were verified against the four Principles and Guidelines formulations criteria (Table 17). The completeness, effectiveness, efficiency, and acceptability criteria originated in the Principles and Guidelines, published in 1983 by the U.S. Water Resources Council and are used during the Federal study process for water resources planning.

- Completeness: The extent to which each plan includes all the necessary project components to obtain the planned effects.
- Effectiveness: The extent to which an alternative plan alleviates the specified problems and achieves the specified alternatives.
- Efficiency: The alternative meets the objective in the least costly fashion while providing a positive net benefit.
- Acceptability: The workability and viability of an alternative plan with respect to acceptance by State and local entities, tribes, and the public, and compatibility with existing laws, regulations, and public policies.

Table 17. Principles and Guidelines Criteria

Alternative	Completeness	Effectiveness	Efficiency	Acceptability
No Action Alternative	No	No	No	No
Alt. 2	Yes	Yes	Yes	Yes
Alt. 3	Yes	Yes	Yes	Yes
Alt. 4	Yes	Yes	No	Yes
Alt. 5	Yes	Yes	Yes	Yes
Alt. 6	Yes	Yes	Yes	Yes
Alt. 7	Yes	Yes	Yes	Yes
Alt. 8	Yes	Yes	Yes	Yes
Alt. 9	Yes	Yes	Yes	Yes

Based on the screening and evaluation criteria above, the No Action Alternative does not meet the minimum standard of completeness since it does not include all the necessary project components to obtain the desired results (i.e., reducing transportation inefficiencies). However, the No Action Alternative is carried forward through the evaluation phase as required by NEPA. All other action alternatives are considered complete because they account for all necessary investments or other actions to ensure the realization of the planned effects.

All action alternatives are considered effective at reducing transportation costs. The No Action Alternative does not effectively reduce transportation costs. Alternative 4 is not considered efficient because costs exceed benefits (see Table 23). The other action alternatives are considered cost effective. All action alternatives are acceptable in

regard to being workable and viable with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies.

National Economic Development, Regional Economic Development, Environmental Quality, and Other Social Effects

The evaluation and comparison process incorporated four accounts to facilitate evaluation and display of effects of alternative plans. The four accounts are national economic development (NED), environmental quality (EQ), regional economic development (RED) and other social effects (OSE). The Federal objective is to determine the project alternatives with maximum net benefits while protecting or minimizing impacts to the environment. Recent USACE guidance (5 January 2021 SACW Memo, "SUBJECT: POLICY DIRECTIVE – Comprehensive Documents of Benefits in Decision Document" (referred to as the Benefits Memo)) directed feasibility studies to "ensure the USACE decision framework considers, in a comprehensive manner, the total benefits of project alternatives, including equal consideration of economic, environmental and social categories." The following section provides an assessment of the alternatives across the four accounts in accordance with the referenced benefits memo. Since the Tentatively Selected Plan (TSP) milestone occurred prior to the release of the Benefits Memo, a qualitative assessment of benefits for the RED, EQ, and OSE accounts is acceptable. Table 18 summarizes differences between the alternatives across the four accounts.

Table 18. Alternative Plans Summary Comparison

Table 18: Alternative Plans Summary Comparison for Brunswick Modifications Study, GA									
1. Plan Description*	1. No Action Alternative/Future Without Project Condition	2. Bend Widener (dredge 205,000 yd³ to expand bend widener dimensions)	3. Turning Basin Expansion (dredge 346,000 yd³ to expand turning basin dimensions)	4. Meeting area west of Sidney Lanier Bridge (dredge 800,000 yd³ to create a vessel meeting area)	5. St. Simons Sound Meeting Area (re-design current Federal channel configuration to create a vessel meeting area. No dredging required due to naturally deep water)	6. Bend Widener + Turning Basin Expansion (dredge 551,600 yd³ to expand bend widener and turning basin dimensions)	7. Bend Widener + Turning Basin Expansion + Meeting Area West of Bridge (dredge 1,352,000 yd³ to expand channel dimensions at identified locations)	8. Bend Widener + Turning Basin Expansion + St. Simons Meeting Area (dredge 551,600 yd³ to expand channel dimensions at identified locations) NED PLAN (updated with FY22 certified cost information)	9. Bend Widener + Turning Basin Expansion + Meeting Area West of Bridge + St. Simons Sound Meeting Area (dredge 1,352,000 yd³ to expand channel dimensions at identified locations)
2. IMPACT ASSESSMENT									
A. National Economic Development (NED) ³									
(1) Project Costs (2) Annual Costs (3) Total Annual Benefits (4) Annual Net Benefits (5) Benefit to Cost Ratio	N/A	(1) \$9,445,000 (2) \$330,000 (3) \$1,025,000 (4) \$695,000 (5) 3.1	(1) \$8,462,000 (2) \$418,000 (3) \$1,259,000 (4) \$841,000 (5) 3.0	(1) \$20,569,000 (2) \$689,000 (3) \$286,000 (4) \$-403,000 (5) 0.4	(1) \$899,000 (2) \$33,000 (3) \$96,000 (4) \$63,000 (5) 2.9	(1) \$14,368,000 (2) \$629,000 (3) \$2,858,000 (4) \$2,229,000 (5) 4.5	(1) \$31,390,000 (2) \$1,218,000 (3) \$2,964,000 (4) \$1,746,000 (5) 2.4	(1) \$14,369,000 (2) \$632,000 (3) \$2,956,000 (4) \$2,324,000 (5) 4.7	(1) \$32,027,000 (2) \$1,224,000 (3) \$3,063,000 (4) \$1,839,000 (5) 2.5
B. Environmental Quality (EQ)									
(1) Hydrology and Floodplains	No changes expected								
(2) Aquatic Resources and Habitat	No change	Minor and short-term impacts expected during the construction phase.			No change	Minor and short-term impacts expected during the construction phase.			
(3) Essential Fish Habitat	Negligible adverse effects								
(4) Wetlands	No impacts expected								
(5) T&E Species	May affect but not likely to adversely affect the following species: Kemp’s ridley sea turtle, Hawksbill sea turtle, Green sea turtle, Loggerhead sea turtle, Leatherback see turtle, Giant manta ray, Shortnose sturgeon, Atlantic sturgeon, West Indian Manatee								
(6) Air Quality	No change	Minor and short-term impacts expected during the one-year construction period			No change	Minor and short-term impacts expected during the one-year construction period			
(7) Water Quality	No change	Minor temporary adverse effects during the one-year construction period			No change	Minor temporary adverse effects during the one-year construction period			

³ Please note that conceptual costs developed at the FY20 price level with a 2.75% discount rate are used for Alternatives 2 – 7 and 9. Since alternative 8 was identified as the NED plan, a certified cost estimate was developed in FY21. NED information presented for Alternative 8 is based on the FY21 certified cost estimate and the 2.5% discount rate. The information is displayed in Table 19 for informational purposes.

Table 18: Alternative Plans Summary Comparison for Brunswick Modifications Study, GA									
1. Plan Description*	1. No Action Alternative/Future Without Project Condition	2. Bend Widener (dredge 205,000 yd ³ to expand bend widener dimensions)	3. Turning Basin Expansion (dredge 346,000 yd ³ to expand turning basin dimensions)	4. Meeting area west of Sidney Lanier Bridge (dredge 800,000 yd ³ to create a vessel meeting area)	5. St. Simons Sound Meeting Area (re-design current Federal channel configuration to create a vessel meeting area. No dredging required due to naturally deep water)	6. Bend Widener + Turning Basin Expansion (dredge 551,600 yd ³ to expand bend widener and turning basin dimensions)	7. Bend Widener + Turning Basin Expansion + Meeting Area West of Bridge (dredge 1,352,000 yd ³ to expand channel dimensions at identified locations)	8. Bend Widener + Turning Basin Expansion + St. Simons Meeting Area (dredge 551,600 yd ³ to expand channel dimensions at identified locations) NED PLAN (updated with FY22 certified cost information)	9. Bend Widener + Turning Basin Expansion + Meeting Area West of Bridge + St. Simons Sound Meeting Area (dredge 1,352,000 yd ³ to expand channel dimensions at identified locations)
(8) Cultural Resources	No impacts to cultural resources or historic properties	Potential for negative impacts to cultural resources. As part of the Programmatic Agreement with GA HPD, surveys will occur prior to construction during the design phase of the project.							
(9) Recreation	No impacts expected								
(10) Aesthetics	No impacts expected								
(11) Noise	No change	Minor impacts during the one-year construction period			No change	Minor impacts during the one-year construction period			
(12) HTRW	No increased risk of disturbance or increase risk of spills								
(13) Climate Change	No change in water levels from existing conditions								
(14) Environmental Justice	No adverse effects expected								
C. Regional Economic Development (RED)									
	No change to the regional economy	Lesser regional economic impact compared to Alt 8.	Lesser regional economic impact compared to Alt 8.	Greater regional economic impact compared to Alt 8.	Minimal impact to the regional economy since no dredging is required.	Lesser regional economic impact compared to Alt 8.	Greater regional economic impact compared to Alt 8.	Harbor modifications and increased O&M expenditures would likely result in short-term increases in local spending, tax revenue, economic output, and full-time employment positions.	Greater regional economic impact compared to Alt 8.
D. Other Social Effects (OSE)									
(1) Life, Health and Safety	No change.	Increases harbor pilot perception of safety due to widened channel locations.							
(2) Availability of material for local use	No change.	Up to 250,000 yd ³ available for use	Up to 346,000 yd ³ available for use	Up to 800,000 yd ³ available for use	No material placed in Andrews Island DMCA.	Up to 551,600 yd ³ available for use	Up to 1,352,000 yd ³ available for use	Up to 551,600 yd ³ available for use	Up to 1,352,000 yd ³ available for use

National Economic Development (NED)

The NED account displays changes in the economic value of the national output of goods and services. Economic benefits were calculated using the USACE Institute for Water Resources (IWR) HarborSym Model. IWR developed HarborSym as a planning level, general-purpose model to analyze the transportation costs of various waterway modifications within a harbor. HarborSym is a Monte Carlo simulation model of vessel movements at a port for use in economic analyses.

Channel improvement modifications (i.e., channel widening and turning basin expansion) in Brunswick Harbor result in reduced transportation cost by creating fewer delays and less congestion when traversing the port. Furthermore, the creation of a meeting area reduces wait times within the harbor. Appendix A includes a detailed description of the economic model, economic analyses, and benefits. Conceptual cost estimates for the alternatives and the results of the economic analysis are displayed in Table 19 at the FY22 price level and 2.25% discount rate.

Table 19. BHMS Alternatives Comparison Summary based on conceptual costs (FY20 prices, 2.25% discount rate)

Alternative	Project First Cost FY20 (\$1,000s)	Quantities Dredged (yd ³)	AAEQ Benefit	AAEQ Cost	AAEQ Net Benefit	BCR
No Action	-	-	-	-	-	-
Alt 2. Bend Widener	\$9,445,000	205,159	\$1,025,000	\$330,000	\$695,000	3.1
Alt 3. Turning Basin expansion	\$8,462,000	346,462	\$1,259,000	\$418,000	\$841,000	3.0
Alt 4. West of Sidney Lanier Bridge	\$20,569,000	800,074	\$286,000	\$689,000	-\$403,000	0.4
Alt 5. St Simons Sound	\$899,000	-	\$96,000	\$33,000	\$63,000	2.9
Alt 6. Bend Widener + Turning Basin	\$14,368,000	551,621	\$2,858,000	\$629,000	\$2,229,000	4.5
Alt 7. Bend Widener + Turning Basin + Area West of Bridge	\$31,930,000	1,351,695	\$2,964,000	\$1,218,000	\$1,746,000	2.4
Alt 8. Bend Widener + Turning Basin + St. Simons Sound	\$15,312,000 ¹	551,621	\$2,956,000	\$664,000	\$2,292,000	4.5
Alt 9. Bend Widener + Turning Basin + Area West of Bridge + St. Simons Sound	\$32,027,000	1,351,695	\$3,063,000	\$1,224,000	\$1,839,000	2.5

¹Conceptual FY20 project first cost listed for comparison of Alternatives Once Alt. 8 was selected as the recommended plan the conceptual cost was revised based on feasibility level design and a certified cost estimate of \$14,369,000 was developed.

The NED plan is the plan which reasonably maximizes annual net benefits. The annual net benefits of an improvement plan are equal to its annual benefits minus its annual costs. The annual benefits, annual costs, benefit-cost ratio (BCR), and annual net benefits for each alternative were evaluated and compared using outputs calculated at the FY22 discount rate of 2.25 percent and conceptual level cost estimates. Since Alternative 4 has negative net benefits it is screened out from selection as the recommended plan.

Alternative 8 has the most net benefits; however, Alternative 6 has similar net benefits. The two alternatives produce no significantly different levels of net benefits and are within 5 percent of each other in respect to net benefits. In situations like this, according to ER 1105-2-100, Appendix G, Exhibit G-1 General Evaluation Guidelines, the lower cost alternative would be selected as the NED plan.

Alternative 8 and Alternative 6 both include expanding the bend widener and turning basin. They differ in that Alternative 8 includes creating a vessel meeting area at St. Simons Sound. The proposed meeting area (Alternative 5) has positive net benefits as a standalone alternative and is relatively low cost. The incremental cost of including the St. Simons Sound meeting area is reasonable to gain the additional benefits above those costs associated with two-way harbor traffic. Furthermore, Alternative 8 would also address transportation inefficiencies in three harbor locations versus Alternative 6 which would address transportation inefficiencies in two locations. Alternative 8 creates those additional benefits without the need for any dredging in St. Simons Sound. The incremental average annual benefits from Alternative 6 to Alternative 8 (\$98,000) outweigh the minimal incremental average annual costs (\$35,000) from Alternative 6 to Alternative 8. Alternative 8 is a more complete, effective, efficient, and acceptable plan than Alternative 6. Therefore, it is reasonable to select Alternative 8 as the NED plan.

Regional Economic Development

The RED account measures changes in the distribution of regional economic activity that would result from each alternative plan. Appendix A contains the full evaluation for the NED plan (Alternative 8).

The RED impact analysis for Alternative 8 was evaluated at the local, state, and national levels. In summary, the Civil Works expenditures of \$13,804,000 support a total of 57.3 full-time equivalent jobs, \$3,777,000 in labor income, \$5,535,000 in the gross regional product, and \$10,465,000 in economic output in the local impact area. More broadly, these expenditures support 141.4 full-time equivalent jobs, \$10,129,000 in labor income, \$15,560,000 in the gross regional product, and \$29,625,000 in economic output in the nation.

It is expected that alternatives with a higher construction cost would have a greater impact on regional economic development in terms of full-time equivalent jobs, labor income, gross regional product, and total economic output in the local impact area. Assuming Civil Works expenditures (Project first cost from Table 18) directly creates positive regional economic benefits, Alternative 9 would have the greatest positive impact to regional economic development. This is because Alternative 9 requires approximately \$32 million dollars (FY20) to implement and is the alternative with the largest construction cost. The No Action Alternative would have the least impact on regional economic development since no funding would be expended as no improvements to the harbor would be made. Among the action alternatives, Alternative 5 would have the least impact to the regional economic development of the area since no dredging would be required to implement it. In comparison to Alternative 8 (NED plan), Alternative 2, 3, 5, and 6 would provide less regional economic development benefits due to the lower project cost. Alternative 4, 7, and 9 would provide greater regional benefits than the NED plan due to the increased project cost and associated impacts to the regional economy.

Environmental Quality

The Environmental Quality account considers non-monetary effects on ecological, cultural, and aesthetic resources. Under this account, the environmental effects of the implementation of the alternatives that include dredging are similar and are not anticipated to have significant environmental impacts. Environmental effects of navigation improvements versus no action are discussed in Chapter 5.

Other Social Effects

In the Other Social Effects (OSE) category, the most significant benefit would be the improved maneuverability through the bend widener and expanded turning basin and the ability for two-way vessel traffic in the Harbor. All action alternatives would allow for greater maneuverability of RO/RO vessels in the Federal channel. However, Alternative 7, 8, and 9 would provide the greatest benefit in the OSE category by improving vessel maneuverability at three or more locations within the harbor. Alternatives 7, 8, and 9 would widen the Federal channel at two locations and add a vessel meeting area. While the Federal channel has no safety concerns, the addition of a formal meeting area is highly sought after by the harbor pilots in order to provide them greater flexibility as they navigate through the channel. An official meeting area will increase the harbor pilots' perception of safety in the area since it would provide a wider channel and additional options for navigating vessels through Brunswick Harbor. Currently, in order to safely pass a vessel in St. Simons Sound the harbor pilots must request and receive USCG permission since the vessel must leave the Federal channel to complete the maneuver. The USCG has stated they will no longer grant permission for vessels to leave the Federal channel to pass an in-coming vessels. With the expansion of the Federal channel at St. Simons Sound, RO/RO vessel pilots will not need USGC permission to pass other RO/RO vessels since the maneuver could be completed within the Federal channel. Alternative 2, 3, 4, 5, and 6 would also increase the perception of safety to the channel, but to a lesser extent than Alternative 7, 8, and 9 due to the smaller project footprint.

All action alternatives except for Alternative 5 would result in an increase in dredged material at Andrew's Island DMCA which has the potential to positively impact the economic vitality of the area. Specifically, the GDOT, which operates the DMCA, utilizes the dredged material for road construction projects and sells the material for construction projects at a significantly discounted rate. The GDOT also enters into agreements with other local governments (e.g., City of Brunswick) for dredged material. The GDOT prices the dredged material at a fraction of the cost that another suitable road-grade or construction-grade material would sell for commercially. This availability of low-cost material to the local community is a benefit to the economic vitality of the area. All action alternatives except for Alternative 5 would add dredged material to Andrew's Island DMCA. Alternative 4, 7, and 9 would have a greater impact than Alternative 8 (NED Plan) since more material would be made available for other uses. Alternative 2, 3, and 5 would have less of an impact on economic vitality in comparison to Alternative 8 as less dredged material would be added.

3.10 Selection of the Recommended Plan for Project Improvements

This section describes how the plans in the final array of alternatives compare in meeting the planning objectives and constraints, how the alternatives address the four accounts, and identifies key tradeoffs among the alternatives.

All of the final array of alternatives, with the exception of the NAA/FWOP, meet the planning objectives and avoid the known constraints. However, the alternatives have varying degrees of completeness, effectiveness, efficiency, and acceptability. For instance, Alternative 2 would increase transportation efficiency along the Cedar Hammock Range (by increasing the width of the bend widener), but no additional benefits would be experienced further upstream by the Colonel's Island Terminal. Similarly, Alternative 3 would increase transportation efficiency near Colonel's Island by expanding the turning basin but would not address navigation challenges at the bend widener. Alternatives 4 and 5 would create vessel meeting areas and create overall efficiency improvements but would not address any navigation challenges at the bend widener or turning basin. For these reasons, Alternatives 2 – 5 were screened from consideration as the recommended plan.

Alternative 6 would address the navigation challenges at the Cedar Hammock Range bend widener and the turning basin near Colonel's Island Terminal, but without the added efficiency gains of including a meeting area. Alternative 7 includes a meeting area, but in a location that requires a larger construction cost when compared to Alternative 6, reducing the net benefits. Alternative 8 includes all benefits of Alternative 6, but with the addition of a meeting area in an area of naturally deep water, thus providing a greater net benefit than any other alternative. Alternative 9, which has both meeting area locations, has the highest cost and less net benefit than Alternative 8. Due to implementation costs, Alternative 7 and 9 were screened from consideration as the recommended plan.

As discussed in the NED section above, Alternative 6 and Alternative 8 have a similar level of net benefits. Both alternatives include dredging at the bend widener and turning basin; however, Alternative 8 includes the creation of a two-way meeting area at St. Simons Sound that does not require dredging. The incremental congestion relief benefits of Alternative 8 (\$98,000) outweigh the minimal incremental costs (\$35,000) above Alternative 6. Alternative 8 is a more complete, effective, efficient, and acceptable plan than Alternative 6.

In conclusion, Alternative 8 maximizes net benefits consistent with the study purpose, since as a deep draft navigation feasibility study, the main project purpose is to reduce transportation inefficiencies as measured within the NED account. Alternative 8 also maximizes total benefits across all benefits categories (NED, RED, EQ, and OSE). This is because Alternative 8 is the NED plan, provides positive regional economic benefits, has a similar impact as other alternatives to environmental quality, and solves navigation challenges at three specific harbor locations. Therefore, it is reasonable to select Alternative 8 as the recommended plan. The non-Federal Sponsor supports selection of Alternative 8 as the recommended plan and there is no Locally Preferred Plan.

Key Assumptions. This section identifies key assumptions that underlie the analysis. Those assumptions include hydrologic, environmental, and economic assumptions key to the formulation and recommendation, including those related to analytic models used in the study.

- Tonnage in Brunswick Harbor will increase according to economic forecasts over the 50 year planning horizon (see Appendix A).

- No environmental mitigation will be required.
- The total volume of dredging for the NED plan (Alternative 8) is approximately 551,600 cubic yards.
- All dredged material is capable of being removed using a hydraulic cutterhead dredge and no blasting is required.
- No dredging (new work or O&M) is required in the proposed meeting area at St. Simons Sound.
- The average shoaling rate for the future turning basin and bend widener is approximately 14,900 cubic yards per year and 2,000 cubic yards per year, respectively.

Risk and Uncertainty

Several risks and approaches to mitigating risks were identified during the evaluation of alternatives. Several risks apply to all alternatives, though in some cases, to varying degrees. For example, a key risk originates from cultural resources surveys occurring during the PED phase. While it is unlikely to find cultural resources in the proposed bend widener area, there is a possibility of finding cultural resources in the turning basin area. In addition, shoreline surveys will be necessary for the widening of the channel near St. Simons sound. Risk related to cultural resources has been mitigated through coordination with GA HPD and the implementation of a PA to comply with Section 106 of the NHPA (Appendix H).

At the commencement of the feasibility study, the geotechnical data available was from the 1990s. To better ascertain the site-specific characteristics of sediments to be dredged, a geotechnical investigation was conducted in November 2020 (Ardaman & Associates, Inc., 2021b). This sampling confirmed that the use of a cutterhead dredge will be sufficient to dredge in the proposed area (i.e. no blasting will be required). The full geotechnical data report is included as an attachment to Appendix B. In addition, as a condition of the 401 WQC issued by GADNR-EPD in October 2020, sediment, surface water, and elutriate samples were analyzed for metals, pesticides, PCBs, PAHs, and dioxins and furans (Ardaman & Associates, 2021a). In general, analyte concentrations were below applicable screening criteria and were similar to those during the 1997 testing (USACE, 1997) and earlier O&M inner harbor and entrance channel sediment testing in 1992 (SIO, 1992), 1993 (USACE, 1993), and 1995 (GSRC, 1996; USACE, 1996). The full environmental testing report from sampling conducted in November 2020 can be found in Appendix L.

Finally, the future tonnage forecast is uncertain and based on the state of the U.S. economy. This risk applies equally to all alternatives and was mitigated by utilizing best available information when making economic forecasts and by performing a sensitivity analysis for low and high commodity growth scenarios.

Overall, the alternatives have similar impacts from various identified risk factors and no alternatives were screened from the analysis due to risk factors.

3.11 Summary of the Recommended Plan for Project Improvements

Feasibility-level cost estimates were developed at the FY21 price level for the recommended plan (Alternative 8). A detailed "Basis of Cost Estimate" that outlines cost assumptions appears in the Cost Appendix (Appendix C). Potential risk events were evaluated and incorporated into a risk model to determine appropriate contingency levels. Costs of the recommended plan were further refined during cost certification and are reflected below.

Table 20 summarizes the certified cost information for the recommended plan which were used in the final economic evaluation. Construction costs were revised to \$14,369,000. Interest during construction was computed on the construction first cost using a 12-month construction duration and the current discount rate of 2.25 percent. There were no service facility costs to capture the widening benefits. The addition of aids-to-navigation was included. Aids to navigation include the addition of 3 buoys to the Brunswick Harbor Federal navigation channel. Two buoys will be required for the expansion of the Federal channel at St. Simons sound and would be placed on the northern edge of the channel. Currently, the bend widener in the Cedar Hammock Range has one buoy marking the channel location. With the expansion of the bend widener a second buoy will be required along with moving the current buoy. The USCG provided costs related to the aids to the navigation (Keefauver, R. Personal communication, 2020). The total investment cost is the sum of the construction first cost, interest during construction, and aids-to-navigation

Table 20. NED Economic Costs (FY22 prices)

Cost	NED Plan
<i>Construction First Cost</i>	\$14,369,000
<i>IDC (12 months @ 2.25%)</i>	\$323,000
<i>Aids to Navigation</i>	\$110,000
<i>Total Investment Cost</i>	\$14,803,000
<i>AAEQ Cost</i>	\$482,000
<i>AAEQ OMRR&R</i>	\$150,000
<i>Total AAEQ Cost</i>	\$632,000
<i>Note: Transportation costs are based on FY16 vessel operating costs updated from EGM 17-04.</i>	

Net Benefits and Benefit-Cost Ratio (BCR)

Table 21 displays the updated costs, benefits, and net benefits for the recommended plan at the FY22 price level and 2.25 percent discount rate. The recommended plan maximizes net benefits at \$2,956,000 and at a BCR of 4.7.

Table 21. Summary of Recommended Plan (FY22 prices)

Alternative	Total AAEQ Costs	Total AAEQ Benefits ¹	Total Net Benefits	Incremental Net Benefits	Benefit/Cost Ratio (BCR)
Alt 8	\$632,000	\$2,956,000	\$2,324,000	--	4.7
¹ Transportation cost savings benefits are based on FY16 vessel operating costs updated from EGM 17- 04.					

Table 22 provides a summary of the costs and benefits of the recommended plan. O&M dredging expenses have been estimated to occur every year at \$150,000 per dredge cycle at the FY22 price level. AAEQ cost is estimated at \$632,000, which includes an AAEQ cost for O&M of \$150,000. AAEQ benefits include origin-to-destination transportation cost savings of approximately \$2,956,000, resulting in total net benefits of \$2,324,000 (AAEQ benefits minus AAEQ costs) and a 4.7 BCR. First costs for authorization are estimated at \$14,369,000 (FY22 price level).

Table 22. Average Annual Equivalent (AAEQ) Benefits and Costs of the Brunswick Harbor NED Plan

	Cost and Benefit Summary of the NED Plan (FY 22 price level)
Interest Rate (Fiscal Year 2022)	2.25%
Construction Period, Months	12
Period of Analysis, Years	50
Construction First Costs	\$14,369,000
Interest During Construction (First Costs only)	\$323,000
Estimated Local Service Facilities	\$0
Estimated Aids to Navigation	\$110,000
Estimated Economic Costs (FY 22 price level)	\$14,803,000
AAEQ Costs	
Amortized Cost	\$482,000
OMRR&R	\$150,000
Total AAEQ Costs	\$632,000
AAEQ Benefits	

	Cost and Benefit Summary of the NED Plan (FY 22 price level)
Origin-to-Destination Transportation Cost Savings ¹	\$2,956,000
<i>Total AAEQ Benefits</i>	<i>\$2,956,000</i>
AAEQ Net Benefits (AAEQ Benefits – AAEQ Costs)	\$2,324,000
Benefit-to-Cost Ratio (computed at 2.25%)	4.7
¹ Transportation costs and cost savings benefits are based on FY16 vessel operating costs updated from EGM 17-04.	

4. Alternatives for Continued Operation and Maintenance of the Federal Navigation Channel

This chapter describes how the Corps developed O&M action alternatives, provides a comparison of the alternatives, and identifies the selection of the preferred alternative for O&M dredging.

4.1 Alternatives Development for Continued O&M

The Corps developed the alternatives based on several key assumptions outlined below:

- Physical and chemical characteristics of the dredged maintenance material is known and no changes to sediment characteristics are anticipated. The Corps will continue to test sediment as required for placement in established maintenance sites, specifically for placement in the ODMDS.
- The additional amount of O&M material from the proposed modifications are minor compared to the annual amount of dredged material, and account for approximately one percent of the total amount of annual maintenance material. The proposed modifications would not require changes to O&M dredging practices or result in impacts not identified in this analysis for continued O&M of the existing Brunswick Harbor, Georgia Project.
- Capacity of the established dredged material placement sites is sufficient and no new placement sites are required.
- No novel dredging equipment will be required. Dredging equipment used in the Brunswick Harbor are described in Section 1.7.
- The Corps will continue to integrate new technology and designs that are protective of ESA-listed species. For example, the Corps uses the Dredging Quality Management Program (DQM) for automated monitoring of dredge activities to provide quality near-real-time data for Corps dredging projects. Another example of this practice is the use of the Brunswick Harbor bed leveler design. This design was developed in coordination the GA-DNR and has been in use in Brunswick Harbor to reduce impacts from entrainment.
- Historically, the Corps has evaluated information from previous dredge cycles and adjusts timing of the dredging activities to minimize impacts to ESA-listed species. This practice will continue.

In evaluation of the key assumptions, the Corps identified that the primary differences between the O&M NAA and action alternatives are the timing of hopper dredging and the incorporation of PDCs of the 2020 SARBO. Therefore, the Corps has developed a range of O&M action alternatives that reflect these differences.

4.2 Alternatives Considered but Dismissed for Continued O&M

The Corps considered alternatives with an exclusive Fall dredging window (September-November) and Spring dredging window (March-May), but dismissed them for the following reasons:

- Sea turtles may be at higher densities during spring and fall migration along the coast (p 634, 2020 SARBO). Impacts represent higher risk for sea turtle entrainment. As discussed on page 320 of the 2020 SARBO:

“A study released by the USACE (Dickerson et al. 2007), also evaluated the risk of sea turtle entrainment and capture in relocation trawling during different times of the year. This study concluded that sea turtle entrainment is higher during the spring and fall within the action area and concluded this may be a result of a higher number of turtles in the area as they migrate up and down the coast.”

- Fall and Spring hopper dredge windows would overlap with the North Atlantic right whale migration and calving season from November 1 through April 30.

The Corps' alternatives analysis does not focus on dredge equipment type. All action alternatives incorporate a risk assessment process. The Corps has not chosen to categorically limit any type of dredge equipment up front but will continue to consider whether limitations are appropriate in its risk assessment process which will be informed by the best available information. Certain types of equipment are preferred in different reaches of the Federal project for various reasons, and flexibility will allow the Corps to best achieve O&M for project benefits. Additionally, equipment availability may be a consideration for some O&M events. Equipment type is also related to different construction durations which will be considered on a case-by-case basis in the risk analyses. For these reasons, the Corps has decided not to include equipment-specific O&M alternatives but rather to continue a risk assessment process with equipment flexibility.

4.3 No Action Alternative (NAA) for Continued O&M

The NAA is the continued O&M dredging within the Federal navigation channel. The NAA alternative does not mean no maintenance dredging, rather it is the continuation of management practices for O&M as covered under the 1998 EIS and 1997 SARBO, i.e., how the Corps would continue to conduct O&M for the Federal navigation project absent the proposed action.

The inner channel is authorized to a depth of -36 feet MLLW +2 feet allowable overdepth and at a width of 400 feet except from station 46+400 to station 67+250 where the authorized depth is -30 feet MLLW and a width of 300 feet. The entrance channel (outer channel) is authorized to a depth of -38 feet MLLW + 2 feet allowable overdepth. The entrance channel is 500 feet wide from station -6+800 to station -55+550 and 400 feet wide from station 0+000 to station -6+200. Between Station -6+200 and station -6+800, the channel width transition from 400 to 500 feet at authorized depths (-36 feet MLLW + 2 feet allowable over-depth).

The average annual quantity of O&M material dredged in Brunswick Harbor is approximately 1.6 MCY. This amount includes approximately 390,000 cubic yards in the inner harbor reach and 1,219,000 cubic yards in the outer harbor or entrance channel. Inner harbor dredged material is placed in the Andrews Island DMCA and entrance channel dredged material is placed in the Brunswick ODMDs. Under the NAA, O&M dredging, using any of the available dredge types including cutterhead suction (cutterhead), clamshell/bucket, bed leveling, and trailing suction hopper dredge (hopper), will occur annually as needed based on shoaling rates.

Additionally, the NAA assumes conditions before the 2020 SARBO, thus according to the terms and conditions of the 1997 SARBO, includes the environmental window for hopper dredging from 1 December – 15 April. The NAA does not include the protective measure of relocation trawling, as it was not evaluated in the 1998 EIS nor was it included in the 1997 SARBO. The Corps has conducted relocation trawling in FY18 and FY20, which required additional coordination with NMFS each time; however, relocation trawling is not conducted as a standard practice. The NAA also assumes that the Port of Brunswick will continue to operate. One-way vessel traffic within the inner harbor is expected along with continued tidal delays. The construction of an additional berth (Berth 0) at Colonel's Island Terminal is included in the NAA. Vessel traffic in the NAA is expected to increase over the period of analysis.

Physical and environmental considerations determine the timing, dredge methods, and placement of dredged material. Section 1.7 includes a general description of dredging methods. Specific dredging processes for the different reaches of the navigation channel are included below:

Entrance Channel Maintenance Dredging

Entrance channel maintenance dredging occurs on an annual basis. While the Corps may use all types of dredging to maintain the entrance channel, the preferred method is hopper dredging. As noted in Section 1.7, hopper dredges are mobile and suitable for areas of high traffic and rough seas. Therefore, hopper dredges are the most effective dredge type in the entrance channel as they can continue to operate during periods of rough waves. Additionally, because hopper dredges are mobile, they also move efficiently throughout the entrance channel during dredging and can easily move out of the way of large vessels traversing the channel.

In comparison, cutterhead and clamshell dredges are less mobile and are not able to operate during periods of rough seas. Furthermore, as all dredged material placed in the ODMDs requires bottom dump placement, production is limited to the capacity and number of scows/barges available to transport the material to the ODMDs. For cutterheads, unless there is an uninterrupted line of scows to receive material, dredging would have to stop while the material is transported for placement and the advantage of a pipeline's continuous dredging is not realized. Additionally, for both clamshell and cutterhead dredging, the need to demobilize and move equipment between dredging sections also creates delays. The downtime for demobilization/mobilization, work stoppage for rough seas, and transport delays all result in cutterhead and clamshell dredging being substantially less efficient than hopper dredging. For

these reasons, clamshell/cutterhead dredge methods, although available as a dredge method, are rarely if ever used in the entrance channel. Table 23 summarizes entrance channel dredging under the NAA.

Table 23. Summary of Entrance Channel Dredging under the NAA

<u>Dredge Type</u>	<u>Timing</u>	<u>Frequency/Duration</u>	<u>Transport/ Placement</u>	<u>Placement Site</u>
Hydraulic				
Hopper	December 1 to April 15 ¹	Annually/ 1-3 months	Bottom Dump ²	ODMDS
Cutterhead	All Year	Rarely/~twice as long as hopper, up to 6 months	Scow/Bottom Dump	ODMDS
Mechanical				
Bucket/Clamshell	All Year	Rarely/ substantially longer timeframe than hydraulic dredge and may not be able to complete in one dredge cycle.	Scow/Bottom Dump	ODMDS
Bed Leveler ³	All Year	Annually	NA	NA
<ol style="list-style-type: none"> 1997 SARBO Environmental Window Current Section 103 approval for ODMDS placement is bottom dump (scow or hopper with split hull or bottom doors) Bed leveling is used to move material from high spots to low spots and complements the other dredge methods. Bed leveling equipment currently follows the Brunswick design. 				

Inner Harbor Maintenance Dredging

Maintenance dredging in the inner harbor occurs on an annual basis. The preferred method of dredging in the inner harbor is cutterhead dredging, as material can be pumped directly to the Andrews Island DMCA, allowing for continuous dredging. Bucket/clamshell dredging occurs infrequently and on an as needed basis. There are no environmental windows for dredging in the inner harbor. Table 24 summarizes the different dredge methods available for use in the inner harbor.

Table 24. Summary of Inner Harbor Dredging under the NAA

<u>Dredge Type</u>	<u>Timing</u>	<u>Frequency/ Duration</u>	<u>Transport/ Placement</u>	<u>Placement Site</u>
Hydraulic				
Cutterhead	All Year	Annually/2-3 Months	Pipeline	Andrews Island DMCA
Mechanical				
Bucket/Clamshell	All Year	Infrequently/ Approximately 2x as long as cutterhead	Scow/Bottom Dump ¹	ODMDS ² / Andrews Island DMCA
Bed Leveler ³	All Year	Annually	NA	NA
<ol style="list-style-type: none"> 1. Current Section 103 approval for ODMDS placement is bottom dump (scow or hopper with split hull or bottom doors) 2. If from reach that has been tested suitable for ODMDS placement. 3. Bed leveling is used to move material from high spots to low spots and conducted in conjunction with the other dredge methods. Bed leveling equipment must follow the Brunswick design. 				

Cedar Hammock Range Maintenance Dredging

Maintenance dredging in the Cedar Hammock Range may be included in entrance channel dredge contracts, inner harbor dredge contracts, or as standalone contracts depending on maintenance needs. As stations 12+750 to 22+000 are currently approved (tested suitable) for ODMDS, this reach may be hopper dredged with material placed in the ODMDS. However, if cost effective, Cedar Hammock may also be maintained using cutterhead dredging with material placed in Andrews Island DMCA. Clamshell dredging is also infrequently conducted within Cedar Hammock. Because clamshell dredging can leave an uneven surface, bed leveling is often used as a final clean-up phase.

4.4 Elements Common to All O&M Action Alternatives

Under all action alternatives, the Corps would continue to maintain the Federal navigation channel according to Congressionally-authorized depths and widths, including potential future maintenance for the proposed modifications evaluated in this report. The proposed modifications would result in approximately 16,900 CY of additional annual maintenance material all within the inner harbor, a 4% increase over inner harbor amounts, and 1% increase over total annual amounts. All action alternatives, with the exception of the timing for hopper dredging would continue to employ dredge methods as summarized under the NAA and in Tables 23 and 24.

Under all action alternatives, when hopper dredging is employed, the Corps would include the use of relocation trawling as a minimization measure for ESA-listed species as determined appropriate by the risk assessment. Relocation trawling is described in the 2020 SARBO, as

follows: “The intentional capture of ESA-listed species by relocation trawling may be used to assess or reduce the abundance of ESA-listed species in a project location to minimize the risk of lethal encounters with a hopper dredging operation. Modified shrimp trawling equipment is used to sweep the sea floor to either startle ESA-listed species out of the area, with open net relocation trawling, or to capture and often relocate these species, through the use of closed net relocation trawling.”(p.60 2020 SARBO) “A trawling vessel may operate either prior to dredging to determine the potential presence of ESA-listed species in the area or prior to and/or concurrently with hopper dredging to intentionally capture ESA-listed species to relocate them out of the dredge area as a minimization measure to reduce take.” (p.37 2020 SARBO). Specific determination related to the use, timing and methods for relocation trawling would be included as part of the risk assessment process outlined in 2.9.2 of the 2020 SARBO prior to any dredging event.

The Corps intends to continue to improve dredging practices with new technology or updated designs that are feasible and protective of ESA-listed species, in consultation with NMFS and USFWS. The Corps would continue to use safeguards during the project to monitor take and take preventive measures as necessary, including suspension of the project and evaluation of the use of minimization measures to reduce take (see Alternative 4).

The Corps would also follow the PDCs included in the 2020 SARBO Appendix B for dredging equipment, which is incorporated by reference. Additionally, the Corps would follow all applicable PDCs in the 2020 SARBO. A summary of PDCs relevant to O&M dredging as compared to the NAA are included below, however this summary is intended to summarize, not replace, the PDCs as described in the 2020 SARBO:

- Hopper dredging- During all hopper dredging operations, NMFS-approved observers will monitor for the presence of ESA-listed species. To prevent impingement or entrainment of ESA-listed species within the water column, dredging pumps will be disengaged by the operator when the dragheads are not actively dredging and therefore working to keep the draghead firmly on the bottom. Pumping water through the dragheads is not allowed while maneuvering or during travel to/from the placement site. All waterport or other openings on the hopper dredge are required to be screened to prevent ESA-listed species from entering the dredge. A state-of-the-art solid-faced deflector that is attached to the draghead must be used on all hopper dredges at all times.

The 2020 SARBO PDCs for hopper dredging are substantially similar to the minimization measures the Corps uses for hopper dredging as described in the NAA and Section 1.7. As described under the NAA, hopper dredging is the preferred method of dredging in the entrance channel; this would not change under this Alternative.

- Cutterhead dredging- Cutterhead dredges will not be engaged/turned on when not embedded in the sediment, to the maximum extent possible. Additional monitoring requirements for sturgeon are also required under the 2020 SARBO.

Incorporation of 2020 SARBO PDCs does not result in a change in the timing or location of cutterhead dredging or the transport and placement of dredged material resulting from cutterhead dredging, as described under the NAA and Section 1.7.

- **Bed-levelers-** Bed-levelers produce a sand wave in front of the leading face of the bed-leveling device such that it disturbs species off the sea/channel floor bottom. All support structures must be welded to prevent impingement or “pinch points” for passing ESA-listed species. The design analyzed in the Brunswick Harbor study is approved to meet these requirements (Dodd 2003). The bed-leveler will be slowly lowered to the sea/channel bottom and the depth of the bed-leveler adjusted constantly to meet required depth and to compensate for tidal fluctuations. The bed-leveler will be towed/pushed along the bottom no faster than needed to move the material at the sea/channel bottom (approximately 1-2 knots). The bed-leveler design as approved in 2020 SARBO, is in use in Brunswick Harbor and the Corps would continue to employ this design.

Although not specifically addressed or approved for use in the 1997 SARBO, bed-leveling was used post 1997 SARBO. Two evaluations on the use of bed levelers were conducted in 2013 and 2014. The goal of the evaluations was to demonstrate the effectiveness of bed levelers at maintaining entrance channels while minimizing the take of sea turtles during hopper dredging activities. Since 2014, bed-leveling was coordinated for individual dredge events and required the use of the Brunswick design. Under the NAA, bed-leveling would occur upon coordination/approval prior to use and would be restricted to the Brunswick design. The Brunswick design is substantially similar to the design restrictions in the 2020 SARBO; however, the 2020 SARBO allows for more flexibility in design deviations as long as the same desired effect is achieved (sand wave produced, etc.).

- The 2020 SARBO requires additional reporting and monitoring requirements for the covered ESA-listed species. The Corps would follow these reporting and monitoring requirements under the action alternatives.

These requirements do not result in changes to dredging, placement, or other covered activities as described under the NAA and Section 1.7.

O&M Action Alternative 1: Winter Hopper Dredge Window

4.5

Under Action Alternative 1, the Corps would implement an environmental window for hopper dredging from December 1- March 31. This environmental window is based on the historical hopper dredging window included in the 1997 SARBO. The Corps would apply risk based approach to determining the timing of dredge activities to the extent allowed within the December 1- March 31 hopper dredging window. The risk assessment process outlined in Section 2.9.2 of the 2020 SARBO would be followed.

4.6 O&M Action Alternative 2: Extended Winter Hopper Dredge Window

Under this alternative, the Corps would implement an environmental window for hopper dredging from September 1 – March 31. The extended winter hopper dredge window was selected to provide more flexibility around the timing of when hopper dredging could occur. The window includes opportunities to dredge that are outside either the NARW calving and migration season or sea turtle migration season. As the NARW calving and migration season is from November 1 through April 30, this alternative would provide some limited opportunity to conduct dredging in September. Furthermore, as the Corps has observed more take of sea turtles in March (section 5.5), this window would allow the Corps to adjust the timing of hopper dredging to be more protective of NARW and sea turtles. Additionally, this window would provide some protection for Atlantic sturgeon, as it includes a portion of a likely fall spawning season (p. 215 2020 SARBO) and sturgeon may not be present within the vicinity of the entrance channel. This alternative also assumes the Corps would apply the risk-assessment process outlined in Section 2.9.2 of the 2020 SARBO to determine the timing of dredge activities to the extent allowed within the September 1- March 31 hopper dredge window.

4.7 O&M Action Alternative 3: Summer Hopper Dredge Window

Under this alternative the Corps would implement an environmental window for hopper dredging from June 1-August 31. This window was chosen due to the 2008 data analysis conducted by ERDC (and others) on entrainment rates by month for all hopper dredging projects from 1995-2008 in the seven habitat subregions of the southeastern U.S. This window is intended to be protective of NARW and sturgeon. Additionally, p. 320-321 of the 2020 SARBO indicates that limited data suggest that entrainment of sea turtles may be less: “It was also noted that entrainment decreased during the summer (July-September) and was comparable to those observed during cold winter months, though the summer dredging sample size was significantly smaller. The study stated that the decrease in entrainment in the summer may be linked to an increase in activity of sea turtles during months were [sic] they are nesting and that they may spend more time moving through the water column, which would result in a lower risk of entrainment by the draghead operating at the sea floor.”

This alternative also assumes the Corps would apply the risk-assessment process outlined in Section 2.9.2 of the 2020 SARBO to determine the timing of dredge activities to the extent allowed within the June 1- August 31 hopper dredge window

4.8 O&M Action Alternative 4: Apply a risk assessment and risk management process

Under this alternative, the Corps would replace the constraint of an environmental window for hopper dredging with a risk assessment approach outlined in Section 2.9.2.2 of the 2020 SARBO, which provides for flexibility in the timing of project completion through the use of a risk assessment and risk management process. Using this risk assessment and management decision-making process, dredging will be allowed outside of the previously established seasonal dredging windows required in the 1997 SARBO. Use of the adaptive risk assessment process does not mean the Corps would dredge year-round or only exclusively

during the summer months. The Corps would, through this process, adjust the timing, dredge equipment type, and other parameters to be protective of ESA-listed species. The purpose of the risk assessment process is to consider the risk to species populations by considering all species that may be present when work is proposed and evaluating ways to reduce risk of take, including adjusting the timing of construction. Since the goal is to reduce all take, this includes to each individual within the population. The Corps would continue to use safeguards during construction to monitor take and take mitigative measures as necessary, including suspension of the project (see below). The risk assessment process outlined in section 2.9.2.2 does not preclude the Corps from collaborating with state resource agencies or other entities during the process. Beyond requirements to coordinate with NMFS, the Corps would work to identify opportunities to collaborate with other Federal and state resource agencies and other stakeholders throughout the risk assessment process.

The risk assessment and risk management process is outlined on p. 70 and 71 of the 2020 SARBO and summarized below:

- **Assessment Step 1. Determine the list of upcoming projects expected and pre-construction risk assessment.** The pre-construction risk assessment uses best available information to determine timing, equipment type, and protective measures needed to reduce take from a proposed dredge project. As noted on p.71 of the 2020 SARBO, “NMFS has provided an initial list of specific suggested items to consider when determining how to reduce take from an upcoming project (Appendix J of the 2020 SARBO); however, the project-specific considerations used are expected to evolve for each equipment type and project area, as USACE and BOEM continue to engage in projects in the action area.”
- **Assessment Step 2. Post-take Risk Assessment -** This process will be completed by USACE after any take occurs to determine what factors led to the adverse effect and if additional measures can be used to prevent it from occurring again. The Corps develops internal plan for addressing take that occurs during an active dredge event. As discussed in the 2020 SARBO Section 2.9.2.1, “This Plan also outlined procedures to follow when take occurred to reduce the risk of further take. The USACE’s practice has been to update this Plan annually to minimize risk to ESA-listed species.” Specifically, this internal plan provides for protocols during construction that require the immediate suspension of any construction event to allow for post-take risk assessment and identification of minimization measures that may be needed to reduce take, including ceasing the dredge event. This internal guidance is a living document and the Corps will update as needed based on available information from dredging activities covered under the 2020 SARBO. Guidance is consistent with the requirements of the 2020 SARBO, and would include avoidance measures (such as reducing vessel speeds if there is a sighting within the vicinity of the project and suspending work if an injured NARW is observed) for NARW as described in Appendix F of the 2020 SARBO.

- Assessment Step 3. Post-Project Review and Reporting- This process will be used to document what happened during the construction event and any lessons learned that can be applied to future construction events to reduce the risk of incidental take.
- Assessment Step 4. Annual Review and Reporting- This process will be used to document what happened during the year and any lessons learned that can be applied to future projects to reduce the risk of incidental take

4.9 **Selection of Preferred Alternative for Continued O&M**

As none of the O&M action alternatives have a significant effect on resources evaluated in Chapter 5, the selection of a preferred alternative was made based on the alternative that balanced impacts to multiple species covered under the 2020 SARBO. The Corps has selected Alternative 4 as its preferred alternative, for the following reasons:

- The restrictive winter window in the NAA and Alternative 1 does not provide for the adaptive management process that would allow adjusting the timing of dredge window to reduce take for multiple species. The historic hopper dredge window in the NAA and Alternative 1 does not represent the most protective alternative for ESA-listed species, including loggerhead sea turtles. As discussed in Section 5.5, the majority of take from past hopper dredging events occurred in March and the winter dredging window is not the only, and not the most effective, way to reduce risk to sea turtles. Additionally, the winter window overlaps with the NARW calving and migration season and does not reduce risk of vessel strike to NARW. Finally, Atlantic sturgeon forage in nearshore waters in the colder months and migrate upstream in the warmer months; therefore, the risk of lethal take of Atlantic sturgeon is higher in the winter months.
- Similarly restricting to an extended winter or summer window (Alts 2 and 3) would not provide the flexibility needed to adjust to be most protective of ESA-listed species.
- Under Alternative 4, the risk assessment and management process would not result in any additional take than would occur under Alternatives with seasonal windows, including the NAA. The lethal take for sea turtles is the same as in the 1997 SARBO. Additionally, the Corps has safeguard protocols that would mitigate for single project effects, as the Corps has to balance the need for maintenance dredging across multiple navigation projects in the South Atlantic Region and disparate amount of take in one navigation project would limit the Corps' ability to conduct maintenance dredging at another project. Therefore, the Corps closely monitors during construction take to prevent disparate amount of take at any single project.
- Alternative 4 is the most cost-effective alternative, as the preconstruction risk assessment would be able to account for dredging availability, dredge equipment type, and would result in increased efficiency and a more competitive contracting environment for maintenance dredging.

5. Environmental Consequences of Alternatives

Chapter 5 examines and describes the direct and indirect physical effects and potential impacts of implementing the final array of alternatives on the resources described in Section 2.0. The final array of alternatives for project improvements consists of 9 alternatives, which are described in Section 3.8. The analysis of environmental impacts for this proposed project involves the discussion of each stand-alone alternative as well as a combination of alternatives. For the purposes of this analysis, the currently authorized Brunswick Harbor design is the FWOP, which for purposes of NEPA, represents the NAA for the proposed modifications. Alternatives for the proposed modification are described in Chapter 3.

Additionally, Chapter 5 provides an analysis of effects for the O&M alternatives described in Chapter 4. The environmental consequences analysis for the O&M action alternatives focuses on the changes to O&M dredging in comparison to the O&M No Action Alternative. As the amount of additional maintenance material for the proposed modifications is negligible compared to the overall amount of annual maintenance material, the analysis of effects for the O&M action alternatives encompasses the effects from the additional maintenance material that would occur from the proposed modification.

5.1 Hydrology and Floodplains

5.1.1 Environmental Consequences for Project Improvements

FWOP/NAA

Under the FWOP/NAA, the Corps would not make any modifications to the currently authorized width or depth of the Federal navigation project. The 1998 EIS indicated no effects to water velocities, water levels, or flow direction from the current authorized and maintained depth of the navigation channel. Hydrodynamic modelling conducted for the 1998 EIS indicated no effect to currents from the current configuration of the navigation channel. As O&M dredging maintains the depth and widths as evaluated in the 1998 EIS, no impacts to hydrology are anticipated under the FWOP. Dredged material is placed in established placement sites (Andrews Island DMCA) and no impacts to floodplains are anticipated under the NAA.

Alternatives 2 through 9

With implementation of the Alternatives 2 through 9, no changes in hydrology and floodplains are anticipated.

Alternative 5 would not result in any physical modifications of the channel, and therefore would not have any impacts to hydrology. No additional O&M dredging would be needed under Alternative 5 and no impacts to floodplains would occur.

The proposed channel modifications were measured in a 2D Adaptive Hydraulic modeling system (AdH) and no increase in water levels throughout the channel were

observed. Therefore, based on modelling the proposed channel modifications are not anticipated to change water levels from the existing water level and the proposed channel modifications in Alternatives 2,3,4,6,7,8 and 9 would not impact hydrology. Placement of dredged material from the new work would occur at Andrews Island DMCA, an established dredged material containment area, and impacts to floodplains are not anticipated.

5.1.2 Environmental Consequences for O&M Alternatives

NAA

Under the NAA, Corps would continue to maintain the currently authorized depth of the Federal navigation channel. The 1998 EIS indicated no effects to water velocities, water levels, or flow direction from the current authorized and maintained depth of the navigation channel. Hydrodynamic modelling conducted for the 1998 EIS indicated no effect to currents from the current configuration of the navigation channel. As O&M dredging maintains the depths as evaluated in the 1998 EIS, no impacts to hydrology are anticipated. Dredged material is placed in established placement sites (Andrews Island DMCA and ODMDs) and no impacts to floodplains are anticipated under the NAA.

O&M Action Alternatives

Additional O&M dredging related to the proposed changes is a nominal amount (16,900 CY) and would not require changes to current maintenance practices. All of the action alternatives for O&M dredging may result in changes in the timing of when dredging may occur in the entrance channel but would not result in any modifications of the dredge prism, or changes in activities related to placement of dredged material at either the Andrews Island DMCA or the ODMDs. Therefore, the continued O&M dredging as described in the action alternatives is not expected to affect hydrology and floodplains. The effects to hydrology and floodplains from O&M dredging would be the same as described under the NAA.

5.2 Aquatic Resources, Habitat and Substrate

5.2.1 Environmental Consequences for Project Improvements

FWOP

All O&M dredging activities will utilize the capability of cutterhead, clamshell, and hopper dredges for the removal of maintenance material. The existing O&M average annual quantities dredged for Brunswick Harbor is approximately 1,609,000 cubic yards. This amount includes 390,000 cubic yards in the inner harbor reach and 1,219,000 cubic yards in the entrance channel/outer harbor. For macrobenthic invertebrate species in the study area, removal of substrate during dredging eliminates most benthic resources in those locations. The placement of dredged material in the ODMDs is also anticipated to impact aquatic resources in the area. Those sites would be available for recolonization and use by benthic organisms once the dredging and placement event ceases, so no irreversible loss of resources would occur. Benthic populations in the

navigation channel and ODMDS are in a constant state of flux due to the continual sedimentation and shoaling that creates the need for maintenance dredging (SHEP-EIS, 2012). Early successional benthic organisms will likely rapidly colonize the dredged footprint (Van Dolah et al., 1984). As described in the 1998 EIS, Corps' studies in the Mississippi Sound and at Apalachicola Bay, Florida showed that the effects of maintenance dredging on the plankton systems were negligible and that natural phenomena such as tidal flushing, rainfall, temperature and salinity gradients appear to have more influence in determining the dynamics of the plankton community. The studies showed that the benthic communities of those estuarine systems have adapted to natural stresses that are similar to those caused by dredging. Given the abundant habitat adjacent to both the navigation channel and ODMDS, it is anticipated that recolonization from pioneer species would occur. Therefore, no significant or long-term changes in community structure or function are expected.

For diadromous fish such as striped bass and blueback herring, although these fish species are present through various life stages and actively use the entire water column within the study area for both traveling upstream and downstream and feeding, minimal impacts are anticipated since most of the fish species present have the ability to freely avoid any dredge or placement activity. In addition, feeding during any dredge or placement activity will likely temporarily decrease in the study area due to a temporary loss of macrobenthic invertebrates, as well as a reduced ability for fish feeding via sight due to the temporary increase of turbidity in the water column. However, no significant impacts are expected to occur on sight feeders, as noted above most of the fish species present have the ability to avoid any dredge or placement activity associated with maintenance dredging.

Alternative 5

With the implementation of Alternative 5, there will be no changes to aquatic resources or habitat in the study area. Alternative 5 would create a RO/RO vessel meeting area located at St. Simons Sound near the entrance channel to Brunswick Harbor. Since this area is naturally deep water (deeper than -38 feet MLLW), no dredging would be required. This would not require any physical work in the channel, and the existing navigational channel centerline would not change. Under Alternative 5, aquatic resources and aquatic habitat will remain the same. No impacts to aquatic resources and aquatic habitat are anticipated beyond normally scheduled annual maintenance dredging. This Alternative, as with the NAA, assumes O&M dredging would occur within the Federal navigation channel at authorized depths (-36 feet MLLW + 2 feet allowable over-depth for the inner harbor and -38 feet MLLW +2 feet allowable over-depth for the outer harbor) as normally scheduled on an annual basis. Andrews Island DMCA will remain as the primary location for the dredged material storage. Impacts from maintenance dredging would be the same as described under the NAA.

Alternatives 2, 3, 4, 6, 7, 8, & 9

Alternatives 2, 3, 4 are considered stand-alone alternatives while 6, 7, 8 and 9 are combinations of the above stated "stand-alone" alternatives.

The proposed new work dredging will be accomplished through the exclusive use of a cutterhead dredge. The new dredging (cutterhead) portion of the project is anticipated to commence on November 1, 2024 (pending congressional authorization and funding availability) and continue for approximately 12 months. Upon construction completion, the Corps will continue to conduct its long-term O&M of Brunswick Harbor once these areas are incorporated into the Federal navigation channel.

Alternatives 2, 3, 4, 6, 7, 8 & 9 all require the removal of material for the proposed channel modifications. Dredged quantities for each action alternative are represented in Table 25 **Error! Reference source not found.**

Table 25. Proposed Dredged Quantities for Each Action Alternative

Alternative	Quantities Dredged (yd³)
Alt 2. Bend Widener	205,159
Alt 3. Turning Basin expansion	346,462
Alt 4. West of Sidney Lanier Bridge	800,074
Alt 5. St Simons Sound	-
Alt 6. Bend Widener + Turning Basin	551,621
Alt 7. Bend Widener + Turning Basin + Area West of Bridge	1,351,695
Alt 8. Bend Widener + Turning Basin + St. Simons Sound	551,621
Alt 9. Bend Widener + Turning Basin + Area West of Bridge + St. Simons Sound	1,351,695

For macrobenthic invertebrate species in the study area, removal of the bottom substrate within the dredging areas would eliminate most benthic resources in those locations. Those sites would be available for recolonization and use by benthic organisms once the dredging event ceases, so no irreversible loss of resources would occur. Early successional benthic organisms will likely rapidly colonize the dredged footprint (Van Dolah et al., 1984). However, the dredged footprint may be comprised of different benthic communities due to the alteration in depth, from shallow to deeper waters (NMFS, 2020). Surviving populations of fish and macroinvertebrates specifically adapted to the shallower habitat will in addition relocate to abundant similar habitat just outside the project scope that will remain preserved. The proposed dredging will not limit the density and diversity of the benthic community that becomes reestablished any more so than existing maintenance activities. Since benthic populations in the navigation channel are also in a constant state of flux due to the continual sedimentation and shoaling that creates the need for maintenance dredging (SHEP-EIS, 2012), the cumulative effects on phytoplankton and zooplankton species living in the water column should not be affected any more than by the existing maintenance activities.

For diadromous fish such as striped bass, and blueback herring, although these fish

species are present through various life stages and actively use the entire water column within the study area for both traveling upstream and downstream and feeding, minimal impacts are anticipated since most of the fish species present have the ability to freely avoid any dredge activity. In addition, feeding during any dredge activity will likely temporarily decrease in the study area due to a temporary loss of macrobenthic invertebrates, as well as a reduced ability for fish feeding via sight due to the temporary increase of turbidity in the water column. No significant impacts are expected to occur to sight feeders.

5.2.2 Environmental Consequences for O&M Alternatives

FWOP/NAA

All O&M dredging activities will utilize the capability of cutterhead, clamshell, and hopper dredges for the removal of maintenance material. The existing O&M average annual quantities dredged for Brunswick Harbor is approximately 1,609,000 cubic yards. This amount includes 390,000 cubic yards in the inner harbor reach and 1,219,000 cubic yards in the entrance channel/outer harbor. For macrobenthic invertebrate species in the study area, removal of substrate during dredging eliminates most benthic resources in those locations. The placement of dredged material in the ODMDS is also anticipated to impact aquatic resources in the area. Those sites would be available for recolonization and use by benthic organisms once the dredging and placement event ceases, so no irreversible loss of resources would occur. Benthic populations in the navigation channel and ODMDS are in a constant state of flux due to the continual sedimentation and shoaling that creates the need for maintenance dredging (SHEP-EIS, 2012). Early successional benthic organisms will likely rapidly colonize the dredged footprint (Van Dolah et al., 1984). As described in the 1998 EIS, Corps' studies in the Mississippi Sound and at Apalachicola Bay, Florida showed that the effects of maintenance dredging on the plankton systems were negligible and that natural phenomena such as tidal flushing, rainfall, temperature, and salinity gradients appear to have more influence in determining the dynamics of the plankton community. The studies showed that the benthic communities of those estuarine systems have adapted to natural stresses that are similar to those caused by dredging. Given the abundant habitat adjacent to both the navigation channel and ODMDS, it is anticipated that recolonization from pioneer species would occur. Full recovery to pre-deepening conditions is not expected given the regularity of maintenance dredging. However, given the localized nature of the impacts and the abundant adjacent habitat, overall no significant or long-term changes in community structure or function are expected.

For diadromous fish such as striped bass and blueback herring, although these fish species are present through various life stages and actively use the entire water column within the study area for both traveling upstream and downstream and feeding, minimal impacts are anticipated since most of the fish species present have the ability to freely avoid any dredge or placement activity. In addition, feeding during any dredge or placement activity will likely temporarily decrease in the study area due to a temporary loss of macrobenthic invertebrates, as well as a reduced ability for fish feeding via sight due to the temporary increase of turbidity in the water column. However, no significant

impacts are expected to occur on sight feeders, as noted above most of the fish species present have the ability to avoid any dredge or placement activity associated with maintenance dredging and there is abundant adjacent habitat.

Actions Common to All O&M Action Alternatives

Under all alternatives, the Corps would use relocation trawling as a minimization measure as determined appropriate during the risk assessment for each dredging event. Use of relocation trawling would have similar effects as described for dredging under the NAA. Given the abundant habitat adjacent to both the navigation channel and ODMDS, it is anticipated that recolonization from pioneer species would occur. In addition, feeding during any relocation trawling activity will likely temporarily decrease in the study area due to a temporary loss of macrobenthic invertebrates, as well as a reduced ability for fish feeding via sight due to the temporary increase of turbidity in the water column. However, no significant impacts are expected to occur on sight feeders, as noted above most of the fish species present have the ability to avoid any activities. Relocation trawling may capture other species as by catch, however this by catch is not anticipated to appreciably impact the populations of other species in the area, as most would be non-lethal and released. Therefore, no significant or long-term changes in aquatic resources, habitat or substrate are anticipated from relocation trawling.

O&M Alternatives 1 and 2

Under Alternatives 1 and 2, impacts to aquatic resources, habitat and substrate would be similar as described under the NAA, as the means of methods for dredging are essentially the same. These alternatives would utilize the risk assessment and management process- in 2.9.2.2 of the 2020 SARBO, however dredging practices are expected to be similar to the NAA, with minor improvements to the design of equipment used. Improvements to the design of equipment used could provide minor beneficial impacts to other fish and macroinvertebrate aquatic species, as these improvements are designed to reduce entrainment and harm to fish and sea turtles. Alternative 2 does provide for an extended winter dredging window for hopper dredging, including dredging in fall months. The extended window would not result in a longer duration for dredging, would just provide flexibility for when dredging may occur, as this window begins in the fall and concludes in the spring, it is outside the warmer summer months with higher productivity and therefore at an increase in impacts to benthic communities is not anticipated. As described under the NAA, given the abundant habitat adjacent to both the navigation channel and ODMDS, it is anticipated that recolonization from pioneer species would occur. Therefore, no significant or long-term changes in community structure or function are expected. Furthermore, no significant impacts are expected to occur to sight feeders, as noted above most of the fish species present have the ability to avoid any dredge or placement activity associated with maintenance dredging, there is abundant adjacent habitat, and minimization measures of 2020 SARBO would also minimize impacts to other aquatic fish species.

Alternatives 3 and 4

Under Alternatives 3 and 4 hopper dredging may be conducted dredging during the warmer summer months in the entrance channel. O&M dredging in the inner harbor is

not restricted to a seasonal window and impacts and dredging methods would be similar as described under the NAA; impacts to aquatic resources from O&M dredging the inner harbor would be the same as described under the NAA. Therefore, impacts to water quality in this section will focus on impacts that may occur from hopper dredging at any time of year in the Cedar Hammock Range and in the open water of the entrance channel and ODMS. Under Alternative 3, the Corps would conduct hopper dredging during the warmer summer months in the entrance channel and Cedar Hammock Range. Under Alternative 4, the Corps would conduct a risk assessment and management process to determine the best time of year to accomplish dredging, including the possible use of hopper dredging at any time of year. The NAA, Action Alternatives 1 and 2 describe impacts that could occur in fall, winter and spring. As conducting hopper dredging during the warmer summer months is anticipated to be most impactful activity as primary productivity is higher, it is assumed that conducting hopper dredging at other times of year would have less of an impact. Therefore, the analysis in this section will focus on impacts that may occur from hopper dredging in the summer months.

Under Alternatives 3 and 4, all other dredging activities would also utilize the risk-assessment process but are expected to be similar to the NAA, with minor improvements to the design of equipment used. Improvements to the design of equipment used could provide minor beneficial impacts to other fish and macroinvertebrate aquatic species, as these improvements are designed to reduce entrainment and harm to fish and sea turtles. If dredging occurred during the warmer months, benthic species may experience minor adverse effects as primary production is higher in the warmer months. However, these impacts would be constricted to the navigation channel and ODMS and would be localized to the immediate area of the dredging activity. As indicated in Section 5.7, water quality impacts are localized and short-term, and mobile species would be able to avoid the area. Additionally, as these areas routinely disturbed during regular maintenance activities, the habitat quality is not of the same quality as the abundant adjacent habitat. As noted above in NAA impacts analysis, there is abundant available habitat adjacent to the entrance channel and ODMS and any adverse effects would not be significant. Impacts from O&M dredging would be similar to those described under the NAA, and overall, there would be no significant impacts to aquatic resources and habitat.

5.3 Essential Fish Habitat

5.3.1 Environmental Consequences for Project Improvements

FWOP/NAA

With implementation of the NAA, EFH will not be adversely affected as no changes are proposed. Continued O&M of the Federal navigation channel is analyzed below.

Alternative 5

With implementation of the Alternative 5, coastal inlet EFH will remain the same. No impacts to coastal inlet EFH are anticipated beyond normally scheduled annual

maintenance dredging. This Alternative, as with the NAA, assumes O&M dredging would occur within the Federal navigation channel at authorized depths (-36 feet MLLW plus 2 feet allowable over-depth) as normally scheduled on an annual basis to continue to accommodate commercial vessel navigation.

Alternatives 2, 3, 4, 6, 7, 8 & 9

With the implementation of Alternatives 2, 6, 7, 8, and 9, material would be placed in the Andrews Island DMCA. Alternatives 2, 3, 4, 6, 7, 8, and 9 are comprised of both stand-alone proposals and in various combinations. The impacts from dredge activity for these alternatives on EFH are discussed below.

Coastal inlets, tidal creeks, and unconsolidated bottom – With the implementation of Alternatives 2, 4, 6, 7, 8, and 9, all alternatives involve impacts to EFH through dredging the bend widener, be it as a stand-alone alternative or as part of a combination of alternatives. The substrata in the area proposed for dredging is of similar composition as the adjacent Federally-maintained channel. The bend widener dredging activity would require removal of material in deep, open-water habitat and, given the abundance of nearby habitats for organisms to recruit from, will likely recovery quickly (NMFS 2020a). Any loss of habitat would be short-term, and through primary and secondary succession, would not adversely affect the reestablishment of the existing benthic communities or alter the capacity of EFH to support healthy populations of managed species over the long-term. Early successional benthic organisms will likely rapidly colonize the dredged footprint (Van Dolah et al., 1984).

Alternatives 3 and 6-9 include dredging at the turning basin expansion and Alternatives 4, 7, and 9 include dredging at the meeting area west of the Sidney Lanier Bridge will result in converting some shallow sub-tidal habitat to open-water habitat and, the dredged footprint may be comprised of different benthic communities due to the alteration in depth, from shallow to deeper waters (NMFS 2020a). Surviving populations of fish and macroinvertebrates specifically adapted to the shallower habitat will relocate to abundant similar habitat just outside the dredging footprint. The conversion of one EFH type to another does not eliminate, diminish, or appreciably disrupt EFH in the study area as the footprint is minimal compared to the availability of similar and immediately adjacent EFH. Therefore, the temporary and minimal impacts associated with the proposed dredging activities will not reduce the quality or quantity of EFH within the study area, and no adverse effects are expected to EFH from these alternatives. Additionally, NMFS offers no EFH conservation recommendations for the proposed Brunswick Harbor Modifications (NMFS 2020a).

5.3.2 Environmental Consequence for O&M Alternatives

FWOP/NAA

The existing O&M average annual quantities dredged for Brunswick Harbor is approximately 1,609,000 cubic yards. This amount includes 390,000 cubic yards in the inner harbor reach and 1,219,000 cubic yards in the entrance channel/outer harbor. O&M dredging activities will use cutterhead, clamshell, and hopper dredges for the

removal of maintenance material. All dredged material would be placed in established ODMDS or Andrews Island DMCA. As described under Section 5.2, benthic populations in the navigation channel are in a constant state of flux due to the continual sedimentation and shoaling, these communities are adapted to natural stresses that are similar to those caused by maintenance dredging. The 1998 EIS included an evaluation of the impacts to habitat and benthic communities. As indicated above in Section 5.2, pages 33, 35, and 36 of the 1998 EIS include an analysis of impacts to benthic communities and habitat. As noted in that analysis benthic communities would be lost from both the dredging activity and the placement of dredged material at the ODMDS and Andrews Island. These impacts would be temporary as after both dredging and placement activities cease, these areas would be available for recolonization. Both the navigation channel and ODMDS are in constant flux with species that are adapted to natural stresses and with abundant adjacent habitat, it is expected that nearby pioneer species would recolonize the new habitat. This effects analysis was coordinated during the development of the 1998 EIS with the NMFS Habitat Conservation Division, using the Fish and Wildlife Coordination Act process in-lieu of separate consultation which was allowed at the time in accordance with the interim final rule (December 19, 1997). Therefore, as there is abundant habitat adjacent to the navigation channel and ODMDS, impacts from maintenance dredging on EFH are anticipated to be negligible.

Actions Common to All O&M Action Alternatives

Under all alternatives, the Corps would use relocation trawling as a minimization measure as determined appropriate by the risk assessment process for each dredging event. Use of relocation trawling would have similar effects as described for dredging under the NAA. Given the abundant habitat adjacent to both the navigation channel and ODMDS, it is anticipated that recolonization from pioneer species would occur. In addition, feeding during any relocation trawling activity will likely temporarily decrease in the study area due to a temporary loss of macrobenthic invertebrates, as well as a reduced ability for fish feeding via sight due to the temporary increase of turbidity in the water column. However, no significant impacts are expected to occur on sight feeders, as noted above most of the fish species present have the ability to avoid any activities.

NMFS-HPD provided additional information regarding potential impacts to highly migratory species, specifically coastal sharks (NMFS, 2021). Coastal sharks may be captured as by-catch during relocation trawling events. The intent of relocation trawling is to provide a non-lethal means to capture and relocate species. The 2020 SARBO, Section 9 provides for shark-handling protocols during relocation trawling regardless of shark species, to avoid lethal impacts and minimize non-lethal impacts to all species of sharks. These protocols would be followed for any relocation trawling event, thereby minimizing impacts to coastal sharks. Therefore, no significant or long-term impacts to EFH are anticipated from relocation trawling.

O&M Alternatives 1 and 2

Under Alternatives 1 and 2, impacts to aquatic resources, habitat and substrate would be similar as described under the NAA, as the means of methods for dredging are essentially the same. These alternatives would use the risk assessment process

described in Section 2.9.2.2 of the 2020 SARBO, however dredging practices are expected to be similar to the NAA, with minor improvements to the design of equipment used and to practices. The 2020 SARBO requires pumps are disengaged when traveling through the water column to prevent entrainment. Maintenance dredging is limited to the existing channel areas and will not entrain species outside of the channel regardless of time of year. Improvements to the design of equipment used could provide minor beneficial impacts to other fish and macroinvertebrate aquatic species, as these improvements are designed to reduce entrainment and harm to fish species. These . Alternative 2 does provide for an extended winter dredging window for hopper dredging, including dredging in fall months. The extended window would not result in a longer duration for dredging, but rather would provide flexibility for when dredging may occur, as this window begins in the fall and concludes at the end of March. It is outside the warmer summer months with higher productivity and coincides with the end of the window in the NAA, therefore, when compared to the NAA, an increase in impacts to benthic communities is not anticipated. As described under the NAA, given the abundant habitat adjacent to both the navigation channel and ODMS, it is anticipated that recolonization from pioneer species would occur. Therefore, no significant or long-term changes in community structure or function are expected.

Under Alternative 2, hopper dredging may occur during the fall months of September and October, during these months neonate/juvenile coast sharks may be transiting from the inner harbor estuary through St. Simons Sound to the entrance channel, these neonate/juveniles may not have the mobility to avoid dredging activities. This area is naturally deep and rarely dredged, Corps records from the past 15 years (FY07-present) indicate that this area has been dredged once in FY10. Therefore, while hopper dredging in fall months may result in a potential increase of impacts to juvenile/neonate coastal sharks, there would not be long-term significant impacts to these populations due to the infrequency of dredging in this area. Furthermore, PDCs in the 2020 SARBO are also expected to minimize entrainment of these species. Most sight feeders present would have the ability to avoid any dredge or placement activity associated with maintenance dredging. Furthermore, PDCs in the 2020 SARBO are also expected to minimize entrainment of these species. Therefore, significant impacts to EFH are not anticipated under these alternatives.

Alternatives 3 and 4

Under Alternative 3, the Corps would, and under Alternative 4, the Corps could conduct hopper dredging during the warmer summer months in the entrance channel. O&M dredging in the inner harbor is primarily cutterhead dredging, and therefore is not constricted to a seasonal window. Dredging impacts and dredging methods in the inner harbor would be similar as described under the NAA; impacts to aquatic resources from O&M dredging the inner harbor would be the same as described under the NAA. Therefore, analysis in this section will focus on impacts that may occur from hopper dredging at any time of year in the Cedar Hammock Range and in the open water of the entrance channel and ODMS. Under Alternative 3, the Corps would conduct hopper dredging during the warmer summer months in the entrance channel and Cedar

Hammock Range. Under Alternative 4, the Corps would use a risk assessment and management process to determine the best time of year to accomplish dredging, including the possible use of hopper dredging at any time of year. The NAA and Action Alternatives 1 and 2 describe impacts that could occur in fall, winter, and spring. Conducting hopper dredging during the warmer summer months is anticipated to be most impactful as primary productivity is higher. It is assumed that conducting hopper dredging at other times of year would have less impact. Therefore, the analysis in this section will focus on impacts that may occur from hopper dredging in the summer months, which would represent the most impacts that could occur under Alternatives 3 and 4.

Under Alternatives 3 and 4, all other dredging activities would also utilize the risk based approach but are expected to be similar to the NAA, with minor improvements to the design of equipment used. Improvements to the design of equipment used could provide minor beneficial impacts to other fish and macroinvertebrate aquatic species, as these improvements are designed to reduce entrainment and harm to fish and sea turtles. If dredging occurred during the warmer months, benthic species may experience minor adverse effects as primary production is higher in the warmer months.

Additionally, there is potential for increased mortality of pregnant adults of coastal sharks listed in Section 2.7 as well as that of neonates and juveniles due to entrainment into the suction draghead of the hopper dredge during periods of ingress and egress through the coastal inlet. Draghead deflectors, and other minimization measures included in the 2020 SARBO PDCs for dredging equipment were developed to reduce entrainment of ESA-listed species, these PDCs would also minimize entrainment of coastal sharks. Additionally, it is anticipated that coastal sharks, as a mobile species, would also avoid areas of active dredging, as there is abundant adjacent habitat avoidance of the dredging activity would not limit foraging. Furthermore, the area of most concern, the narrow transition between inner harbor and entrance channel, located approximately at St. Simons Sound is a naturally deep area of the channel and is infrequently dredged. Impacts would be as described under Alternatives 1 and 2, and no significant impacts are anticipated.

Overall, as noted above in NAA impacts analysis, there is abundant available habitat adjacent to the entrance channel and ODMDS and any adverse effects would not be significant. Impacts to coastal sharks during the summer months would be minimized either through avoidance behavior or by the minimization measures to reduce entrainment, such as draghead deflectors and requiring pumps are disengaged when traveling through the water column to prevent entrainment. Other impacts from O&M dredging would be similar to those described under the NAA, and overall, there would be no significant impacts to EFH. NMFS provided comments regarding EFH impacts in a letter dated July 21, 2021. This letter contained a conservation recommendation to use an adaptive management approach to determine timing of dredge events. As the risk assessment process described in Section 2.9.2.2 of the 2020 SARBO is substantially similar to the risk assessment process in conservation recommendation, the Corps compliance with the conservation recommendation would occur through

integration of EFH considerations into the risk assessment process. In summary, no significant impacts are anticipated under Alternatives 3 and 4 with the implementation of the conservation recommendation, and for the reasons stated above.

5.4 Wetlands

Project Improvements and O&M Alternatives

No direct or indirect effects to wetlands are anticipated under any of the alternatives, including O&M NAA and action alternatives. As indicated under section 5.1, the NAA and action alternatives would not impact water levels or velocities, therefore indirect impacts to wetlands from channel modifications are not anticipated. Continued O&M as it would maintain the channel dimensions would also not result in indirect impacts to wetlands from in-water work. All new work and O&M dredged material would be placed in established regulated placement sites and placement of dredged material would not result in any loss of wetlands. There is sufficient capacity in the Andrews Island DMCA and ODMS for material produced from both new work and continued O&M. Establishment of new placement sites is not needed. Overall, there would be no effect to wetlands from any of the alternatives or from continued O&M. Additional information regarding wetland impacts can be found in Appendix L.

5.5 Protected Species

5.5.1 Environmental Consequences for Project Improvements

FWOP/NAA

Under the FWOP/NAA, no modifications to the Federal navigation project would occur, therefore would be no effect to ESA-listed species or other protected species. Effects from continued O&M is evaluated below.

Alternatives 2 through 9

With implementation of any of the action alternatives being evaluated, the Corps has concluded that the proposed actions may affect but are not likely to adversely affect some and have no effect to other Federally listed species under NMFS and USFWS jurisdiction.

The Corps ESA-listed species determination for marine life under the NMFS jurisdiction is specifically for the new work dredging proposed by the BHMS. The new work being proposed would be exclusively conducted using cutterhead dredging. All proposed activities are designed and will be implemented in compliance with the PDCs in Appendix B of the 2020 SARBO.

Pursuant to Section 7 of the ESA, NMFS issued a Letter of Concurrence (LOC), dated May 24, 2021, that evaluated the effects from the modification (new work) to ESA-listed species. The LOC can be found in Appendix I. It also considered that future maintenance dredging and dredged material placement may then be covered under 2020 SARBO. In its LOC, NMFS evaluates those portions and effects of the project not analyzed in 2020 SARBO and incorporates the 2020 SARBO by reference for analysis

of effects to ESA-listed species and designated critical habitat resulting from future maintenance of the modified channel in Brunswick Harbor. Future maintenance of the project is evaluated below. The LOC evaluated effects to sea turtles (Kemp's ridley, green, hawksbill, leatherback, and loggerhead), sturgeon (shortnose and Atlantic), and Giant manta ray. The effects determination of these species is identified in Table 26.

Table 26. Effects Determination(s) for Species the Action Agency or NMFS Believes May Be Affected by the Channel Modification

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North Atlantic [NA] distinct population segment [DPS])	T	NLAA	NLAA
Green (South Atlantic [SA] DPS)	T	NLAA	NLAA
Kemp's ridley	E	NLAA	NLAA
Leatherback	E	NLAA	NE
Loggerhead (Northwest Atlantic [NWA] DPS)	T	NLAA	NLAA
Hawksbill	E	NLAA	NE
Fish			
Shortnose sturgeon	E	NLAA	NLAA
Atlantic sturgeon (All DPSs)	T/E ¹	NLAA	NLAA
Giant manta ray	T	NLAA	NLAA
E = endangered; T = threatened; NE = no effect; NLAA = may affect, not likely to adversely affect. ¹ The New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs are listed as endangered; the Gulf of Maine DPS is listed as threatened.			

A no effect determination was made for all other NMFS managed species identified in Table 26, for the proposed modification, as the species are not expected to occur in the action area of the new work dredging (recommended plan) and there no designated critical habitat in the project location.

All applicable PDCs (from the 2020 SARBO), terms and conditions, and reasonable and prudent measures resulting from these consultations shall be implemented in order to minimize take of endangered species and avoid jeopardizing the species. The Corps will follow all applicable PDCs in the 2020 SARBO for the proposed new work dredging. Conservation Measures and Best Management Practices included in the LOC are as follows:

- The action agency has agreed to adhere to NMFS' Sea Turtle and Smalltooth Sawfish Construction Conditions (2006).

- In order to minimize impacts to threatened and endangered (T&E) species and marine mammals, all relevant PDC from the 2020 SARBO will be incorporated in the new work.
- Apparent cold-stunned sea turtles and/or distressed marine mammals will be immediately reported to the Georgia Sea Turtle Stranding and Salvage Network (1-800-2-SAVE Me or 912-280-6892) or the Georgia Marine Mammal Stranding Hotline (912-269-7587), respectively.
- All personnel shall report giant manta ray sightings to the giant manta ray recovery coordinator at NMFS Southeast Region Protected Resources Division (manta.ray@noaa.gov). Giant manta ray observations should be photographed and include the latitude/longitude, date, and environmental conditions at the time of the sighting.
- All personnel shall follow observation and reporting observation guidelines of ESA-listed species found in Appendix H in 2020 SARBO. The BHMS new work dredging proposes to use the cutterhead dredge method, minimizing turbidity by piping away the sediments without having to bring material up through the water column in a bucket or transport them to an offshore location by way of scow.
- Cutterhead dredging shall be monitored for take of sturgeon in accordance with the guidelines outlined in the 2020 SARBO.
- In-water lines (rope, chain, and cable), if used, shall be stiff, taut, and non-looping. Flexible in-water lines, such as nylon rope or any lines that could loop or tangle, shall be enclosed in a plastic or rubber sleeve/tube to add rigidity and to prevent the line from looping or tangling. No excess line is allowed in the water. All lines or cables shall be monitored regularly to ensure nothing has become entangled and then immediately removed upon project completion. Cables or lines with loops used to move pipelines, or buoys shall not be left in the water unattended.

For North Atlantic right whales (*Eubalaena glacialis*), the project action area for the new work is limited to areas in the South Brunswick River, Turtle River, and St. Simons Sound, where North Atlantic right whales that inhabit coastal ocean habitat would not occur. The proposed project will not increase cargo vessel traffic, and therefore, the project action area does not include shipping lanes or the Federal navigation project extending offshore in the Atlantic Ocean. As a result, the proposed new work will have no effect on North Atlantic right whales.

The Corps has consulted with the USFWS on our may affect, not likely to adversely affect determination for the West Indian manatee (*Trichechus manatus*) and a no effect determination for the Wood stork (*Mycteria Americana*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*) and Eastern black rail (*Laterallus jamaicensis*), as well as other species under their jurisdiction.

Additionally, the Corps has coordinated with USFWS as required by the FWCA. On May 20, 2020, USFWS provided the Corps with a FWCA evaluation (Appendix K). The evaluation addresses species that under USFWS jurisdiction, including ESA-listed species and migratory birds and shorebirds. For ESA-listed species, the USFWS concurred with the Corps' effects determinations contained in a letter dated June 18,

2020 and by email received on January 25, 2021. USFWS concluded that the none of the proposed channel modification action alternatives are expected to significantly impact fish and wildlife resources under their jurisdiction (see Appendix K). The following paragraphs provide a summary of basis of the effects determination.

Piping plovers, red knot, and Eastern black rail do not nest in the proposed study area, and the area does not possess their preferred feeding or resting habitats. There are no wood stork rookeries in the project area. Additionally, cutterhead dredging will occur at the edge of the ship channel, which is a sufficient distance from bird usage areas that no disturbance should occur from this part of the action.

For all dredging activities under any of the action alternatives, the Corps would include requirements in the dredging contracts for the protection of West Indian manatees. Therefore, the proposed project may affect but is not likely to adversely affect the West Indian manatee. During consultation for O&M activities, the Corps in coordination with the USFWS updated the manatee conditions. This correspondence, which outlines the updated manatee conditions is included in Appendix G and K and manatee conditions are also detailed in Section 5.5.2.

5.5.2 Environmental Consequences for O&M Alternatives

Impacts Common to All O&M Alternatives

As piping plovers, red knot, and Eastern black rail do not nest in the inner harbor and neither the entrance channel or the inner harbor possesses their preferred feeding or resting habitats, the Corps made a no effect determination for the piping plover, red knot, and Eastern black rail for O&M dredging. Additionally, as there are no wood stork rookeries in the vicinity, the Corps made a determination of no effect to wood stork for all of the O&M dredging. USFWS in a letter dated September 10, 2021 concurred with the Corps determination of no effect for these species for O&M dredging.

The South Brunswick River is not a sturgeon river listed in Appendix E of 2020 SARBO, and, while transient sturgeon may be present within the inner harbor, it is not anticipated that sturgeon would aggregate or spawn in the inner harbor. Sturgeon entrainment in a cutterhead dredge during O&M dredging of the inner harbor is extremely unlikely to occur. Additionally, implementation of applicable PDCs from the 2020 SARBO will further reduce any impacts. Therefore, O&M dredging of the inner harbor would not result in significant effects to sturgeon species.

Shortnose sturgeon-entrance channel impacts

Shortnose sturgeon, unlike Atlantic sturgeon, tend to spend relatively little time in the ocean, according to the NOAA species directory website (<https://www.fisheries.noaa.gov/species/shortnose-sturgeon>). When they do enter marine waters, they generally stay close to shore. Consequently, there is no recorded relocation or take of shortnose sturgeon from hopper dredging, or any other type of dredging in the Brunswick or Savannah Harbors entrance channel. Therefore, for the NAA and all O&M Action Alternatives, significant impacts from entrance channel dredging are not expected.

West Indian manatee

NAA: The 1998 EIS evaluated impacts to the West Indian manatee. The following is found on p. 43: "If the proposed dredging is conducted during the winter, there would be less potential for harming these mammals. However, if dredging does occur in the summer, precautions would need to be implemented to avoid injuring any animal present." On March 6, 1998, the USFWS issued a biological opinion for the action proposed in the 1998 EIS, including continued O&M of the Federal navigation channel. Their evaluation is as follows: "After reviewing the current status of the manatee, the environmental baseline for the action area, the effects of the proposed actions, the cumulative effects, and the above conservation measures the Corps will implement, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the manatee." Conservation measures are listed in the USFWS 1998 biological opinion and are required to be implemented year round:

- All construction activities in open water will cease upon the sighting of manatees within 100 yards of the project area. Construction activities will not resume until the manatee has not been seen in the project area for at least 30 minutes. The Service assumes that construction activities include both dredging operations and blasting of bedrock.
- All vessels associated with the project will (1) operate at "no-wake" speeds at all times while in water where vessel draft provides less than four feet of clearance from the bottom and (2) follow routes of deep water to the extent possible.
- The contractor will instruct all personnel associated with dredging of potential manatee presence and the need to avoid collisions with this species.
- All personnel associated with the dredging will be advised that there are civil and criminal penalties for harming, harassing, or killing manatees. The contractor may be held responsible for any manatee harmed, harassed, or killed as a result of construction activities.
- Any collision with a manatee will be reported immediately to the Corps, the Service's Brunswick Field Office, and the Georgia Department of Natural Resources.
- The contractor will keep a log detailing sightings, collisions, or injury to manatees which occur during dredging operations, and a report summarizing such incidents will be provided to the Savannah District for coordination with the Brunswick Field Office.

The Corps has continued to implement these conservation measures, and through adaptive management, refined the measures and added additional measures to further minimize impacts to manatees, including additional requirements for the lowering of equipment or materials, securing pipelines to river floor to avoid crushing hazards, measures to avoid entanglement and entrainment, and signage in the construction area. In their 1998 BiOp, USFWS indicated the following regarding take of the manatees: "The Service does not anticipate that the proposed action will incidentally take manatees. Since incidental take is not anticipated, we propose no reasonable and prudent measures, or implementing terms and conditions, to minimize take" (USFWS

1998). Under the NAA, the Corps would continue to implement the conservation measures for manatees to minimize effects to these species. No significant impacts to West Indian manatees are expected under the NAA.

O&M Action Alternatives: For all of the O&M action alternatives the Corps has made a determination of may affect, but not likely to adversely affect the West Indian manatee. The Corps has consulted with the USFWS on effects to West Indian manatee. The USFWS, in letter dated September 10, 2021, has concurred with the Corps determination, provided the Corps include requirements in the dredging contracts for the avoidance of impacts to West Indian manatees, regardless of location (inner harbor or entrance channel). These requirements are:

- Personnel associated with dredging activities shall be advised of the civil and criminal penalties for harming, harassing, or killing manatees, or other species protected under the Endangered Species Act of 1973 and the Marine Mammal Protection Act of 1972. The Contractor may be held responsible for manatees, whales, sea turtle, or sturgeon harmed, harassed, or killed as a result of project activities.
- A minimum of 2 temporary manatee awareness construction signs that are 3 feet by 4 feet will be provided and maintained at prominent locations within the construction area prior to initiation of construction/dredging and removed upon completion of the project. Signs shall be posted prior to and during construction and dredging activities to remind personnel to be observant for manatees during active construction/dredging operations and within vessel movement zones (i.e., the work area), and at least one sign shall be placed where it is visible to the vessel operator. One additional temporary sign will be installed in a location prominently visible to water-related construction crews.
- Siltation or turbidity barriers below the high tide line are not allowed in association with this project.
- To prevent a crushing hazard to manatees or other protected species, pipelines used to transport dredged material shall be secured to the river bottom or to a fixed object along their length to prevent movement with tides or wave action.
- Clamshells buckets, and other dredging equipment (pipelines, anchors, etc.) shall be raised and lowered in the water column at the slowest possible speed. Upon retrieval, clamshell buckets shall be held just above the water's surface so excess water can drain before being raised higher. This reduces the splashing noise associated with the draining water as it contacts the water's surface, a possible manatee attractant.
- Night dredging with a clamshell should be avoided if possible. However, if it is necessary, bright lights adequate to provide illumination to aid in spotting manatees must be used.
- Vessels associated with dredging projects shall operate at "no wake/idle" speed while in the immediate project area and while in water where the draft of the vessel provides less than four feet of clearance from the bottom. Vessels shall follow routes of deep water when possible.

- If a manatee is sighted within 100 yards of the active work zone, special operating conditions shall be implemented, including: In-water operations, including vessels and moving equipment, shall be shut down if one or more manatees comes within 50 feet of the operation; vessels shall operate at no wake/idle speeds within 100 yards of the work area. In-water operations shall not resume until the manatees have moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatees have not reappeared within 50 feet of the operation. Animals shall not be herded away or harassed into leaving. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions are no longer necessary, but careful monitoring shall resume. • Collisions with manatees or other Federally listed species shall be immediately reported to the Corps of Engineers, Savannah District (912-652-6086 or 912- 652-5020) and the USFWS Coastal Suboffice (912-832-8739). The above offices shall be notified upon locating a dead, injured, or sick endangered or threatened species specimen. Care shall be taken in handling dead specimens to preserve biological materials for later analysis of cause of death. Dead manatees found in the project area shall be secured to a stable object to prevent the carcass from being moved by the current. The finder shall ensure that evidence intrinsic to the specimen is not unnecessarily disturbed. In the event of injury or mortality of any protected species, aquatic activity in the project area shall cease, pending Section 7 consultation under the Endangered Species Act between the USFWS and the Corps.
- A log shall be kept detailing sightings, collisions, and injury to manatees, sea turtles, sturgeons, and whales which have occurred during the Contract period. Within 15 days following project completion, a report shall be submitted to the Contracting Officer or Contracting Officer Representative summarizing sightings and incidents. Reports shall be signed by the Contractor or its representative and shall include the name of the person making each sighting.
- During hopper dredging activities, the Corps will provide the USFWS (gaes_assistance@fws.gov) notification on changes to inflow/outflow screen size and configurations, and other conditions which limit the ability of the NMFS-approved Protected Species Observer (PSO) to safely monitor dredging operations. The Corps will send the same notification and information to USFWS that is sent to NMFS, in accordance with the 2020 SARBO. PSOs shall be directed to include in their inspections impacts to manatees in (entrainment) and around the dredge along with the NMFS and other protected species.
- The Corps will comply with the most current version of the SARBO and any relevant PDC for the proposed action.

Therefore, for the NAA and O&M Action Alternatives, there would be no significant effect to manatees.

Impacts Analysis for Hopper Dredging

The analysis included in the following sections will focus on impacts from hopper dredging. While the entrance channel is the primary focus of the analysis, this analysis

also covers potential impacts from O&M hopper dredging of the Cedar Hammock Range.

The impacts analysis provided below is for the purposes of NEPA, and as stated in Chapter 1, the 2020 SARBO is incorporated by reference into this document. The 2020 SARBO describes all routes of effect to ESA-listed species under NMFS jurisdiction, and additional detail about each of the 25 species and seven critical habitats considered in the 2020 consultation can be found in the 2020 SARBO

(https://media.fisheries.noaa.gov/dam-migration/sarbo_acoustic_revision_6-2020-opinion_final.pdf). The analysis of impacts provided in this section is not meant to replace the analysis included in the 2020 SARBO, but rather serve as the analysis to support decision-making under NEPA. As the O&M alternatives differ in the regards to timing of hopper dredging, this effects analysis will focus on effects to ESA-listed species from the timing of hopper dredging. Species most likely to be affected include the North Atlantic Right Whale, Atlantic sturgeon, and sea turtles.

No Action Alternative

Under the NAA, O&M of the Brunswick Harbor, Georgia Project would be accomplished in a manner consistent with the 1997 SARBO including limiting hopper dredging to the historic environmental window of December 1- April 15, and limiting bed-leveling to only the Brunswick Harbor design. Relocation trawling and bed-leveling would depend upon approval prior to each use.

Under the NAA, the Corps would continue to apply a risk management process. USACE has a long history of adaptive project management to assure that no project results in excessive take of any species or a combination of species, which includes closely tracking all projects, adjusting project components, adding species take minimization measures, and even stopping projects deemed to be too high risk to continue. These decisions are based on past experience and determination is different for every project based on a project-specific and regional considerations such as the total project and regional take for a specific species that fiscal year, the frequency of take, factors that may be leading to the take and if they can be minimized, the need to continue dredging to meet navigational requirements, and other logistical and economic factors.

North Atlantic Right Whale

NARW typically inhabit coastal waters along coastal Georgia and northern Florida each winter, often close to shore. According to the NOAA species directory website (<https://www.fisheries.noaa.gov/species/north-atlantic-right-whale>), each fall, some right whales travel more than 1,000 miles from North Atlantic feeding grounds to their only known calving grounds in the southeast; the majority of calving occurs in the shallow, coastal waters off Georgia and northeastern Florida. These whales remain near the surface with their new calves and are hard to spot in the water making them susceptible to vessel strikes, which is one of the leading causes of death for this species.

Entanglement is the other leading cause of death. The 2020 SARBO identifies the NARW migration and calving season from November 1 through April 30. The historical

hopper dredging window falls within this window and a key risk to limiting hopper dredging to this window is the risk of vessel strike to NARW from any equipment associated with the project that is over 33-ft in length and transiting coastal waters. The coastal areas of the study area, including the entrance channel, ODMDS, and areas transited between them are used for calving by NARW from December to March each year. As discussed in the affected environment, this critically endangered species has seen a loss of 10% of the less than 400 population in the last several years and calving rates have been low with no calves born in 2018. In fact, both NARW deaths that occurred in 2021 occurred in the area covered by the 2020 SARBO - with one death caused by a vessel strike in St. Augustine, Florida and the other death off Myrtle Beach, South Carolina from a long-term entanglement. Both of these deaths occurred in February 2021. Entangling is another leading cause of death for this species and the reason the 2020 SARBO requires all lines associated with work on a project to be non-entangling. Therefore, the effects analysis in the 2020 SARBO considers the consequences of a potential vessel strike to a NARW mother and/or calf from all vessels associated with the project. Prioritizing working outside of calving season is a requirement of the North Atlantic Right Whale Conservation Plan in the 2020 SARBO as well as continued funding by USACE to provide aerial surveys to identify the presence of this species from North Carolina to Florida. Under the NAA, the requirement in the 2020 SARBO to prioritize working outside the calving season would not be met.

Without the ability to move dredging outside of the winter and NARW calving season, some options for reducing risk to NARW would be to reduce the number of vessels that may transit to the ODMDS, the number of vessels associated with the project and the speed of vessels over 33-feet in length. Even with one or more of these minimization measures, the risk to NARW would be greater than if the O&M dredging was done outside of the calving season as vessel traffic would be increased. Additional options are to use cutterhead dredge, place material on shore, or use clamshell dredging. These last options, while they were considered, were determined to be either too costly for routine O&M or incongruent with the least cost placement required by Federal regulations. The risk to NARW from vessel traffic was not fully understood at the time of the 1997 SARBO and on October 10, 2008, the final rule to implement speed restrictions for vessels 65 feet in length or greater was published in the Federal Register. In addition, the NOAA Fisheries website indicates that because vessels of all sizes can strike a whale, they encourage vessels less than 65 feet in length to slow to 10 knots or less within seasonal management areas (e.g. the calving area off of the south Georgia/north Florida coast). Prior to the 2020 SARBO, the Corps was not subject to this rule while completing dredging and material placement. The NARW Conservation plan in the 2020 SARBO (Appendix F of the 2020 SARBO) provides when and where specific speed restrictions will be enacted for vessels working on projects covered under 2020 SARBO. Therefore, the added minimization measures of prioritize working outside the calving season for NARW under the 2020 SARBO would not be applied under the NAA.

As noted in Section 3.1.4.1.4 of the 2020 SARBO: "We [NMFS] believe that the risk of a vessel strike occurring during a project analyzed under this Opinion is very low,[1] since

we are only aware of 2 reported interactions with vessels related to dredging, worldwide with North Atlantic or the closely related South Atlantic right whales despite decades of dredging both within the action area and globally. ***However, the consequences of potential take of a North Atlantic right whale to the small population of the species is high (emphasis added).*** While we do not normally discuss the status of a species when evaluating effects to a species if the effects from the action are not likely to adversely affect the species, the risk of vessel strikes and potential outcome of a strike to a North Atlantic right whale is unique due to the critical status of the population of this species. Key factors that affect the status of this species include an already low population size that is declining, a decline in the number of calves born annually with none born during the 2017-2018 calving season, an increasing number of years between calving cycles for reproductive females, and evidence of declined health of the reproductive females of this species. Additionally, the action area for this Opinion also includes the only calving grounds for North Atlantic right whales, meaning that smaller calves may be present. Due to their smaller size, calves are at an increased risk of mortality from vessel strikes". The risk of a vessel strike from dredging equipment working in the historic dredging windows under the NAA is low, especially with implementation of the NARW conservation measures in 2020 SARBO Appendix F. However, the consequence of a strike is high in that it could change the trajectory of the survivability of a species with such low population numbers. Furthermore, the hopper dredging window coincides with NARW calving season and dredging during this window increases the risk of strike. In addition, the 2020 SARBO does not include take for this species, meaning any take is in violation of the ESA.

Atlantic sturgeon

The largest and most undisturbed river system available to Atlantic Sturgeon within the South Atlantic DPS is the Altamaha River, approximately 14 miles north of the project area. Ingram (2016) conducted a study using telemetry data to better understand the spatial and temporal dynamics of the species' spawning migration in the Altamaha system. The data indicated that adults exercise two patterns of migration for spawning within that river's designated critical habitat. About one-third of the population exhibit a two-step migration entering the river from April to May, initiating the upstream migration in the spring/early summer, mid-river staging through the summer, and resuming the migration upstream in the fall, late August/early September. The remaining two-thirds migrate using a one-step pattern directly to the spawning habitat in the Ocmulgee and Oconee tributaries that begins in late August/early September. Regardless of the pattern used, all fish returned downstream and left the Altamaha River system by early January.

Studies in the Savannah River, another Georgia sturgeon river with critical habitat designation, report similar movement patterns that find Atlantic sturgeon in nearshore waters in the colder months. Rogers (2000) suggested that sturgeon are probably inhabiting important foraging areas during cooler seasons when the growth rates of juvenile Atlantic, and probably shortnose, sturgeon are low. These areas appear to include the freshwater/saltwater boundary of the lower Savannah River (pre-Savannah Harbor Expansion Project - SHEP) (Hall 1991) for both species and, for Atlantic

sturgeon, the nearshore continental shelf and shipping channels (Rogers et al., 1994). Trawling relocation data support this. In 2018, 79 Atlantic sturgeon were relocated from Brunswick Harbor's entrance channel between January 31 and March 15. In Savannah, during the 3 years (2016, 2017, 2018) of winter dredging (December - March) in the entrance channel for the SHEP, 17, 78 and 41 Atlantic sturgeon were relocated, respectively.

The relatively high numbers of relocated sturgeon in the colder months directly relates to the number of lethal take that can be expected. A review of incidental take data from FY13 through FY20 for hopper dredging projects from North Carolina to the Florida Keys revealed that almost 75% of Atlantic sturgeon take occurred in Savannah Harbor, Brunswick Harbor and Kings Bay, Georgia.

For Atlantic sturgeon, prior O&M at Brunswick and nearby channels during historic winter environmental windows has resulted in lethal take of Atlantic sturgeon including six in FY18 (hopper dredging December 30, 2017 to March 15, 2018) and four in FY20 (hopper dredging from January 10 to February 20, 2020) in Brunswick. The mortality risk for Atlantic sturgeon has been reduced by performing relocation trawling, which required additional coordination with NMFS each time it was conducted. Relocation trawling that occurred during February and March of 2018 when Brunswick Harbor was dredged during the environmental windows, resulted in 79 Atlantic sturgeon relocations. While minimal mortality was associated with this effort, it is still stressful to the sturgeon and may result in decreased ability to weather other stresses. In general, the number of sturgeon in the entrance channel is much higher in the winter than it is during the summer. The current theory among biologists is that sturgeon are staging in these areas to go up nearby spawning rivers in the spring. In addition, sturgeon are a benthic species generally found on the sea floor, which can reduce the effectiveness of capture by relocation trawling (Rogers 2000).

One method to reduce risk of species entrainment from hopper dredging (e.g. sea turtles and sturgeon) is to utilize bed-levelers. Take of species tends to be the highest at the end of hopper dredging since it is more difficult for the hopper dredge draghead to stay embedded in the uneven remaining sediment and species in the area, including those resting in the valleys, can be entrained. Switching from hopper dredging to bed-leveling at the end of the hopper dredge can reduce the amount of time a hopper dredge is needed to remove remaining sediment. The bed-lever is used to smooth out the hills and valleys created by hopper dredging. Using a bed-leveler at the end of hopper dredging can reduce take from entrainment.

An evaluation was done in Brunswick Harbor to determine if bed-leveling harmed sea turtles or sturgeon (see 2020 SARBO Section 3.1.1.6.1). Brunswick was chosen for this study based on the density of sea turtles in the area and the concern of sea turtle brumation (hibernating on the sea floor during cold weather events) leading to their being injured by bed-leveling. During the trials, trawling behind the bed-leveler approximately 80% of the time captured and released 38 live sea turtles and two Atlantic sturgeon with no mortalities, thus demonstrating that sea turtles and sturgeon

were present during the bed-leveling operations and unharmed by the process (Dodd 2003). USACE believes this process is effective at protecting all mobile species without harm. Only the Brunswick Harbor design of bed leveler would be used for the NAA, to be consistent with what has been done in the past. Given the restrictive design requirements for a Brunswick Harbor design, there is limited flexibility in the modifications allowed for bed leveler, and therefore to meet contract deadlines, a hopper dredge would be used for cleanup.

Atlantic sturgeon was not an ESA-listed species in 1997 and as such the 1997 SARBO did not address take of the species. Since listing of the Atlantic sturgeon in 2012, the number of recorded Atlantic sturgeon lethal takes in Brunswick Harbor during hopper dredging activities.. There were no reported takes from 2006-2014; one in 2015 and 2017; six in 2018; and four in 2020. Therefore, it is anticipated that lethal take of Atlantic sturgeon is likely to continue to occur under the NAA. Lethal take was not authorized under the 1997 SARBO, any future take would need to be compliant with the 2020 SARBO, and dredging activities would need to be compliant with the applicable PDCs in the 2020 SARBO. The 3-year observed lethal take for Atlantic sturgeon South Atlantic DPS in the 2020 SARBO is 73, or approximately 24/year.

The 2020 SARBO identified Brunswick River as a site to conduct hopper dredging during the warmer months to balance and minimize take of the species covered by the 2020 SARBO across the area. While minimization measures such as bed leveling (under limited circumstances) or draghead deflectors may be used under the NAA to minimize take, important minimization measures of relocation trawling and adjusting the timing of hopper dredging would not be applied under the NAA. Lethal take of Atlantic sturgeon would be expected to increase under the NAA resulting in long-term adverse impacts to the Atlantic sturgeon. Because lethal take is managed throughout the 2020 SARBO covered area, these effects would be minimal. However, higher levels of take in Brunswick Harbor may affect the Corps ability to complete maintenance dredging at other important harbors if take numbers are exceeded and dredging required to cease.

Sea Turtles

The 1997 SARBO was a turtle-centric approach that considered the best way to protect sea turtles was to limit work to winter months when sea turtle abundance throughout the 2020 SARBO action area was lower. From FY13-20, almost 60% of all sea turtle takes for all turtle species and also almost 60% of all loggerhead sea turtle takes from North Carolina to the Florida Keys occurred at just three project locations adjacent to each other (Savannah Harbor, Brunswick Harbor, and Kings Bay). While the percent of take by project or region provides some information, it does not consider the number of projects, frequency of projects, or length of time to complete a project. The most significant number and percent of lethal hopper dredging takes are limited to such a small area of projects covered under 2020 SARBO (i.e., Savannah Harbor, Brunswick Harbor, and Kings Bay). Hopper dredging in these areas has been generally limited to historic winter dredging windows as a way to minimize take. A study released in 2020 used genetics to determine that the majority (84.4%) of female loggerhead sea turtles nesting in North Carolina, South Carolina and Georgia migrate north to foraging areas

north of North Carolina after nesting each summer (Pflaller 2020). However, not all turtles migrate, leaving a smaller resident population that moves shorter distances to forage and overwinter. The 2020 study also concluded that these turtles then migrate back south to wintering areas from Cape Hatteras, North Carolina to West Palm Beach in Florida, “where they can enter warmer waters adjacent to the Gulf Stream while minimizing the migratory distance, time and energy required to return to their northern foraging sites when water temperatures rise in the spring.” Due to the greatest number of hopper dredging lethal take of sea turtles being concentrated in this south Georgia/northern Florida area, this area may have a higher number of wintering sea turtles that are too cold to easily avoid interactions with hopper dredging.

NMFS determined in the 2020 SARBO that limiting work to winter months, as was required under the 1997 SARBO, is not the only or even most effective way to reduce risk to sea turtles. Of the data from FY13 to FY20 that was reviewed for hopper dredging projects from North Carolina to the Florida Keys, almost 60% of sea turtle takes occurred in March, which lends support to the conclusion that spring is not the optimal time for hopper dredging. However, with projects historically limited to winter hopper dredging windows, March also represented the month in which dredging had to be completed, and there may have been a disproportionate number of project areas that had hills and valleys created by hopper dredging (cleanup phase) that caused the greatest risk of take if the draghead could not remain embedded in the sediment. Much knowledge has been gained since the decision was made to try to protect sea turtles by restricting hopper dredging to winter months. Because most take occurs when the dragheads are not firmly embedded in the sediment, USACE has worked to find ways to reduce this risk by adding draghead deflector shields that create a sand wave to move turtles away from the draghead, requiring that draghead pumps are disengaged when not actively dredging, or under limited circumstances switching to bed-leveling during clean-up phase when hills and valleys left by hopper dredging make it harder to keep dragheads embedded. As these minimization measures are in place under the NAA, other measures for minimizing take of sea turtles are to adjust the timing of hopper dredging (not only seasonally, but also include a longer window to provide flexibility for use of bed-levelling at the end of the dredge) or to conduct relocation trawling. Under the NAA, these minimization measures are not available, thereby limiting the Corps ability to further minimize risk to sea turtle species.

Overall, under the NAA, with hopper dredging limited to the December 1 - April 15 environmental window, the Corps could not adjust the timing of hopper dredging to avoid risk of take to NARW, Atlantic sturgeon, and sea turtles. Relocation trawling is also another measure that would not be used under the NAA to minimize take of sturgeon and sea turtles. Under the NAA, the risk to NARW, sturgeon, and sea turtles is greater than under the 2020 SARBO. As the NARW are critically endangered, it is important to minimize the likelihood of take to the degree practical. Additionally, conducting activities during the NARW calving season may require reinitiating ESA consultation, as it is not consistent with 2020 SARBO.

Actions Common to All O&M Action Alternatives

Common to all action alternatives, the Corps will continue to conduct long term O&M of Brunswick Harbor and will include the improvements, once constructed. Any subsequent O&M dredging would occur annually, as needed, based on shoaling rates, and follow all applicable PDCs in the 2020 SARBO.

Under all action alternatives, the Corps would use relocation trawling as minimization measure as determined appropriate during the risk assessment process for each dredging event. As noted on p. 116 of the 2020 SARBO:

Relocation trawling is method used to minimize the risk of lethal hopper dredging take by sweeping the area around a hopper dredge using a modified shrimp trawl nets to capture and relocate ESA-listed species that may be in the dredging area. While relocation trawling is intended to reduce the occurrence of lethal take from hopper dredging, the process of relocating ESA-listed species is, in and of itself, a form of take under the ESA for those species that are caught. Relocation trawling covered under this Opinion [2020 SARBO] will be monitored by PSOs based on the guidance provided in the PDCs, especially the PSO PDCs in Appendix H of the 2020 SARBO that provide handling and reporting guidance for ESA-listed species captured during relocation trawling. Additional PDCs regarding the time and locations where relocation trawling can occur are provided in the General PDCs in Section 3.5 of Appendix B of the 2020 SARBO, which limit tow times to 42 minutes to minimize the risk of adverse effects on ESA-listed species, primarily mortality of sea turtles due to forced submergence.

Effects from relocation trawling to Atlantic sturgeon and sea turtles is discussed in section 6.1.4 of the 2020 SARBO, and not repeated here. Overall, use of relocation trawling would provide a minor beneficial effect as it is intended to reduce lethal take.

O&M Action Alternative 1

Under Action Alternative 1, the Corps would implement an environmental window for hopper dredging from December 1- March 31. As this window is similar to the NAA, the impacts from adhering to this window would be the same as the NAA except that the Corps could use relocation trawling as a minimization measure under this alternative, which may minimize risk of lethal take for Atlantic sturgeon and sea turtles. The Corps would be severely limited in adjusting timing to avoid lethal take of sturgeon and sea turtles. There would be no reduction in risk to NARW, as relocation trawling has no benefit to NARW. Observers on dredges would continue to monitor for NARW and the Corps would take measures to reduce risk of vessel strike should NARW be observed, such as reduce speeds or halt dredging activities.

As noted under the NAA, a narrow dredging window may also result in more take as not all minimization measures may be fully used, such as bed-levelling. As the NARW are critically endangered, it is important to minimize take to the degree practical. This Alternative represents greater risk to the NARW, Atlantic sturgeon, and sea turtles than

full implementation of the risk assessment process in Section 2.9.2.2 in the 2020 SARBO.

O&M Action Alternative 2

Under this alternative, the Corps would implement an environmental window for hopper dredging from September 1- March 31. The extended winter hopper dredge window was selected to provide more flexibility around the timing of when hopper dredging could occur. This window allows dredging outside the NARW calving and migration and sea turtle migration seasons. As the Corps has observed more take of sea turtles in March (section 5.x), this window would allow the Corps to adjust the timing of hopper dredging to be more protective of NARW and sea turtles. Furthermore, this window would provide some protection for Atlantic sturgeon, as it includes a portion of a likely fall spawning season (p. 215 2020 SARBO) and sturgeon may not be present within the vicinity of the entrance channel. Additionally, the longer time frame would allow time to more fully use minimization measures, such as relocation trawling and bed-leveling.

NARW

The NARW migration and calving season is November 1 through April 30, and while this window provides for adjustment to hopper dredging to occur outside the migration and calving season, given the approximate 3 month duration to conduct annual maintenance, even if dredging were to begin at the beginning of the window, there would still be some overlap between dredging activities and the migration and calving season. This alternative would not provide for full avoidance of the calving and migration season if the risk assessment process identified that as need. Additionally, if a dredging project begins in the fall and sturgeon or sea turtle takes do occur at unacceptable levels, the only schedule option is to move the project into the winter months which would mean more risk of vessel strike as the dredging equipment would be moving from entrance channel to the ODMDS.

Atlantic sturgeon

The extended window would provide more flexibility in scheduling dredging projects which may benefit sturgeon. Adult spawning runs of Atlantic sturgeon are still not completely understood, but generally, data suggests that Atlantic sturgeon begin their spawning migration in late summer/fall. This implies that dredging during the first few months of the window in this alternative when sturgeon have begun spawning migrations upstream could result in less impacts to Atlantic sturgeon than the latter half (cooler months) when juvenile and subadults are suspected to be foraging in nearshore continental shelf waters and shipping channels (Rogers et al., 1994). However, if a dredging project begins in the fall and sturgeon or sea turtle takes do occur at unacceptable levels, the only schedule option is to move the project into the winter months where take numbers could be expected to increase, or terminate the project until the following year.

Sea Turtles

To date, the only hopper dredging completed outside of the historic dredging windows in Brunswick, was part of a pilot study in Brunswick and Savannah in September 2009 (Fall). The 2009 dredging resulted in six loggerhead sea turtle takes for the combined project (4 in Brunswick, 2 in Savannah). For comparison, Brunswick and/or Savannah Harbors have been frequently dredged with less take; however, six sea turtle takes occurred in FY12 in Brunswick and six sea turtle takes in FY20 in Brunswick (5) and Savannah (1) combined when water temperatures were $\leq 15^{\circ}\text{C}$. Therefore, limiting to winter timeframes with colder water is not a completely effective way to reduce risk as this window encompasses the fall migration for sea turtles, which may increase risk of entrainment of sea turtles. Given historic dredging information and data from the 2009 pilot study, Alternative 2 may result in an increase in take compared NAA and Alternative 1. However, as noted above, if a dredging project began at the beginning of the window resulted in takes at unacceptable levels as determined during a post-take assessment as described in Chapter 4.0, the project may be rescheduled to later in the window or terminated.

In summary, under Alternative 2, with the timing of the hopper dredging constrained to fall and winter, the Corps cannot adjust the timing of hopper dredging to include warmer months to avoid risk of take to NARW and Atlantic sturgeon.. While the window in this alternative includes months outside the NARW migration and calving season, other project considerations, including take of sturgeon and sea turtles, may still result in dredging during that time. As the NARW are critically endangered, it is important to minimize risk of take to the degree practical. This Alternative represents greater risk to the NARW, Atlantic sturgeon, and sea turtles than full implementation of the risk assessment process in Section 2.9.2.2 in the 2020 SARBO.

O&M Action Alternative 3

Under Alternative 3, the Corps would implement an environmental window for hopper dredging from June 1-August 31. This window was chosen due to the 2008 data analysis conducted by ERDC (and others) on entrainment rates by month for all hopper dredging projects from 1995-2008 in the seven habitat subregions of the southeastern U.S., and to avoid the fall/spring sea turtle migration.

NARW

This alternative includes three months to schedule and complete dredging in the entrance channel, and all hopper dredging would be conducted outside the NARW migration and calving season. This alternative would eliminate the risk of vessel strike of the NARW by working when they are not present.

Atlantic sturgeon

Based on historical migration and movement data, dredging during the summer months, when sturgeon have begun their migration into estuaries and upstream to spawning habitat (Ingram, 2016) could be expected to have few, if any, Atlantic sturgeon take. Applicable 2020 SARBO PDC and the SAD Management Protocol could be applied in managing risk to sturgeon if needed.

Sea Turtles

In understanding risk to sea turtles from conducting hopper dredging in summer months there is limited amount of historic data to determine what potential effects may occur. As described above under Alternative 2, the only hopper dredging completed outside of the historic dredging windows in Brunswick, was part of a pilot study in Brunswick and Savannah in September 2009 (Fall). The 2009 dredging for two separate projects resulted in six total loggerhead sea turtle lethal takes for the combined project (4 in Brunswick, 2 in Savannah). For comparison, Brunswick and/or Savannah Harbors have been frequently dredged with less take; however, six sea turtle takes occurred in FY12 in for a single project in Brunswick and six sea turtle takes occurred for two combined projects in FY20 in Brunswick (5) and Savannah (1) indicating that even work occurring during the historic dredging windows when water temperatures are colder ($\leq 15^{\circ}\text{C}$) resulted in the same lethal of lethal take. Therefore, limiting to winter timeframes with colder water is not a completely effective way to reduce risk.

Warm waters and/ or high sea turtle density in an area does not necessarily equate to higher or unacceptable hopper dredging take. For example, multiple hopper dredging projects have occurred in recent years during time periods when waters were warm and sea turtle abundance in the area was known to be high. Yet, these projects were able to be successfully completed with a low level of lethal take per project.

- Bogue Banks, North Carolina. Hopper dredging from February 21, 2021 – April 6, 2021 resulted in three sea turtle takes (two Kemp's ridley and one loggerhead) while 24 sea turtles (10 Kemp's ridley and 14 loggerheads) were relocated. In addition, 17 Atlantic sturgeon were relocated. Dredging in FY21 was the third phase of this project. Dredging from March 8, 2019 – April 24, 2019 did not have any lethal hopper dredging take. Dredging from February 6, 2020 – April 29, 2020 dredged 2,270,000 cubic yards of material with only 3 lethal sea turtle takes (one Kemp's ridley and two loggerheads). Relocation trawling was conducted in both FY19 and FY20 and relocated sea turtles and Atlantic sturgeon (a combined total of eight Kemp's ridley, 14 loggerheads, six green sea turtles, and 17 Atlantic sturgeon). No Atlantic sturgeon were taken in any of the three years of hopper dredging.
- Wilmington, North Carolina. Hopper dredging from May 24, 2021 to June 27, 2021 did not result in any sea turtle take, even without relocation trawling. However, it was determined that additional dredging was needed to meet the contract requirements and hopper dredging resumed from August 8-11, 2021, resulting in one loggerhead sea turtle lethal take from hopper dredging. For comparison, most years that Wilmington was dredged within the winter timeframe did not result in take; however, five sea turtles (three green and two loggerhead) and one Atlantic sturgeon were taken between October 18, 2016 and January 4, 2017.
- Morehead City, North Carolina. Hopper dredging from May 29, 2020 – July 30, 2020 resulted in two loggerhead sea turtle takes. Hopper dredging again during

the summer of 2021 (May 30, 2021 – June 14, 2021) resulted in two loggerhead and one green sea turtle takes with nine sea turtles relocated (six loggerhead and three Kemp's ridley).

- Oak Island, North Carolina. Hopper dredging from May 6, 2021 – May 22, 2021 resulted in only one loggerhead lethal take while 34 turtles were relocated (19 Kemp's ridley and 15 loggerhead sea turtles) and 12 Atlantic sturgeon.

Take during these dredge events in warmer months indicate that take levels may be similar to the historic dredge window in winter months, further supporting that limiting to winter timeframes may not be the most advantageous to reducing risk to sea turtles.

Additionally, on p. 320 of the 2020 SARBO, NMFS indicates that limited data suggest that entrainment of sea turtles may be less during warmer months:

It was also noted that entrainment decreased during the summer (July-September) and was comparable to those observed during cold winter months, though the summer dredging sample size was significantly smaller. The study stated that the decrease in entrainment in the summer may be linked to an increase in activity of sea turtles during months were they are nesting and that they may spend more time moving through the water column, which would result in a lower risk of entrainment by the draghead operating at the sea floor.

A study released in 2020 used genetics to determine that the majority (84.4%) of female loggerhead sea turtles nesting in North Carolina, South Carolina and Georgia migrate north to foraging areas north of North Carolina after nesting each summer (Pflaller 2020). This study shows that a large percentage of sea turtles move out of Brunswick area to forage in the summer. Some sea turtle experts believe that summer hopper dredging may have the lowest risk to sea turtles, even if abundance is high in the area. In the summer, turtles are warmer and can more easily avoid interactions and may be using areas outside of channels as they disperse throughout the region. Since the majority of loggerhead sea turtles migrate to northern foraging grounds, the density of turtles in the summer (post-nesting) may be lower.

In summary, Alternative 3 would reduce risk to NARW and Atlantic sturgeon, and as data suggest may not result in an increased risk of lethal take of sea turtles. However, due to the narrow timeframe (3 months, the shortest of all the timeframes), it may not allow enough time complete work including the ability to utilize bed-leveling at the end of hopper dredge as a minimization measure to reduce entrainment of sea turtles. Additionally, the restrictive, narrow time frame would not allow the full implementation of the risk assessment process outlined in Section 2.9.2.2 in the 2020 SARBO. As there is limited historic dredging information related to impacts to any of the ESA-listed species in this timeframe, the need to adaptively manage through adjustment of the timing of hopper dredging is critical, this narrow timeframe would limit capability to apply risk assessment and management process for each dredge event.

O&M Action Alternative 4

Under this alternative, the Corps would replace the constraint of an environmental window for hopper dredging with risk assessment process outlined in Section 2.9.2 of the 2020 SARBO. The 2020 SARBO provides for flexibility in the timing of project completion through the use of a risk assessment and risk management process, outlined in Section 2.9.2.2 of the 2020 SARBO. Using this risk based decision-making process, dredging will be allowed outside of the previously established seasonal dredging windows required in the 1997 SARBO. Use of the adaptive risk assessment process does not mean the Corps would dredge year-round or only exclusively during the summer months. The Corps would, through this process, adjust the timing, dredge equipment type and other parameters to be protective of ESA-listed species. The Corps would continue to use safeguards during construction to monitor take and take mitigative measures as necessary, including suspension of the project if necessary. Additionally, the 2020 SARBO provides take limits for Atlantic sturgeon and sea turtles for all projects covered under the 2020 SARBO over four states and two territories, the Corps is required to adhere to those take limits. Take limits are included in Section 10 of the 2020 SARBO.

NARW

The risk-assessment considerations for NARW were described under the NAA, including risk from vessel strike and entanglement. The presence of the NARW in the project area is a key consideration in the risk assessment process. Moving work outside the historic winter environmental windows further reduces the risk to NARW beyond the minimization measures already considered in the 2020 SARBO by working when this species will not be present in the area. The 2020 SARBO Section 6.1.1, lists the navigation channels that USACE had proposed to be dredged in warmer months and were analyzed by NMFS (that is, Brunswick Harbor, Savannah Harbor, Charleston Harbor, Wilmington Harbor Entrance/Inner Ocean Bar, Morehead City, and Manteo Entrance Channel). Under the North Atlantic Right Whale Conservation Plan (2020 SARBO Appendix F), USACE would reduce vessel traffic when and where NARW may be found. Specifically, in the 2020 SARBO, Avoidance Measure NARW.1 states, “Hopper dredging and projects requiring survey vessels over 33-ft in length will be scheduled, to the maximum extent practicable, outside of North Atlantic right whale migration and calving season to avoid impacts to North Atlantic right whales, including reproducing females and newborn calves.” Under Alternative 4, the Corps would to the extent practicable schedule dredging activities outside the NARW migration and calving season for work that includes vessel traffic from dredging considered in this document to the ODMDS.

The 2020 SARBO Section 6.1.1, lists the navigation channels that USACE had proposed to be dredged in warmer months and were analyzed by NMFS (that is, Brunswick Harbor, Savannah Harbor, Charleston Harbor, Wilmington Harbor Entrance/Inner Ocean Bar, Morehead City, and Manteo Entrance Channel). Under the North Atlantic Right Whale Conservation Plan (2020 SARBO Appendix F), USACE would reduce vessel traffic when and where NARW may be found. Specifically, in the 2020 SARBO, Avoidance Measure NARW.1 states, “Hopper dredging and projects

requiring survey vessels over 33-ft in length will be scheduled, to the maximum extent practicable, outside of North Atlantic right whale migration and calving season to avoid impacts to North Atlantic right whales, including reproducing females and newborn calves.” Under Alternative 4, the Corps would to the extent practicable schedule dredging activities outside the NARW migration and calving season for work that includes vessel traffic from dredging considered in this document to the ODMDS..

Entangling is another leading cause of death for this species and the reason the 2020 SARBO requires all lines associated with work on a project to be non-entangling.

Atlantic sturgeon

Under this alternative, the risk assessment process would take into account sturgeon presence when determining the dredge window and other minimization measures such as relocation trawling and bed-leveling. Relocation trawling during winter months has resulted in the relocation of high numbers of Atlantic sturgeon in some areas, including 79 Atlantic sturgeon relocations in Brunswick Harbor between January 18 to March 18, 2018. In Savannah Harbor, 41 Atlantic sturgeon were relocated between November 30, 2017 to April 1, 2018. In general, the number of sturgeon in many entrance channels is much larger in the winter than it is during the summer. While relocation trawling can be used as minimization measure to reduce lethal take of sturgeon, there is still minimal risk of mortality as discussed in Section 6.1.4 of the 2020 SARBO and relocation is stressful to sturgeon and may result in decreased ability to weather other stresses. Under this alternative, the Corps through the risk assessment process, may adjust the timing of each dredge event to avoid those times when sturgeon may be most abundant in the entrance channel.

Sea Turtles

Under the 2020 SARBO, species are appropriately managed at the regional level, as all move throughout the South Atlantic. Under the 2020 SARBO, the annual allowed take for loggerhead sea turtles is similar to what it was under the 1997 SARBO. Specifically, the 1997 SARBO evaluated the loss of 35 loggerhead sea turtles annually (observed lethal take). The 1997 SARBO did not account for unobserved take, as that was not common practice at that time. The 2020 SARBO evaluated loggerhead sea turtle take including 107 observed lethal takes + 107 unobserved lethal takes per 3 consecutive year period to account for annual variation as is now common in their biological opinions. For context, 107 observed lethal takes per three years is an average of 35.6 observed lethal takes per year, essentially the same as the allowed take in the 1997 SARBO. Since 1997, the maximum recorded observed lethal loggerhead sea turtle take was 18 in one year with an average of 9 observed lethal loggerhead lethal take per year. USACE has and will continue to closely monitor all take (lethal and non-lethal) and adjust dredging operations or cease dredging as deemed appropriate based on multiple considerations. USACE would not and could not allow a single project to use all take covered since it must manage all USACE navigation projects as well as Corps regulatory actions covered under the 2020 SARBO. Therefore, this alternative would not

result in any additional lethal take than what would occur under the historic winter windows of the NAA.

During the risk assessment process, the Corps would consider the impacts to sea turtles that may occur in different seasons. NAA and Alternatives 1,2, and 3 address impacts from conducting dredging in the fall, winter and summer months. As described under those alternatives, there are risks associated with each of the seasons, including the historic winter window. Analysis in the NAA indicates that the historic winter window may not be the most protective of sea turtles. Moving work outside the winter window may slightly increase risk as more sea turtles may be in the area in the spring, summer or fall because sea turtles are more abundant in the study area during warmer months. However, as analyzed under Alternative 3, impacts from dredging in the warmer months in Brunswick Harbor may result in fewer or similar impacts to sea turtles as the historic winter window and as summarized in Alternative 3, hopper dredging has been successfully done in other areas when sea turtle abundance was high and did not result in sea turtle take by hopper dredging or take was not higher than timeframes when turtle abundance was low. As indicated under NAA and Alternative 1, spring may have the most risk for take as it coincides with northern migration, and indeed historic dredging indicates 60 percent of take in March. Fall may also represent greater risk as it is coastal migration season for sea turtles. Timing consideration is an important aspect of the risk assessment process in the 2020 SARBO, and under this alternative, through the risk assessment and management process, the Corps would continue to monitor take by area and time of year and work with turtle experts to better understand these movement patterns to adjust the timing for maintenance dredging to reduce the risk of take.

A study conducted by GA-DNR indicates that loggerhead turtles exhibit extremely high intra-seasonal nest site fidelity (Shamblin et al. 2017). Forty seven percent (47%) of NRU loggerhead nesting females used 5 km of beach or less for nesting and 73% used less than 20 km. This data does indicate that at least a portion of the population may use a wider range of nesting areas. If 74% are within 20 km then the remaining 26% range even further and likely will help to ensure nesting over the full range over time even if individual members are lost in a specific location for any reason including natural ones such as lost nests during hurricanes, etc. Additionally, it is not clear that the data support that a sea turtle take in a specific location like Brunswick Harbor are always associated with a nearby beach. The turtle could be passing through and be one that nests in another state. Therefore, the loss of that individual or individuals in the harbor are not likely going to disproportionately change the local population unless they are all residents. This same analysis also seems to indicate that there are more loggerhead females than previously thought (GADNR 2020) See “Assessment of the demographic recovery criteria for the Northern Recovery Unit of loggerhead turtles (*Caretta caretta*) using genetic mark-recapture including implementation of high priority recovery actions.” Grant Number: NA16NMF4720076. Project Duration: July 1, 2016 – June 30, 2020).

NMFS recently completed a biological opinion for the Southeast U.S. shrimp fisheries: NMFS Reinitiation of Endangered Species Act (ESA) Section 7 Consultation on the

Implementation of the Sea Turtle Conservation Regulations under the ESA and the Authorization of the Southeast U.S. Shrimp Fisheries in Federal waters under the Magnuson-Stevens Fishery Management and Conservation Act (MSFMCA), NMFS Tracking Number SERO-2021-00087. According to the 2021 NMFS biological opinion for the shrimp fisheries: “NMFS (2009) estimated the minimum adult female population size for the NWA DPS22 in the 2004-2008 time frame to likely be between approximately 20,000-40,000 individuals (median 30,050), with a low likelihood of being as many as 70,000 individuals. NMFS (2011a) preliminarily estimated the loggerhead population in the Northwest Atlantic distinct population segment (NWA DPS) along the continental shelf of the Eastern Seaboard during the summer of 2010 at 588,439 individuals (estimate ranged from 381,941 to 817,023) based on positively identified individuals, with the possibility of increasing to approximately 801,000 individuals when including data on unidentified sea turtles that were likely loggerheads. This is an underestimate of the total population of loggerheads since it did not include Florida’s east coast south of Cape Canaveral or the Gulf of Mexico, which are areas where large numbers of loggerheads can also be found. In other words, it provides an estimate of a subset of the entire population. These numbers were derived prior to additional years of increased nesting.” (NMFS 2021)

NMFS (2021) states in the status of species section that loggerhead sea turtles in the northern recovery unit (NRU) “are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, GADNR press release, <http://www.georgiawildlife.com/node/3139>). South Carolina and North Carolina nesting have also begun to shift away from the past declining trend. Loggerhead nesting in Georgia, South Carolina, and North Carolina all broke records in 2015 and then topped those records again in 2016. Nesting in 2017 and 2018 declined relative to 2016, back to levels seen in 2013 to 2015, but then bounced back in 2019, breaking records for each of the three states and the overall recovery unit.” Loggerhead nesting totals for the NRU are provided in the table below (NMFS 2021).

Table 27. Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets compiled at Seaturtle.org).

Nests Recorded				
Year	Georgia	South Carolina	North Carolina	Totals
2008	1,649	4,500	841	6,990
2009	998	2,182	302	3,472
2010	1,760	3,141	856	5,757
2011	1,992	4,015	950	6,957
2012	2,241	4,615	1,074	7,930
2013	2,289	5,193	1,260	8,742
2014	1,196	2,083	542	3,821

2015	2,319	5,104	1,254	8,677
2016	3,265	6,443	1,612	11,320
2017	2,155	5,232	1,195	8,582
2018	1,735	2,762	765	5,262
2019	3,945	8,774	2,291	15,010
2020	2,786	5,551	1,335	9,672

Given the above information – the increased number of loggerhead sea turtles and their ability to nest along the southeast coast – the impact to loggerhead sea turtles from utilizing any of the possible minimization measures (including dredging outside the traditional windows) is not expected to significantly impact sea turtle species especially since the total lethal take limit for all projects covered under the 2020 SARBO is limited to 107 observed lethal loggerhead take per three-year period (approximately 35 per year consistent with the 1997 SARBO) and USACE has a long history of managing hopper dredging projects without excessive take. Since 1997, no more than six observed lethal loggerhead sea turtle takes have occurred at a single project covered under SARBO. No more than four observed lethal take have occurred at Brunswick in any given year since 1997

In summary, under this alternative the Corps would fully implement the 2020 SARBO, which offers the flexibility to continue to adjust project timing, equipment options, and minimization measures covered under 2020 SARBO to adjust projects to continue to try to reduce risk to all species based on an increased understanding of species and risk year after year. Continued research increases the understanding of species use of areas and risk from projects and how these continue to change based on factors such as extreme weather events like hurricanes and climate change. Implementation of Alternative 4 would not result in significant impacts to ESA-listed species, as the Corps would comply with all applicable PDCs in the 2020 SARBO, and use the risk assessment and management process to reduce risk to all species.

5.6 Air Quality

5.6.1 Environmental Consequences for Project Improvements

FWOP/NAA

O&M dredging would continue under the FWOP, O&M dredging is not expected to adversely affect air quality in the study area. With respect to air quality and vessel traffic, the economic forecast anticipates that the frequency of vessels calling on Brunswick Harbor will increase during the period of analysis. Under the FWOP, the transportation efficiencies as proposed under the action alternatives would not occur, which may have a negligible adverse effect on air quality due to idling ships or ships remaining longer in the channel.

Alternative 5

With implementation Alternative 5, air quality will remain unchanged as no dredging beyond existing O&M would occur. With respect to air quality and vessel traffic, the economic forecast anticipates that the frequency of vessels calling on Brunswick Harbor will increase during the period of analysis, given the limited transportation efficiency

benefits that would be realized under this alternative, nominal beneficial effects to air quality may occur. Therefore, under Alternative 5, no effects to air quality are anticipated.

Alternatives 2, 3, 4, 6, 7, 8 & 9

With implementation of the above Alternatives, minor temporary adverse impacts to air quality will occur during the approximately one-year construction period. The study area is currently an air quality attainment area and neither the new work project nor future O&M dredging would change this designation. During the study analysis period, it is anticipated that number of vessels calling on the Port of Brunswick is expected to increase. Transportation efficiencies that would be realized through the implementation of these action alternatives may have a minor beneficial effect on air quality, as vessels would move more efficiently through the harbor and navigation channel and reduce sources of mobile air pollutants.

5.6.2 Environmental Consequences for O&M Alternatives

FWOP/NAA and Action Alternatives

Neither the NAA nor the action alternatives would increase annual maintenance activities. While changes to the timing of when hopper dredging may occur are proposed under the action Alternatives, these changes would not increase maintenance activities, as they would not affect the annual amount of maintenance material dredged. Therefore, there would be not be a significant effect to air quality from continued O&M dredging as described in the NAA and Action Alternatives.

5.7 Water Quality

5.7.1 Environmental Consequences for Project Improvements

FWOP/NAA

Under the NAA, O&M dredging to maintain the currently authorized depth would continue. As the navigation channel configuration would not change, there would be no effect to water quality from the FWOP. This amount includes approximately 390,000 cubic yards in the inner harbor reach and 1,219,000 cubic yards in the outer harbor or entrance channel. Inner harbor dredged material is disposed of in the Andrews Island DMCA and outer harbor dredged material is disposed of in the Brunswick ODMDs. O&M dredging, using all dredge types including cutterhead, clamshell, and hopper dredges, will occur annually as needed based on shoaling rates. Dredging activities can affect salinity, turbidity, and dissolved oxygen levels, with primary concern for turbidity and dissolved oxygen levels. Effects from continued O&M are analyzed in Section 1.9.10.

Alternative 5

Under Alternative 5, no physical modifications to the channel are proposed and no impacts to water quality are anticipated.

Future Conditions with Alternatives 2, 3, 4, 6, 7, 8 & 9

Alternatives 2, 3, 4, 6, 7, 8, and 9 are comprised of alternatives that are both stand-alone and in combination. With implementation of the above alternatives, minor temporary adverse impacts to water quality will occur during the approximately one-year construction period.

The project proposes to use hydraulic pipeline cutterhead dredging to implement the proposed action. In general, cutterhead dredges utilize the rotational motion of the cutterhead to size and move the material towards the dredge suction inlet and the dredging cutterhead is not operated until it is fully embedded in the sediment. While this dredging method may create a small turbidity plume, the plume is expected to be localized around the dredging head. Dredged material is then efficiently piped away to a placement area without having to transfer the material up through the water column in a bucket or to an offshore location. Cutterhead dredging pumps near-surface water to the cutterhead blade to improve excavation efficiencies and material recoveries. This action draws in a portion of the more oxygen rich surface water and moves it to the sea floor where DO levels typically are lower. A recent study (USACE 2019b) measuring changes in DO around a cutterhead dredge in the Savannah River noted that the greatest increase in DO occurred in the bottom third of the water column where the cutterhead was operating. Changes in DO in the bottom of the water column were most notable within 50 meters downstream of the dredge and returned to background levels within 100 meters of the dredge. All changes occurred directly downstream and did not extend the width of the river.

In a similar Savannah River study, ERDC (ERDC, 2019) reported that the cutterhead dredge *Hampton Roads* pumped 480-700 gallons per minute of water from 0.7 meters depth down to the cutterhead operating at the river bottom. Because of the very small footprint where the cutterhead dredge is removing sediment once embedded, the area of higher turbidity and lower DO are localized and normalize quickly in riverine environments once dredging activities are concluded. Most of the study area is open water that receives semi-diurnal tidal flushing from St. Simons Sound. As a result, the water in the harbor is well-mixed with a relatively uniform salinity, DO, and other important water quality parameters. Any impacts to water quality would be temporary and minimal, and project impacts are considered discountable and insignificant.

Andrews Island DMCA: Effluent from Andrews Island would be discharged into the East River and Turtle River in accordance with Section 401 and Section 303 of the CWA WQC and monitoring rules (GA-EPD 2020). The effluent could contain sediments that in turn could be released into the East River and Turtle River and subsequently deposited in habitat located downstream. However, once the dredged material is placed, the sediments can settle out before the effluent is discharged into the river. As a result, most of the sediment remains within the DMCA and would not be discharged with the effluent or enter the water column. As a condition of the GADNR-EPD issued 401 WQC, sediment proposed to be dredged in the bend widener and turning basin were analyzed for contaminants. Results show that placement of the proposed dredged sediments into

the Andrews Island DMCA is not expected to result in any release which may cause a violation of state water quality standards or impact the aquatic ecosystem (See Appendix L). The amount of effluent that would be discharged into the East River and Turtle River would be minimal compared to the volume of water currently within the river. Any suspended solids within the effluent would be diluted in the water column (GPA 2015). Additionally, the Corps would follow the terms and conditions outlined in the most recent WQC which is the October 26, 2020 401 WQC . Based upon the project design and the minimal short-term impacts associated with the dredging, there would be no long-term impacts to water quality, and only short-term negligible impacts.

5.7.2 Environmental Consequences for O&M Alternatives

NAA

Under the NAA, O&M dredging to maintain the currently authorized depth would continue. This amount includes approximately 390,000 cubic yards in the inner harbor reach and 1,219,000 cubic yards in the outer harbor or entrance channel. Inner harbor dredged material is disposed of in the Andrews Island DMCA and outer harbor dredged material is disposed of in the Brunswick ODMDs. O&M dredging, using all dredge types including cutterhead, clamshell, and hopper dredges, will occur annually as needed based on shoaling rates. Dredging activities can affect salinity, turbidity, and dissolved oxygen levels, with primary concern for turbidity and dissolved oxygen levels.

Turbidity

The suspension of sediment in the water column during dredging and material placement can result in increased turbidity in the area. The type of dredging equipment used can result in varying levels of turbidity, total suspended solids, and sedimentation. Dredging equipment is generally designed to scoop (e.g., mechanical dredges such as clamshell and bucket dredges), suction up (e.g., cutterhead pipeline and hopper dredges), or to smooth over/level out sediments (e.g., bed-leveling). The placement method of dredged sediments can also affect turbidity such as hopper dredge overflow that allows water to run off of the sediment collected in the hopper, effluent from DMCA, and bottom dump into the ODMDs. Generally dredging and material placement-generated turbidity plumes are limited to an area only a few hundred feet to a few thousand feet and most turbidity settles out quickly once dredging or material placement is complete (2020 SARBO Section 3.1.1.2, p.96).

The distance suspended solids can travel outside of the project footprint can vary dramatically depending on the density of the suspended solids (generally referred to as the percent of fines in the material) and local hydrographic patterns, such as the local tides and currents. The velocity of water movement in the area can affect the time that suspended solids remain in the area. For example, riverine environments with an outgoing tide will flush away turbidity quicker than areas with less current such as an estuary with limited tidal flushing. In rivers, the currents also act to compress the turbidity plume as it moves downstream and settles, reducing the overall area/volume affected by it (2020 SARBO Section 3.1.1.2, p.97).

Inner Harbor

The inner harbor is open water that receives semi-diurnal tidal flushing from St. Simons Sound. As a result, the water in the harbor is well-mixed, and tidal flushing flushes away any turbidity plumes created by dredging. The areas of higher turbidity are localized and normalize quickly in riverine environments once dredging activities are concluded. Additionally, within the inner harbor/Cedar Hammock Range, there is 5 minute overflow restriction for hopper dredging, this restriction further minimizes any impacts to turbidity. Any turbidity impacts from maintenance dredging within the inner harbor are temporary and minor.

Entrance Channel

Entrance channel is open water and subject to wave action and ocean currents. Any turbidity plumes created by maintenance dredging in the entrance channel quickly disperse, and impacts are temporary and minor.

Andrews Island DMCA

Suspended particulate and turbidity levels are expected to undergo minor increases during dredging activities and effluent discharge; however, suspended sediment will quickly fall out of the water column and return to normal conditions. Effluent from Andrews Island would be discharged into the East River and Turtle River in accordance with Section 401 and Section 303 of the CWA WQC and monitoring rules (GA-EPD 2020). The effluent could contain sediments that in turn could be released into the East River and Turtle River and subsequently deposited in habitat located downstream. However, once the dredged material is placed, the sediments settle out before the effluent is discharged into the river. As a result, most of the sediment remains within the DMCA and would not be discharged with the effluent or enter the water column. The Corps was recently issued a new CWA 401 WQC, which included conditions for effluent from Andrews Island DMCA. The Corps will follow these conditions, and maintenance dredging is not expected to violate any State water quality certification conditions.

ODMDS

Turbidity at the ODMDS can be substantial during placement operations. However, wave action and ocean currents at the placement site disperses sediments, and the area would normalize quickly. Turbidity impacts would be temporary and localized, and no significant effects are anticipated to resources in the area. Impacts to aquatic resources, EFH and protected species are addressed in separate sections in this chapter. Because of the localized temporary nature of the turbidity impacts, no significant effects to these resources are anticipated.

Dissolved Oxygen

Maintenance dredging can temporarily impact dissolved oxygen levels at the site of the active dredging. Generally, dredging is believed to reduce dissolved oxygen levels as it disperses sediment in the water column, thereby increasing sediment oxygen demand. Impacts to dissolved oxygen are therefore expected to be similar as described for turbidity. A recent study conducted by USACE for both hopper dredging and mechanical

dredging indicates that dredging has minimal impacts on DO levels (ERDC 2020). As noted above for turbidity, turbidity is expected to disperse quickly due to tidal flushing in the inner harbor and wave and ocean currents in the entrance channel. Therefore, any impacts to dissolved oxygen are similar to turbidity; localized, temporary and minor.

Overall, any impacts to water quality would normalize quickly at the conclusion the maintenance dredging and dredged material placement. Because of the vintage nature of the 1998 CWA 401 WQC issued by Georgia Environmental Protection Division, a new 401 WQC was issued on October 26, 2020. Terms and conditions of the October 2020 401 WQC would be followed for any O&M dredging. Therefore, overall impacts from maintenance dredging in the NAA are temporary and minor.

Actions Common to All O&M Action Alternatives

Under all alternatives, the Corps would use relocation trawling as a minimization measure as determined appropriate during the risk assessment for each dredging event. Relocation trawling may result in increased localized turbidity in the inner harbor and entrance channel. The inner harbor is open water that receives semi-diurnal tidal flushing from St. Simons Sound. As a result, the water in the harbor is well-mixed, and tidal flushing flushes away any turbidity plumes that may be created by relocation trawling. Entrance channel is open water and subject to wave action and ocean currents. Any turbidity plumes created by relocation trawling in the entrance channel would quickly disperse. Any impacts from turbidity would minor as they would temporary and localized. Relocation trawling may reduce dissolved oxygen levels as it disperses sediment in the water column, thereby increasing sediment oxygen demand. Impacts to dissolved oxygen are therefore expected to be similar as described for turbidity, temporary and localized. Therefore, any impacts to water quality from relocation trawling would not be significant.

O&M Action Alternative 1

As described under the NAA, dredging activities can affect salinity, turbidity, and dissolved oxygen levels. As the action alternative would not result in changes to dredging practices as compared to the NAA, including the timing of when hopper dredging may occur, the impacts to water quality would be the same as those described under the NAA.

Overall, any impacts to water quality would normalize quickly at the conclusion the maintenance dredging and dredged material placement. Because of the vintage nature of the 1998 CWA 401 WQC issued by Georgia Environmental Protection Division, a new 401 WQC was issued on October 26, 2020. Terms and conditions of the October 2020 401 WQC would be followed for any O&M dredging. Therefore, overall impacts from maintenance dredging under this alternative would be temporary and minor.

O&M Action Alternative 2

Impacts to water quality would be similar as described under the NAA and Alternative 1. As this alternative would not change the frequency or duration of dredging and would be conducted using same means and methods as the NAA and Alternative 1, impacts to water quality would be the same as described under NAA and Alternative 1, any impacts to turbidity and dissolved oxygen would be temporary, localized and minor. The extended window would not result in a longer duration for dredging, would just provide flexibility for when dredging may occur, as this window begins in the fall and concludes in the spring, increased impacts to dissolved oxygen impacts would not be expected as the window is outside the warmer months when dissolved oxygen levels are low.

Overall, any impacts to water quality would normalize quickly at the conclusion the maintenance dredging and dredged material placement. Because of the vintage nature of the 1998 CWA 401 WQC issued by Georgia Environmental Protection Division, a new 401 WQC was issued on October 26, 2020. Terms and conditions of the October 2020 401 WQC would be followed for any O&M dredging. Therefore, overall impacts from maintenance dredging under this alternative would be temporary and minor.

O&M Action Alternative 3

Under this alternative, the Corps would conduct hopper dredging during the warmer summer months in the entrance channel and Cedar Hammock Range. O&M dredging in the inner harbor would be similar as described under the NAA and impacts to water quality from O&M dredging the inner harbor would be the same as described under the NAA. Therefore, the impacts to water quality in this section will focus on impacts that may occur from hopper dredging in the summer months.

Dredging during the warmer months may result in effects to dissolved oxygen, as warmer temperatures increase biological activity resulting in higher dissolved oxygen demands, and naturally lower dissolved oxygen levels. Hopper dredging during warmer months may occur in the Cedar Hammock Range and in the open water of the entrance channel.

To better understand how dredging during summer months may impact turbidity and dissolved oxygen, the Corps' ERDC performed water quality sampling during a hopper dredge event in the summer months of 2020, which measured turbidity and DO levels in the Beaufort Inlet in South Carolina. Sampling units (EXO sondes) set up within the channel limits at various depths and distances continuously recorded data as the dredges moved and as tides shifted. The water quality sampling in Beaufort Inlet occurred during July 2020 as a result of the resource agencies authorizing one-time hopper dredging outside of the 1 December – 15 April window for the Regional Hydraulic Dredge Contract (RHDC). A member of the ERDC team measured turbidity plumes and DO levels at various depths adjacent to the active hopper dredge for several days. The Beaufort Inlet study reported negligible increases in turbidity and negligible decreases in DO; observed turbidity that was elevated up to 11 Nephelometric Turbidity Units (NTU) that dissipated within 10 minutes. Dissolved

oxygen observed very minor decreases for less than 4 minutes and never dropped below 6 mg/L (USACE ERDC, 2020).

ERDC also sampled turbidity and DO levels in the Cape Fear River adjacent to an active mechanical dredge. Water quality studies occurred in January and July 2020 and did not observe any notable decreases in DO from mechanical clamshell dredging either time. The January sampling occurred in an area of relatively lower flows with silty-clay sediment which is sometimes anoxic. There was a drop in dissolved oxygen during the tide change; however, DO never dropped to a level that would be deleterious to aquatic organisms in the area. The July data were taken during the summer when DO mg/L is typically lowest throughout the year. The July sampling was conducted where sediments were mostly sand which are rarely anoxic. DO never decreased below 4.8mg/L (75% saturation) around the dredge during sampling operations which is over 2-times greater than values that are considered problematic (2.0mg/L) for sturgeon.

While conditions in Brunswick Harbor are not identical to Cape Fear or Beaufort Inlet, many conditions are similar; southeast coastal systems that subject to tidal flushing and experience lower DO levels during warmer months because of higher biological oxygen demand. Both the Savannah River 2019 ERDC cutterhead dredge DO study (see summary in section 5.7.1) and the 2020 ERDC studies summarized above³ demonstrate negligible decreases in DO and increases in turbidity resulting from dredging. The 2020 ERDC study further demonstrates that dredging in warmer summer months is also expected to have negligible impacts to DO.

Overall, the proposed changes to maintenance dredging, notably conducting maintenance dredging in the warmer months, are not expected to have significant adverse effect, as water quality would normalize quickly at the conclusion of the O&M dredging, and there is not expected to be an appreciable difference from the NAA. Additionally, the Corps would follow the terms and conditions outlined in the most recent CWA 401 WQC issued in October 26, 2020.

O&M Action Alternative 4

Under Alternative 4 continued O&M would fully utilize the minimization measures in the 2020 SARBO, and as noted in Section 4.9 of this report, this would result in using the risk assessment and management approach to determine the best time of year to accomplish dredging, including the possible use of hopper dredging during any time of year. Determination of the type of dredge equipment and timing of dredging would use the risk assessment and management process outlined in Section 2.9.2.2 of the 2020 SARBO. However, dredging means and methods would be expected to be similar to that of the NAA, including the duration and frequency of annual maintenance dredging and equipment type based on reach. O&M dredging in the inner harbor is not constricted to a seasonal window and means and methods for dredging would be similar as described under the NAA; impacts to water quality from O&M dredging the inner harbor would be the same as described under the NAA, temporary, localized and minor. Therefore, impacts to water quality in this section will focus on impacts that may

occur from hopper dredging at any time of year in the Cedar Hammock Range and in the open water of the entrance channel and ODMS.

NAA, Action Alternatives 1 and 2 describe impacts that could occur in fall, winter and spring and Action Alternative 3 describes impacts that could occur during warmer summer months. As conducting hopper dredging during the warmer summer months is anticipated to be most impactful activity to water quality, it is assumed that conducting hopper dredging at other times of year would have less of an impact. As described under Action Alternative 3, dredging in warmer summer months is expected to have negligible impacts to DO and turbidity.

Overall, the proposed changes to maintenance dredging, notably conducting maintenance dredging at any time of year, are not expected to have significant adverse effect, as water quality would normalize quickly at the conclusion of the O&M dredging, and there is not expected to be an appreciable difference in impacts from the NAA. Additionally, the Corps would follow the terms and conditions outlined in the most recent WQC which is the October 26, 2020 401 WQC.

5.8 Cultural Resources

5.8.1 Environmental Consequences for Modification Alternatives

FWOP/NAA

With implementation of this alternative, no impacts to cultural resources or historic properties are anticipated. Standard operations currently in place would continue and no ground disturbing activities would occur. O&M dredging that would occur would be carried out within the navigation channel in previously disturbed areas. No new placement areas would be required for the dredged material. Upland placement would consist of material placed into Andrews Island DMCA. Andrews Island DMCA has been used for dredge material placement since 1961. Use of this area would have no anticipated impacts to cultural resources. Remote sensing surveys and diver identifications of anomalies performed in 1997, 2007, and 2017, identified no cultural resources of significance. Although additional cultural resource investigations are not considered necessary due to a lack of cultural resources identified in this area that would be adversely affected, surveys will be conducted in accordance with the PA to ensure Section 106 compliance. A low likelihood of previously unidentified cultural resources is anticipated based on the results of past surveys in the area (Tuttle and James 1999, Watts et al. 2017). If unanticipated cultural resources are identified during these surveys, little to no effects are still anticipated.

Alternative 2

Implementation of Alternative 2 has the potential to cause negative impacts to cultural resources. Dredging impacts on submerged cultural resources can be classified as direct and indirect. Direct impacts are associated with damage caused by the dredging equipment itself. While the most destructive impacts would be related to cutterhead damage, submerged cultural resources and wreck remains could also be negatively

impacted by the mooring and anchoring of the dredge. Dredging in undisturbed deposits in the area around the bend widener would have the potential to cause direct negative impacts to submerged cultural resources, such as shipwreck remains and prehistoric archaeological sites. Indirect impacts would be associated with exposure or burial of submerged cultural resources and shipwreck remains.

Section 2.10 contains a list of shipwrecks that have been identified as lost in the Brunswick area that date back to the colonial era. As the exact locations of these wrecks are unknown, there is high potential that unrecorded resources exist in the APE. Remote sensing surveys (side scan sonar and magnetometer) of the proposed areas will be conducted in accordance with the PA executed between the Corps and the GA HPD (Appendix H). The agreement contains mitigation strategies that would be carried out if any NRHP-eligible resources are located that cannot be avoided through design modification or refinement. Execution of the PA ensures that impacts to cultural resources would have minor effects.

Dredged material would be disposed of in an upland placement area (i.e., the existing Andrews Island upland placement area). Placement of dredged material has the potential to bury cultural resources. Burial from sedimentation could have both positive/beneficial and negative impacts. Sediments placed on top of archaeological sites could result in in-situ preservation of the resource. Negative impacts would occur as the resource would no longer be easily accessible for scientific research or investigation.

The non-Federal sponsor owns the parcel proposed for the staging area and no cultural resources investigations would be required to use the parcel as it has been used previously and no impacts to cultural resources are anticipated with continued use. Should other staging areas be identified through design and alternative refinement, cultural resources background research and investigations would be carried out in accordance with the PA during PED if the area had not been used previously.

Alternative 3

Implementation of Alternative 3 would result in the same types of impacts from dredging as described in Alternative 2. Two anomalies with signatures indicative of cultural resources were located in 1997 by Panamerican Consultants Inc. (Tuttle and James 1999) in an area adjacent to the existing turning basin. Surveys to relocate and assess these anomalies, including diver investigation, would be carried out in accordance with the PA executed between the Corps and the GA HPD. Surveys would also be conducted in areas where dredging will occur, including a buffer area for mooring and anchoring. NRHP-eligible resources would be avoided if possible, or mitigated in accordance with the PA.

Impacts associated with placement of dredged material would be the same as described in Alternative 2 due to the fact that the same areas would be used.

Impacts associated with the staging area would be the same as described in Alternative 2.

Alternative 4

Implementation of Alternative 4 would result in the same types of impacts from dredging as described in Alternative 2. Remote sensing surveys would be conducted of the areas that would be dredged, including a buffer area for mooring and anchoring. NRHP-eligible resources would be avoided if possible, or mitigated in accordance with the PA.

Impacts associated with placement of dredged material would be the same as described in Alternative 2 due to the fact that the same areas would be used.

Impacts associated with the staging area would be the same as described in Alternative 2.

Alternative 5

Implementation of this alternative has the potential to cause negative impacts to cultural resources. The potential for negative impacts is low due to the fact that no dredging would be required or conducted as this area is in naturally deep water and there is sufficient depth for vessels to navigate. However, there could be effects from increased wave action that may impact cultural resources on the shoreline and underwater near the vicinity of the expanded Federal channel. For these reasons, remote sensing surveys would be conducted of the areas that would become part of the Federal channel, including a buffer area to account from increase vessel wave impacts. NRHP-eligible resources would be avoided if possible, or mitigated in accordance with the PA.

Alternative 6

Implementation of Alternative 6 would result in the same types of impacts from dredging as described in Alternative 2. Remote sensing surveys to relocate and assess these anomalies, including diver investigation, would be carried out in accordance with the PA executed between the Corps and the GA HPD. Remote sensing surveys would be conducted of the areas that would be dredged, including a buffer area for mooring and anchoring. NRHP-eligible resources would be avoided if possible, or mitigated in accordance with the PA.

Impacts associated with placement of dredged material would be the same as described in Alternative 2 due to the fact that the same areas would be used.

Impacts associated with the staging area would be the same as described in Alternative 2.

Alternative 7

Implementation of this alternative would have the same impacts as described in Alternatives 2, 3, and 4 for dredging, placement of dredged material, and staging areas. Cultural resources investigations, avoidance, minimization, and mitigation would be conducted as detailed in Alternatives 2, 3, and 4 in accordance with the PA.

Alternative 8

Implementation of this alternative would have the same impacts as described in Alternatives 2, 3, and 5 for dredging, placement of dredged material, and staging areas. Cultural resources investigations, avoidance, minimization, and mitigation would be conducted as detailed in Alternatives 2, 3, and 5 in accordance with the PA.

Alternative 9

Implementation of this alternative would have the same impacts on cultural resources as described in Alternatives 2, 3, 4, and 5 for dredging, placement of dredged material and staging areas. Cultural resources investigations, avoidance, minimization, and mitigation would be conducted as detailed in Alternatives 2, 3, 4, and 5 in accordance with the PA.

5.8.2 Environmental Consequences for O&M Alternatives

O&M dredging, as described in the NAA and action alternatives would not result in impacts to cultural resources or historic properties, as there are no identified resources in this area. New resources may be identified during implementation of the proposed modifications. For any new resources, avoidance, minimization and mitigation would be conducted in accordance with the PA and would occur during implementation of the proposed modifications. Subsequent O&M would therefore have no impact to cultural resources, as appropriate measures to protect these resources would have occurred. Standard operations currently in place would continue. O&M dredging that would occur would be carried out within the navigation channel in previously disturbed areas. No new placement areas would be required for the dredged material. Upland placement would consist of material placed into Andrews Island DMCA. Andrews Island DMCA has been used for dredge material placement since 1961. Use of this area would have no impacts to cultural resources, nor would cultural resource investigations be necessary for the placement area. Any impacts from new work are as described in Alternatives 2-9, O&M dredging in the new work areas would not result in any additional impacts.

5.9 Recreation

5.9.1 Environmental Consequences for Project Improvements

Recreational vessels using Brunswick Harbor, St. Simons Sound, or the AIWW would not experience negative impacts from the FWOP/NAA or proposed modifications. Recreational vessels can easily avoid the areas proposed for dredging during their transits to and from the ocean. Alternatives would not impact areas that are known to be popular for recreational vessels to congregate. Most of the river and sound are navigable for recreational vessels, so transits are unlikely to be impeded during project construction. There will be no changes to recreational vessel use from the proposed modifications, and no impacts to recreation are anticipated.

As noted above, coastal Georgia is an important tourist area, with visitors enjoying the opportunity to view marine wildlife such as dolphins and sea turtles. As the Corps would comply with the environmental requirements in this EA, impacts to marine life that is

enjoyed by tourists would be minimized. Therefore, impacts to visitor experience of coastal Georgia is not anticipated.

5.9.2 Environmental Consequences for O&M Alternatives

The NAA or action alternatives for O&M would result in changes to dredging frequency or duration, nor would the channel prism be affected. For these reasons, impacts from O&M alternatives would be as described for the proposed modifications, with no impacts anticipated.

5.10 Aesthetics

5.10.1 Environmental Consequences for Project Improvements

With implementation of the FWOP/NAA and with Alternatives 2 through 9, aesthetics will remain the same. There are no upland projects proposed that would alter viewsheds in the study area. Vessels transiting the channel and dredging equipment are an expected part of the viewshed in the study area, and therefore the project would have no effect to the aesthetics of the area.

5.10.2 Environmental Consequences for O&M Alternatives

There will also be no changes to aesthetics from O&M dredging activities as described in the NAA and action alternatives, changing the timing of hopper dredging would not affect viewsheds in the area, as vessels and dredging equipment are an expected part of the viewshed.

5.11 Environmental Justice

Project Improvements and O&M Alternatives

Executive Order (E.O.) 12898 directs Federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. As none of the alternatives estimate any adverse human health or environmental effects, there would also be no adverse effects on minority or low-income populations. A breakdown of those potential populations is shown in Section 2.1.3.

5.12 Noise

5.12.1 Environmental Consequences for Project Improvements

FWOP/NAA and Alternative 5

With implementation of the NAA or Alternative 5 no impacts to current noise levels in the study area are expected. Annual O&M dredging would continue, and noise levels

associated with O&M dredging are consistent with background noise levels associated with vessel traffic in the channel.

Alternatives 2, 3, 4, 6, 7, 8 & 9

With implementation of the above alternatives, minor short-term negative impacts from noise during the approximately one-year construction period would be expected. Equipment used during construction would temporarily raise the noise level in the areas where dredging construction would occur. Construction equipment would be properly maintained to minimize these effects in compliance with local laws.

5.12.2 Environmental Consequence for O&M Alternatives

Subsequent O&M dredging associated with the new work is a nominal amount and would not result in additional impacts to noise levels associated with O&M dredging. As identified under the FWOP, no impacts to noise levels are expected from annual O&M dredging, as the annual amounts of O&M dredging would not increase with implementation of any of the action alternatives. Therefore, there would not be an increase in dredging activities or noise levels, and impacts would be negligible.

5.13 Hazardous, Toxic, and Radioactive Waste (HTRW)

5.13.1 Environmental Consequences for Project Improvements

Neither the FWOP/NAA nor action alternatives are expected to cause any of the local Toxic Release Inventory facilities to adversely impact the environment.

No significant changes have been made in Brunswick Harbor since the last Tier III sediment evaluation that would impact channel sediments. No new berths or terminals have been added; however, a permit has been issued to GPA for construction of a new berth at the existing Colonel's Island Terminal. The majority of recent changes in the harbor have been minor to moderate improvements to existing docks, infrastructure and parking facilities.

As a condition of the GADNR-EPD 401 WQC, sediment proposed to be dredged in the bend widener and turning basin were analyzed for contaminants. Results show that placement of the proposed dredged sediments into the Andrews Island DMCA complies with state water quality standards. Furthermore, sediment sampling of the proposed dredging reaches indicates that metals, chlorinated pesticides, total PCBs, and PAHs are below levels of concern (See Appendix L).

5.13.2 Environmental Consequences for O&M Alternatives

O&M dredging conducted under both the NAA and action alternatives is not expected to affect HTRW. O&M dredging equipment must follow guidelines for the safe operation of the equipment and must employ best management practices to prevent spills from equipment.

5.14 Climate Change

5.14.1 Environmental Consequences for Project Improvements

Climate change assessments are required for all phases of the project life cycle including feasibility and PED, for both existing and proposed projects. Because climate science is continuing to evolve, additional climate assessments may be performed during future project phases, which may include quantitative climate assessments on SLC and/or updated hydrology.

The proposed channel modifications were modeled in a 2D AdH modeling system and no increase in water levels or velocities throughout the channel were observed. Therefore, it is assumed that the channel modifications will not have an impact on water levels or velocities from the existing water level and therefore, SLR will have the same effect on the NAA as compared to the other alternatives. Comparison of water levels between alternative depths to the FWOP condition, using the low, intermediate, and high sea level rates, showed no difference due to the project modifications under any of the Alternatives.

5.14.2 Environmental Consequences for O&M Alternatives

O&M dredging under either the FWOP/NAA or action alternatives would maintain the authorized depth and therefore would have the effects as described for the modification alternatives.

5.15 Cumulative Impacts

As this study has been prepared in accordance with the CEQ regulations that were in place prior to September 2020, a cumulative effects analysis is included. The CEQ regulations (40 CFR 1508.7, prior to September 2020) require an analysis of the cumulative impacts resulting from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes these other actions. Cumulative effects are not caused by a single project but include the effects of a particular project in conjunction with other projects (past, present, and future) on the particular resource. Cumulative effects are studied to enable the public, decision-makers, and project proponents to consider the “big picture” effects of a given project on the community and the environment. In a broad sense, all impacts on affected resources are probably cumulative; however, the role of the analysis is to narrow the focus of the cumulative effects analysis to important issues of national, regional, and local significance (CEQ, 1997). This section addresses the cumulative effects arising from the alternatives being evaluated as part of this study when combined with other ongoing or proposed actions within and near the Brunswick Harbor study area.

Brunswick Harbor is a deep draft navigation harbor that serves three distinct commercial facilities. To maintain viable commercial navigation at the Port of Brunswick, dredging efforts, channel improvements, and other navigation works completed by the GPA as well as by the Corps are common occurrences. It is expected that in the future, additional dredging projects will occur as well as routine O&M dredging. Future dredging efforts are expected to be very similar in nature to current dredging. The future dredging for both new work and O&M efforts, in conjunction with the alternatives being evaluated as part of this study, are not expected to have any adverse cumulative impacts within the study area. Sufficient room exists in the Andrews Island DMCA for Federal dredging projects and additional O&M quantities are estimated to be minimal.

In addition to new work and maintenance dredging within Brunswick Harbor, the GPA is planning to construct a new pile-supported RO/RO berth which will involve dredging and impact approximately twelve acres of waters of the U.S. as part of the construction effort. The GPA worked with Corps Regulatory Division as well as State and Federal resource agencies to ensure the proper mitigation and monitoring plans were developed to minimize impacts to resources such as rare, threatened, and protected species, wetlands, EFH, air quality, water quality, etc. As a result, the construction and dredging efforts associated with future new berths, in conjunction with the alternatives being evaluated as part of this study are not expected to have any adverse cumulative impacts within the study area from a watershed and system perspective.

Within the Brunswick Harbor study area, there are also ongoing efforts associated with removing the MV Golden Ray. It is anticipated that removal will be complete by the end of 2021. It is not expected that any part of this removal effort will impact the Federal navigation channel and it is expected that the vessel would be removed before dredging and construction efforts associated with this study would begin. Protective measures in the form of air, species, and pollution monitoring activities are being implemented in a proactive manner to avoid, minimize, and/or mitigate adverse effects resulting from the vessel removal, including spill of hazardous material and disposal of debris. Because of the protective measures that are being implemented, the cumulative impacts associated with the removal efforts would possibly have temporary minor adverse effects. The adaptive management plan is used to adjust mitigation measures on-site and in real-time for fish, turtles, and marine mammals. Specific mitigation and monitoring measures are being implemented to address entanglement or entrapment risks during project implementation and adaptively managed through to completion.

No Action Alternative

With implementation of the NAA, standard O&M dredging operations at Brunswick Harbor would continue with no modifications to the Federal navigation channel and there would be no additional adverse cumulative impacts to aquatic resources, EFH, wetland habitat, water quality, air quality, or noise within the study area. Further, with implementation of the NAA, there would be no adverse cumulative impacts to cultural resources or historic properties. O&M dredging that would occur would be carried out within the navigation channel and at the ODMS in previously disturbed areas and

therefore impacts to cultural resources would remain low, as well as the risk of encountering new HTRW material.

No significant cumulative impacts associated with the No Action Alternative and other past, present, and foreseeable actions have been identified during this assessment.

Alternatives 2, 3, 4, 5, 6, 7, 8 & 9

Alternatives 2, 3, 4, 6, 7, 8, and 9 would all involve widening the existing Brunswick Harbor Federal navigational channel. With implementation of these alternatives, there would be minor and temporary impacts to air quality, water quality, noise, and aquatic resources within the immediate study area as a result of the dredging and construction efforts. It is expected that with implementation of the appropriate best management practices during construction, that the river system within the study area would recover very shortly after dredging and construction is completed. While Alternative 5 would result in widening of the authorized navigation channel, this alternative does not require any dredging, and cumulative impacts would be insignificant.

Regardless of the alternative selected, the Corps will comply with the relevant Project Design Criteria in Appendix B of the 2020 SARBO to avoid and minimize impacts to ESA listed species.

Additionally, it is anticipated that the cumulative impacts associated with EFH for the alternatives being evaluated are temporary and minimal. Within the study area, there are abundant areas of similar, shallow water habitat immediately adjacent to the proposed areas where dredging will occur. The temporary and minimal impacts associated with the proposed dredging activities will not reduce the quality or quantity of EFH within the study area and no adverse cumulative effects are expected to EFH from these alternatives.

With implementation of alternatives 2, 3, 4, 6, 7, 8, and 9, there is the potential to cause adverse effects to historic properties. Dredging in undisturbed deposits has the potential to cause direct adverse impacts to submerged cultural resources such as shipwreck remains and prehistoric archaeological sites. Surveys of the proposed areas will be conducted in accordance with the PA to be executed between the Corps and the GA HPD. NRHP-eligible resources would be avoided, if possible, or mitigated in accordance with the PA.

No significant cumulative impacts associated with the alternatives 2, 3, 4, 6, 7, 8, and 9, and other past, present, and foreseeable actions have been identified during this assessment. These alternatives were developed and evaluated using a systems and watershed context, and it is anticipated that implementation of these alternatives, including the recommend plan, will not cause any long-term impacts to the Brunswick Harbor system/watershed.

O&M Dredging

Cumulative effects from continued O&M would be similar as those described under action alternatives 2-9. However, the risk based, adaptive approach for minimizing effects to ESA-listed species would be able to utilize a range of minimization measures, resulting in potential long-term beneficial effects to all the ESA-listed species covered by the 2020 SARBO. As previously indicated, the 2020 SARBO allows for a risk assessment and management approach to maintenance dredging and adjustments to dredging practices as more information is learned about effects to all the ESA-listed species. This approach would result in long-term minimization of effects from maintenance dredging and other covered activities. The realization of these long-term benefits vary by degree with each of the alternatives considered. Under the NAA, the Corps would not be able to utilize all minimization measures available in the 2020 SARBO. Long-term adverse cumulative impacts to ESA-listed species may occur, as the risk based, adaptive approach to protection of the ESA-listed species covered under the 2020 SARBO would not be followed. Similarly, the dredging windows proposed in alternatives 1-3 would also limit the adaptive management approach and the full realization of the benefits that could occur under the complete applications of the risk-based assessment process described under Alternative 4 would not occur.

6. Recommended Plan

The USACE Vertical Team endorsed Alternative 8 as the recommended plan for modifications to the Brunswick Harbor, Georgia Project at the Agency Decision Milestone held on October 12, 2020. Once the recommended plan was selected, the Corps finalized engineering designs, developed a certified construction cost estimate, updated economic benefits and costs, and implementation requirements. Chapter 3 provides a description of the recommended plan. Further details can be found in technical appendices. USACE has also selected Alternative 4 as the preferred alternative for continued O&M.

6.1 Description of the Recommended Plan: Harbor Modifications

Alternative 8 is a combination of expanding the bend widener near Cedar Hammock Range, expanding the turning basin near Colonel's Island Terminal, and creation of a RO/RO vessel meeting area at St. Simons Sound. Alternative 8 includes dredging 205,000 cubic yards of material at the bend widener, 346,000 cubic yards at the turning basin expansion, and zero cubic yards at the meeting area at St. Simons Sound for a total of approximately 551,600 cubic yards of dredged material. Dredging will occur to a depth equal to the existing Federal channel (-36 feet MLLW + 2 feet allowable over-depth). Approximately 7,000 linear feet of channel would be dredged under the proposed action. The AAEQ benefit is \$2,956,000, AAEQ cost is \$632,000, and annual net benefit is \$2,324,000. The benefit-to-cost ratio is 4.7. Alternative 8 is the recommended plan. The non-Federal sponsor (GPA) supports this plan and there is no Locally Preferred Plan.

6.2 Description of the Preferred Alternative: Continued O&M

The Corps has selected Alternative 4 as the preferred alternative for continued O&M. Alternative 4 incorporates the 2020 SARBO and replaces the constraint of an environmental window for hopper dredging with the risk assessment and management process outlined in Section 2.9.2.2 of the 2020 SARBO. Using this risk based decision-making process, dredging will be allowed outside of the previously established seasonal dredging windows required in the 1997 SARBO. Use of the adaptive risk assessment process does not mean the Corps would dredge year-round or only exclusively during the summer months. Instead, it means that the risk-assessment approach will consider all factors to determine the most appropriate equipment to use and time of year to perform work based on the best available information with an emphasis on the protective of ESA-listed species covered under the 2020 SARBO.

6.3 Dredging and Dredged Material Management

A hydraulic pipeline cutterhead dredge will be used to widen the turning basin and bend widener. This is a conventional dredging method that is routinely used for deep draft navigation projects throughout the county. The dredge works using a rotating cutter

apparatus surrounding the intake of a suction pipe to cut and remove material. A detailed description of this type of dredge and its operation can be found in EM 1110-2-5025 (USACE, 2015). For future Operations and Maintenance (O&M) activities in the bend widener and turning basin a variety of dredging equipment could be used such as cutterhead, hopper dredge, and clamshell dredge dependent on the O&M requirements for the dredge cycle. Dredged material from the harbor improvements will be disposed of in the Andrews Island DMCA which has sufficient capacity for the 551,600 cubic yards plus approximately 17,000 cubic yards of annual O&M dredging (for at least 20 years). The current capacity of Andrew's Island is approximately 15.5 million cubic yards. The navigation improvements are expected to increase annual O&M dredging for Brunswick Harbor, Georgia Project by approximately 1%. This will include a minimal cost increase to annual O&M dredging (approximately \$150,000). Table 28 illustrates the relationship between the recommended plan and Brunswick Harbor Federal channel O&M dredging.

Table 28. Brunswick Harbor Federal Navigation Channel Dredging

Brunswick Harbor Dredging O&M dredging in relation to Recommended Plan Implementation	Cubic yards (yd³)
Proposed new work dredging (Recommended Plan – Alt 8)	551,600
Existing annual O&M dredging* that is disposed of in Andrews Island DMCA.	390,000
Estimate of O&M dredging that will be needed due to recommended plan implementation (additional material disposed of in Andrew's Island DMCA)	16,900
Estimate of future annual O&M dredging after recommended plan implementation that will be disposed of in Andrew's Island DMCA	406,900
Existing annual O&M dredging* that is disposed of in the offshore placement site	1,219,000
Estimate of total annual Brunswick Harbor Navigation Operations and Maintenance dredging (406,000 + 1,219,000)	1,625,000

* Average over 10-year period. Brunswick Harbor O&M dredging fluctuates on a yearly basis due to dredging needs and funding availability. On average, over a 10-year period, approximately 390,000 yd³ of material is dredged from the Brunswick Harbor Federal Navigational Channel and disposed of in the Andrews Island DMCA. This number fluctuates due to navigational needs. For instance, some years shoaling patterns are different due to events like severe storms and the navigation channel could require more or less dredging. Funding availability also impacts the rate and frequency of navigation channel dredging.

A 1% increase (16,900 yd³) to annual O&M dredging is expected due to implementation of the recommended plan.

It is the Corps of Engineers policy to accomplish the placement of dredged material associated with the construction or maintenance dredging of navigation projects in the least costly manner. Placement is to be consistent with sound engineering practice and meet all Federal environmental standards including the environmental standards

established in Section 404 of the Clean Water Act of 1972 or Section 103 of the MPRSA, as amended. This constitutes the base placement plan for the navigation purpose. The current Dredge Material Management Plan (DMMP) was developed during the previous harbor deepening in 1998 (USACE – SAS, May 1998). Currently, no plans are underway to update the DMMP as sufficient capacity exists for the next 20 years.

Upland Placement

Upland placement will consist of dredged material pumped into Andrews Island DMCA, an existing placement area typically used for placement of sediments removed during O&M dredging of Brunswick Harbor. The area is completely diked and covers about 770 acres. There are five existing weirs in the placement area. The main weir consists of three 48-inch weirs side-by-side which are connected to one 60-inch HDPE outfall pipe which discharges to the East River. The other two 48-inch weirs are currently not in use for maintenance dredging but are available after ditching is performed to allow water to flow to them.

Weir #3, located on the northwest corner of Andrews Island DMCA, was used during the previous Brunswick Harbor deepening, at which time GADNR-CRD noted erosion of approximately a half-acre of salt marsh. The Corps acknowledges that all weirs should operate in a manner that does not exacerbate erosion issues and does not expect additional erosion as a result of this project. In response to concerns from GADNR-CRD, prior to the use of Weir #3 for this project, the Corps will conduct a pre-construction survey to evaluate the condition of the marsh in the vicinity of the Weir #3 outfall. At a minimum, the requirement that “Discharge flow will be maintained to prevent scour or erosion” will be included in dredging contracts to ensure that the weir is operated in a manner that minimizes erosion risk. A post-construction survey will be completed, and if erosion is found that is attributable to the operation of the weir, a plan will be developed to restore the marsh to its pre-construction condition.

In 2009, the Andrews Island DMCA dikes were raised to elevation +44 feet Mean Low Water (MLW) to increase capacity. The dike improvement is expected to extend the remaining useful life of the site to about 50 years with two future dike raisings planned to extend the useful life of the DMCA.

ODMDS

Dredged material from continued O&M would also be placed in the ODMS. The ODMS encompasses an area of 2.0 square NM within a 1.0 by 2.0 NM rectangular site. A SMMP for Brunswick Harbor, pursuant to the MRPSA, was updated in 2013 and is effective for 10 years (EPA 2013). Current remaining capacity of the site is approximately 18 MCY, according to survey conducted in April 2021. It is a dispersive site and even with an average placement of 1.2 MCY of material annually, average annual capacity loss is estimated at 400,000 CY. There is sufficient capacity for at least 15 years (with no dispersion), however considering the dispersive nature of the site, estimated sufficient capacity range up to 45 years. The Corps will update the SMMP again in 2023.

Beneficial Use

Dredged material from this project has the potential for numerous beneficial uses. Coordination between the Corps and resource agencies is ongoing, and to date the following opportunities have been identified:

- GANDR-CRD proposed using dredged material to repair erosion along the northern and northeastern edge of the existing Bird Island in St. Simons Sound. It was estimated that this placement would require approximately 36,000 CY of material, whereas the proposed bend widener located nearby would consist of approximately 205,000 CY of dredged material.
- USFWS proposed several options including placement nearshore or onshore at Jekyll Island, restoration of the existing Bird Island to as-built volumes, creation of up to four new shorebird nesting islands between St. Simons and St. Andrews Sounds, and possibly marsh thin layer placement. USFWS acknowledged that the proposed areas would require additional coordination with NMFS for EFH impacts, the Federal Aviation Administration (FAA) due to the position of the existing Bird Island along the flight line approach to St. Simons Island airport, and GADNR-WRD at a minimum.

For a beneficial use opportunity to be feasible in the context of this study, it must be a part of the “base plan”, also known as the Federal Standard (See Section 3.6 for a discussion on the Federal Standard).

The Corps evaluated the feasibility of beneficial use proposals in coordination with the recommending agency. Geotechnical borings were collected as part of the feasibility-level engineering design and the physical and chemical characteristics of the sediments were analyzed to estimate the volume of material suitable for beneficial use. Based on the sediment analysis results most of the dredged material is suitable for beneficial use, however, beneficial use exceeds the base plan so is not economically feasible in the context of this study. The two most viable options for beneficial use (placing material on the existing Bird Island or creating a new Bird Island near the location of the proposed dredging) contain required actions that cause costs to exceed the base plan. In the case of restoring Bird Island, only 36,000 cubic yards would be required. Expanding the bend widener requires removal of 205,000 cubic yards. Therefore, if Bird Island was restored there would still be a need to dispose of 169,000 cubic yards in the Andrew’s Island DMCA. Two placement locations for one feature creates additional costs that make restoring Bird Island cost prohibitive in the context of this study. Creating a new Bird Island requires a significant investment in sediment transport modeling and environmental compliance activities which leads to increase costs. These two options exceed the cost of the Federal Standard (or base plan) and are therefore unable to be included in this study.

The Corps will continue to explore beneficial use opportunities to incorporate as part of O&M activities. One option for beneficial use projects is the Corps’ Section 204 of the Continuing Authorities Program. This process requires a non-Federal cost share partner

if construction costs exceed the base plan. A feasibility study would be required along with all environmental compliance activities.

6.4 Real Estate Considerations

Georgia Ports Authority (GPA) is the NFS for this feasibility study. All lands needed for construction of the recommended plan are NFS owned. The recommended plan consists of widening parts of the Federal channel in Brunswick Harbor to help reduce the difficulty in maneuvering and turning of larger shipping vessels. Excavation to widen parts of the Federal channel will be below mean high water and within the right of navigational servitude. Excavated and dredged material will be disposed of in Andrews Island DMCA . Access to Andrews Island DMCA is also subject to the government's right of navigational servitude. The GPA as the NFS will provide a staging area at the port facility during construction. There are no utility/facility relocations associated with this project. No further real estate is required for the project, however as the recommended plan is considered a new project a new Real Estate Certification and Attorney's Certificate of Authority will be required prior to construction for use of the staging area. This certification will require the NFS to sign a new Authorization for Entry for Construction and Attorney Certificate of Authority to support the project and confirm the prior staging area remains available. The incidental administrative costs associated with the Real Estate Certification are considered creditable to the NFS in accordance with Section 101(a)(3) of WRDA 1986 and are reflected in the Cost Share Table (see Section 5.6)

Should it later be determined that an additional real estate interest is required for the project, the NFS is responsible for providing the lands, easements, and rights-of-way (LER) required to implement the project. See Real Estate Appendix D.

6.5 Fish and Wildlife Coordination Act Considerations

The Corps initiated consultation with the USFWS during a kick-off Planning Charrette held for the State and Federal resource agencies on May 17, 2019. Following multiple discussions with USFWS staff on the scope and preliminary selection of alternatives, a draft Fish and Wildlife Service Coordination Act (FWCA) evaluation for the project (Appendix K) was submitted to the Corps on February 18, 2020. USFWS provided a preliminary FWCA report on May 20, 2020. The Corps provided responses to those comments in Appendix K of June 2020 Draft IFR/EA, which was provided to USFWS for review and comment. USFWS provided a final response in their letter dated September 10, 2021. All comments and responses are included in Appendix K. The following summarizes key points from the USFWS comments:

- The FWCA evaluation summarily stated that the USFWS had no opposition to any of the proposed alternatives as presented and did not expect significant impacts to fish and wildlife resources under their jurisdiction during project implementation. However, USFWS did enumerate several potential opportunities

for the project to mitigate or minimize the effects of storm surge and predicted sea level rise through beneficial use of dredged sediments for Bird Island creation and/or marsh restoration. Recommendations included restoring the existing Bird Island in St. Simons Sound; restoring the Satilla River Marsh Island Natural Area in the mouth of the Satilla River in St. Andrews Sound; and creating a new bird islands in shallow protected areas in St. Simons, Jekyll, and/or St. Andrews Sounds.

- The USFWS also recommended dredged material placement offshore that could serve as a source for sand migration onto nearby Jekyll beach, and temporary intertidal and/or supratidal berms to provide foraging/loafing and nesting habitat for shore and seabirds.
- Finally, the USFWS suggested that the Corps reconsider how we determine the feasibility of beneficial use opportunities for projects. Rather than determining best placement methods based on the least costly alternative, consistent with sound engineering practices while meeting all Federal environmental requirements, they recommend the Corps also consider the societal value of a created feature (e.g., bird habitat, marsh restoration) and costs savings that a feature may produce in future channel maintenance or restorative projects (e.g., fewer beach renourishments needed as a result of naturally occurring onshore sand migration from constructed nearshore feeder berms).

Corps Response

We acknowledge that several stakeholders, including GADNR-CRD and USFWS have identified potential areas for beneficial use of dredged material. Coordination with these potential non-Federal sponsors for beneficial use is ongoing. Rough order of magnitude costs were developed for the beneficial use recommendations and are included in the project record. However, beneficial use is not part of the recommended plan. This is due to transportation distance to the proposed beneficial use site and the fact that not all the dredged material is able to be used at one beneficial use site. Costs for the base plan are shared with the NFS as outlined in the project cost-sharing agreement. The Corps will continue to explore beneficial use opportunities to incorporate as part of O&M activities or implement under other authorized programs.

6.6 Summary of Environmental Consequences and Cumulative Effects of the Recommended Plan

With implementation of Alternative 8, there would be no significant environmental impacts to water quality, existing wetlands, threatened and endangered species, EFH, terrestrial resources and habitat, aquatic resources and habitat and other protected resources within the study area. In order to minimize adverse impacts, the Corps will follow BMPs in its design and operations. In addition, the proposed dredging activity for the modifications to the Federal channel will be accomplished through hydraulic cutterhead style dredging. The environmental consequences of conducting dredge activities through hydraulic cutterhead dredging are discussed below. O&M dredging will

continue in compliance with the Final Environmental Impact Statement, Brunswick Harbor Deepening Project (1998) and 2020 SARBO.

For implementation of the recommended plan (Alternative 8) short term impacts are expected on aquatic resources from cutterhead dredging. The cutterhead dredge minimizes turbidity by piping away the sediments without having to bring them up through the water column in a bucket or transport them to an offshore location. Impacted areas would be available for recolonization and use by benthic organisms once the dredging event ceases, so no irreversible loss of resources would occur. Short-term habitat loss of benthic communities is expected; however, the populations should reestablish once dredging is complete.

The proposed dredging will not limit the density and diversity of the benthic community that becomes reestablished any more so than existing maintenance activities. However, benthic populations in the navigation channel are in a state of flux due to the continual sedimentation and shoaling that creates the need for maintenance dredging (SHEP-EIS 2012). Cumulative effects on phytoplankton and zooplankton species living in the water column should not be affected any more so than the existing maintenance activities.

Results of recent sampling and analysis of sediments in the turning basin and bend widener areas proposed for deepening do not show widespread contaminants in excess of screening criteria (Ardaman & Associates, Inc., 2021a; summary report can be found in Appendix L). Similar analyte concentrations were found in previous testing events in which project sediments were determined suitable for beneficial use and upland confined placement. Therefore, it is not expected that placement of these sediments into the Andrews Island DMCA and resultant weir discharges will cause violation of state water quality standards or degradation of the aquatic ecosystem.

Environmental impacts to cultural resources will be assessed during the Preconstruction, Engineering, and Design phase in accordance with the October 121, 2020 Programmatic Agreement between the Corps and Georgia State Historic Preservation Officer. As project designs are refined and optimized, impacts to cultural resources caused by dredging and other ground disturbing activities will continue to be minimized and avoided in some cases. The purpose of the PA is to ensure compliance with Section 106 of the NHPA. The PA includes a detailed process for identification, evaluation and mitigation of historic properties. Therefore, pursuant to 54 U.S.C. 306108, 36 CFR 800.4(b)(2), and 36 CFR 800.14(b)(1)(ii), the Corps is deferring final identification and evaluation of historic properties until after project approval, additional funding becomes available, and prior to construction by adhering to the PA.

6.7 Project Implementation

The approved feasibility report is scheduled to be transmitted to Headquarters USACE by October 2021, and a Chief of Engineer's Report is scheduled to be signed by March 2022. Following approval of the feasibility report, a Design Agreement will be executed with the non-Federal sponsor for the Preconstruction, Engineering, and Design (PED)

phase, at which point funds must be appropriated by Congress to complete the project design. Project construction would require Congressional authorization and appropriation of funds.

The total cost of the feasibility study is shared (50/50) with the non-Federal sponsor pursuant to the terms of the FCSA executed by the District Commander and the Georgia Ports Authority on April 11, 2019. The cost share for the PED phase and the construction phase will be included in the Design Agreement and Project Partnership Agreement, respectively. Estimated cost shares based on model agreements are included in Table 29 below. The AAER cost for OMRR&R is \$150,000, which is a 100% Federal cost.

Table 29. Cost Sharing Summary

Federal/Non-Federal Cost Apportionment – NED Plan October 2022 Price Levels (Project First Costs)			
	Total Cost	Fed Share	Non-Fed Share
<i>¹Feasibility Phase [50% Fed / 50% Non-Fed]</i>			
¹ Feasibility Study	\$3,000,000	\$1,500,000	\$1,500,000
<i>²General Navigation Features (GNF) [75% Fed / 25% Non-Fed]</i>			
Dredging and Placement	\$12,444,000	\$9,333,000	\$3,111,000
Planning, Engineering, & Design	\$1,293,000	\$969,750	\$323,250
Construction Management	\$627,000	\$470,250	\$156,750
LERRs	\$5,000	\$1,500	\$3,500 ³
Subtotal – Project First Costs (rounded)	\$14,369,000	\$10,774,500	\$3,594,500
NFS Additional 10% Contrib. GNF	-	(\$1,436,600)	\$1,436,600
Local Services Facilities ⁴	-	-	-
USCG Aids to Navigation [100% Fed]	\$110,000	\$110,000	\$0
Total Cost Apportionment	\$14,479,000	\$9,447,900	\$5,031,000

¹Cost share from FCSA executed on 11 April 2019.

² Project-specific Design Agreement will be developed following completion of the Final Feasibility Report. Project-specific Project Partnership Agreement will be developed during the PED phase.

³ Real Estate costs are associated with incidental administrative costs to procure a new Real Estate Certification for the construction staging area. Georgia Ports Authority owns the construction staging area; however, its land value was credited to the GPA during a previous Federal project. The Real

Estate Certification will require the NFS to sign a new Authorization for Entry for Construction and Attorney Certificate of Authority to support the project. These costs are creditable in accordance with Section 101(a)(3) of WRDA 1986.

⁴ No local service facilities improvements are required for the recommended plan. The existing berthing area depths and bulkheads improvements are sufficient.

6.8 Risk and Uncertainty

Several risks and mitigation approaches to those risks were identified during evaluation of the alternatives. Key implementation risks related to cultural resource surveys, and shoaling rate assumptions are discussed in this section. Since cultural resources surveys will be conducted during the PED phase of the project, actual impacts to historic properties and cultural resources will not be identified until PED and could potentially add time to the schedule if specific mitigation or design readjustment are required to minimize impacts. This risk would be reduced through frequent coordination with the GA HPD to ensure adherence to the process identified in the executed Programmatic Agreement.

Another identified risk is that shoaling may increase as a result of project implementation. This risk was reduced through using a combination of historical O&M dredging data as well as by estimating shoaling rates based on conditional surveys. Future O&M quantities were estimated for each project feature using Brunswick Harbor O&M dredging records provided by the Corps' Operations Division. Dredging records from 2014 to 2020 were evaluated. For the bend widener analysis, a January 2018 survey was compared to the January 2020 survey using Autodesk Civil 3D software. No dredging had occurred in the Brunswick Point Cut Range and Cedar Hammock Range between the two surveys. From this analysis, shoaling rates were determined to be approximately 2,000 CY/year in the location of the bend widener. For the turning basin analysis, O&M dredging records were available and evaluated from 2015 to 2019 for the South Brunswick River near the existing turning basin. Dredging records show approximately 16,000 CY of material was dredged in FY15, 58,000 CY of material was dredged in FY16, and no material was dredged in FY17, FY18, or FY19 near the existing turning basin. The average turning basin shoaling rate for this five-year period is approximately 14,900 CY and will be assumed as the future annual shoaling rate for the turning basin.

For the St. Simons Sound Meeting Area, there has been no O&M dredging in the St. Simons Sound Meeting Area. Velocities are also relatively high (>2.5 knots) in this location, depths range from 40–60 feet MLLW, and shoaling is not expected to occur in the future. These data were incorporated into the cost estimate for each alternative.

The feasibility-phase ship simulation study is considered sufficient to support selection of the recommended plan. The ship simulation study significantly reduced uncertainty regarding ship maneuverability in the turning basin near future Berth 0 and resulted in the minimum turning basin geometry considered adequate for efficient navigation. The

effort also reduced uncertainty about vessel transit through the proposed bend widener and confirmed that a geometry similar to the existing downstream bend widener is appropriate to relieve future restrictions. Lastly, the feasibility-phase ship simulation confirmed that the St. Simons Sound, a naturally deep, wide area can be used, without modification, as a meeting area without future transit restrictions.

There is, however, some ongoing residual risk and uncertainty present with considering ship simulation complete. For instance, while 44 test runs were completed during feasibility level ship simulation, only 7 runs were duplicates. There would be more opportunity for additional duplicate runs in PED-phase ship simulation. Similarly, only two out of seven Brunswick harbor pilots participated during the feasibility level ship simulation. There would be an opportunity to allow for more (or potentially all) pilots to attend and provide additional input during PED-phase ship simulation. Also, there were minor concerns that wind was not included when developing the currents and was rather forced in the simulator. While the pilots did feel the effects of the wind gusts in the simulator, the winds did not properly affect the currents in the hydrodynamic modeling as they should have (See ship simulation report as part of Engineering Appendix B for additional details). Lastly, the harbor pilots simulated runs using the HERO Class ship (design vessel) as well as a container ship to feel the large effects of wind gusts on an empty vessel, but there could be a potential opportunity for the harbor pilots to perform additional simulations using other vessels different than the design vessel. Overall, these residual risks are very low and not expected to change the outcome of the selected alternative nor the current footprint of the channel design. For these reasons, the feasibility level ship simulation effort is considered complete for the Brunswick Harbor Modifications Study.

7. Environmental Compliance

This chapter provides documentation on how the recommended plan for the modification study and the preferred alternative for O&M dredging comply with all applicable Federal environmental laws, statutes, and executive orders.

7.1 Statutes

Abandoned Shipwreck Act of 1987 (43 U.S.C. §§ 2101-2106)

Modification study – Recommended Plan

As part of the modification study, the recommended plan has been coordinated with the State Historic Preservation Office (SHPO). A Programmatic Agreement (PA) was executed on October 21, 2020 (Appendix H). The PA will allow any mitigation to be completed if impacts to historic properties and other cultural resources, such as shipwrecks, are unavoidable. There are currently no known shipwrecks in the project.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

There are no known shipwrecks that may be impacted by O&M activities. Any inadvertent discoveries would be handled according to all applicable cultural resources laws and regulations as they are discovered.

Anadromous Fish Conservation Act of 1965, as amended (16 U.S.C. § 757a et. seq.)

Modification study – Recommended Plan

All channel deepening alternatives under consideration are in compliance with this Act. The project considered habitat impacts to sturgeon, striped bass, and blue back herring. Mitigation would not be required for the minor adverse effects on these species due to water quality changes and/or habitat displacement. The project has been coordinated with NMFS and is in compliance with the Act.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

Any future planning for the use or development of water or land resources affecting anadromous fish will be coordinated with local, State and Federal resource agencies in accordance with NEPA regulations and submitted to Congress.

Archaeological and Historic Preservation Act, as amended (54 U.S.C §§ 312501-312508) and Archeological Resources Protection Act (16 U.S.C § 470 aa-mm)

Modification study – Recommended Plan

The recommended plan was coordinated with the State Historic Preservation Office (SHPO). A Programmatic Agreement (PA) was executed on October 21, 2020. The PA will allow any mitigation to be completed if impacts to historic properties and other cultural resources are unavoidable (Appendix H)

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

There are no known historic properties and/or cultural resources known in this area that may be impacted by O&M activities. Any inadvertent discoveries would be handled according to all applicable cultural resources laws and regulations as they are discovered.

Bald Eagle Act of 1972 (16 U.S.C. §§ 668-668d)

Modification study – Recommended Plan

Bald and Golden eagles protected under the Act are present in the study area. Contract specification for implementation of the recommended plan would include all protection and avoidance measures necessary to avoid take during placement operations in the Andrews Island DMCA where the potential exists to adversely impact Eagles and other migratory birds.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

Bald and Golden eagles protected under the Act are present in the study area. Contract specification for implementation of the recommended plan would include all protection and avoidance measures necessary to avoid take during placement operations in the Andrews Island DMCA where the potential exists to adversely impact Eagles and other migratory birds. No impacts are expected to Bald and Golden Eagles from dredging that is disposed of in the ODMDS.

Clean Air Act of 1972, as amended (42 U.S.C. § 7401 *et. seq.*)

Modification study – Recommended Plan

The “general conformity” requirements of Section 176(c)(4) of the Clean Air Act, are met as only short-term negligible impacts are anticipated. Long-term beneficial impacts may be realized with increase transportation efficiency.

O&M Dredging of the Brunswick Harbor Federal Navigation Project – Agency Preferred Alternative

The “general conformity” requirements of Section 176(c)(4) of the Clean Air Act, are met as only short-term negligible impacts are anticipated. No increase in maintenance activities are anticipated that would result in potential degradation of air quality.

Clean Water Act of 1971, as amended (33 U.S.C. § 1251 *et. seq.*)

Modification study – Recommended Plan

CWA 401 WQC for harbor improvements and continued O&M was received on October 26, 2020 (Appendix L). Pursuant to the terms in the 401 WQC, sampling was completed in November 2020 and results submitted to GADNR-EPD and EPA on February 25, 2021 (Appendix G and L). While the Corps does not process and issue permits for its own activities, pursuant to 33 CFR 336.1, we do authorize our own discharges of dredged or fill material by applying all applicable substantive legal requirements, including application of the section 404(b)(1) guidelines. Appendix L contains the CWA 404(b)(1) analysis for the modifications and concludes that the of the placement of

dredged material in Andrews Island DMCA, which is the relevant activity resulting in discharge is in compliance with section 404(b)(1).

O&M Dredging of the Brunswick Harbor Federal Navigation Project – Agency Preferred Alternative

CWA 401 WQC for O&M was issued on October 26, 2020 (Appendix L). Terms and conditions of the October 2020 401 WQC, which replaces the 1998 WQC, will be followed for any O&M dredging. While the Corps does not process and issue permits for its own activities, pursuant to 33 CFR 336.1, we do authorize our own discharges of dredged or fill material by applying all applicable substantive legal requirements, including application of the section 404(b)(1) guidelines. As part of our review, the Corps evaluated the probable impacts, including cumulative impacts, of the placement of dredged material in Andrews Island DMCA, which is the relevant activity resulting in discharge, and the intended use on the public interest. All factors which may be relevant to the proposal must be considered including the cumulative effects. For reasons identified in Table 30, the Corps concludes that the proposed activity is in the public interest.

Table 30. Analysis of Public Interest Factors Under the CWA.

Public Interest Factors						
	None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
1. Conservation The study area largely consists of open water that receive semidiurnal tidal flushing. No sanctuaries or refuges are located within the study area. Therefore, the Corps has determined that the proposed action would have no effect on conservation.	X					
2. Economics The evaluation of impacts and benefits of the proposed action on economics has been analyzed in Appendix A, Economics Evaluation, in the Final BHMS IFR/EA. The Corps has determined that the proposed action would have a beneficial effect on economics.					X	
3. Aesthetics The evaluation of impacts of the proposed action on aesthetics has been analyzed in Section 5.10, Environmental Consequences of Alternatives, Aesthetics, in the Final BHMS IFR/EA. The Corps has determined that the proposed action would have no effect on aesthetics.	X					
4. General Environmental Concerns: The environmental concerns for the proposed action focuses on the potential impacts on aquatic resources, cultural resources, fish, wildlife, and food chain organisms. Each of these concerns was discussed in Section 5 of the Final BHMS IFR/EA and further described herein. No other adverse environmental impacts are anticipated. Therefore, the Corps has determined that the net effect of this action on the environmental factors, which were evaluated in the previously enumerated public interest factors, would be negligible.				X		

Public Interest Factors						
	None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
5. Wetlands: The evaluation of impacts of the proposed action on wetlands has been analyzed in Section 5.4, Environmental Consequences of Alternatives, Wetlands, in the Final BHMS IFR/EA and Appendix L Section 404 (b)(1) Evaluation. The Corps has determined that the proposed action would have a negligible effect on wetlands.				X		
6. Historic Properties: The evaluation of impacts of the proposed action on historic properties has been analyzed in Section 5.8, Environmental Consequences of Alternatives, Cultural Resources, in the Final BHMS IFR/EA. The Corps has determined that the proposed project would have a neutral(mitigated) effect on cultural resources in accordance with the Programmatic Agreement executed between the Corps and the GA HPD (Appendix H).			X			
7. Fish and Wildlife Values: The evaluation of impacts of the proposed action on fish and wildlife values has been analyzed in Section 5.3, Environmental Consequences of Alternatives, Essential Fish Habitat, Section 5.5, Protected Species in the Final BHMS IFR/EA and Appendix L, 404 (b)(1) Evaluation. The Corps has determined that the proposed action would have a negligible effect on fish and wildlife values.				X		
8. Flood Hazards: The evaluation of impacts of the proposed action on flood hazards has been analyzed in Section 5.1, Hydrology and Floodplains, in the Final BHMS IFR/EA and Appendix B, Engineering evaluation. The Corps has determined that the proposed action would have no effect on flood hazards.	X					
9. Floodplain Values: The evaluation of impacts of the proposed action on floodplain values has been analyzed in Section 5.1, Hydrology and Floodplains, in the Final BHMS IFR/EA and in Appendix B, Engineering evaluation. The Corps has determined that the proposed action would have no effect on floodplain values.	X					

Public Interest Factors							
		None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
10. Land Use: The study area is subject to the maritime industry as well as recreational boaters and consists largely of open water that receive semidiurnal tidal flushing. The proposed action would not change the present land use in the study area. Therefore, the Corps has determined that the proposed project would have no effect on land use.	X						
11. Navigation: The purpose of the proposed action is to improve transportation maneuverability for the RO/RO vessels that call on the Port of Brunswick. The evaluation of impacts of the proposed action on navigation is described in Appendix B, Engineering evaluation, in the Final BHMS IFR/EA. The Corps has determined that the proposed action would have a beneficial effect on navigation.						X	
12. Shoreline Erosion and Accretion: The study area is subject to semi diurnal tides as well as wakes from passing container and cargo vessels and recreational boaters. The proposed channel modifications were modeled in a 2D AdH modeling system and no increase in water levels or velocities throughout the channel were observed. Additional modeling results and discussion of shoaling are described in Appendix B, Engineering evaluation, in the Final BHMS IFR/EA. Therefore, the Corps has determined that the proposed action would have a negligible effect on shoreline erosion and accretion.					X		
13. Recreation: The evaluation of impacts of the proposed action on recreation has been analyzed in Section 5.9, Environmental Consequences of Alternatives, Recreation, in the Final BHMS IFR/EA. The Corps has determined that the proposed action would have no effect on recreation.	X						
14. Water Supply and Conservation: : The primary raw water source for communities located within and adjacent to the study area is the is the Upper Floridan Aquifer, a limestone formation that runs under the entirety of Glynn County. A supplemental source of raw water is the Lower Brunswick Aquifer. The Corps has	X						

Public Interest Factors						
	None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
determined that the proposed action would have no effect on water supply and conservation.						
15. Water Quality: The evaluation of impacts of the proposed action on water quality has been analyzed in Section 5.7, Environmental Consequences of Alternatives, Water Quality, in the Final BHMS IFR/EA and in Appendix L, Section 404 (b)(1) Evaluation. The Corps has determined that the proposed action would have a negligible effect on water quality.				X		
16. Energy Needs: Energy in the form of electricity, petroleum fuels, natural gas, etc. would be used during the construction phase of the proposed action. These energy sources are readily available and are expected to be available in the future. Therefore, the Corps has determined that the proposed action would have no effect on energy needs.	X					
17. Safety: The proposed action would provide improved maneuverability through the bend widener and expanded turning basin and the ability for two-way vessel traffic in the Harbor. An official meeting area will increase the harbor pilots' perception of safety in the area since it would provide a wider channel and additional options for navigating vessels through Brunswick Harbor. However, there are no existing safety issues within the Federal Channel. Therefore, the Corps has determined that the proposed action would have a negligible beneficial effect on safety.				X		
18. Food and Fiber Production: The study area is subject to the maritime industry as well as recreational boaters. The proposed action would provide no opportunity for food or fiber production. Therefore, the Corps has determined that there would be no effect to food or fiber production.	X					
19. Mineral Needs: Construction materials associated with the dredging and disposal of sediment would be used during the construction phase of the proposed	X					

Public Interest Factors							
		None	Detrimental	Neutral (mitigated)	Negligible	Beneficial	Not Applicable
action. These materials are readily available and are expected to be available in the future. Therefore, the Corps has determined that construction of this project would have no effect on mineral needs concerns.							
20. Consideration of Property Ownership: Property ownership has been evaluated in Section 6.3, Real Estate Considerations, in the Final BHMS IFR/EA and Appendix D, Real Estate Evaluation. The Corps has determined that the proposed action would have no effect on considerations of property ownership.		X					
21. Needs and Welfare of the People: The evaluation of impacts of the proposed action on needs and welfare of the people has been analyzed in Section 5.11, Environmental Justice, in the Final BHMS IFR/EA. The Corps has determined that the proposed action would have no effect on needs and welfare of the people.		X					

Coastal Barrier Resources Act of 1982 (16 U.S.C. § 3501 et seq.)

Modification study – Recommended Plan

The recommended plan action does not encourage development or provide Federal expenditures and financial assistance to relatively undeveloped barrier islands listed in the John H. Chafee Coastal Barrier Resources System (CBRS), including Jekyll Island, which is an Otherwise Protected Area and the closest unit to the study area.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative
Continued O&M of the Brunswick Harbor, Georgia Project would not result in development in the Jekyll Island Otherwise Protected Area.

Coastal Zone Management Act of 1972, as amended (16 U.S.C. § 1451 et seq.)

Modification study – Recommended Plan

On April 23, 2021, GADNR - CRD provided conditional concurrence to Corps' CZMA consistency determination for the Brunswick Harbor Modifications Study (BHMS). The Corps found the conditions unacceptable in accordance with § 930.4(a)(2), and views GA-DNR CRD conditional concurrence as an objection. The Corps has concluded that the proposed action is fully consistent with the enforceable policies of the management program (§ 930.43(d)(2)) or, alternatively, that the proposed action is consistent to the maximum extent practicable with the enforceable policies of the management program (§ 930.43(d)(1)). The Corps has notified GADNR-CRD, in a letter dated May 21, 2021, as required in 15 C.F.R. § 930.43(e), of the Corps' decision to proceed with the BHMS after May 12, 2021, which is the end of the 90-day period that is specified in § 930.43(d). Prior to the end of this 90-day period, the Corps and CRD engaged in a good faith effort to resolve differences using an informal process that included representatives of the National Oceanic and Atmospheric Administration, Office of Coastal Management. The Corps objects to the specified conditions because they do not reflect enforceable policies, the State does not have legal authority to require the conditions, and because they conflict with Federal legal requirements. Specifically, GA-DNR-CRD's conditions conflict with the ESA by imposing requirements that conflict with the ability of the Federal government to implement the ESA for the protection of all relevant listed species. Second, GA-DNR-CRD's conditions directly conflict with the Corps' ability to comply with the ESA and implement the 2020 SARBO – as legally required – to address risk across the southeast to listed species. Additionally, certain conditions present a conflict under Section 6(f) of the ESA. The Corps is consistent with Georgia's coastal zone management plan or, alternatively, consistent to the maximum extent practicable without accepting these conditions. Appendix J includes the April 23, 2021 conditional concurrence from GADNR-CRD and Appendix J.1 includes the Corps response dated May 20, 2021.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative
The Federal consistency determination provided for this IFR/EA was inclusive of continued O&M of the Federal navigation channel. Compliance with CZMA is outlined above.

Endangered Species Act of 1973 (16 U.S.C. § 1531 *et. seq*)

Modification Study - Recommended Plan

Pursuant to section 7 of the ESA, NMFS issued a Letter of Concurrence, dated May 24, 2021, that determined that the recommended plan for harbor modifications may affect, but is not likely to adversely affect the following ESA-listed species: sea turtles (Kemp's Ridley, green, and loggerhead), sturgeon (shortnose and Atlantic), and Giant manta ray. Based on coordination with NMFS, the Corps concluded the recommended plan would have no effect on the leatherback and loggerhead sea turtles (Appendix I)

NMFS in the letter of concurrence included a recommendation to contact the University of Delaware – College of Earth, Ocean, and Environment regarding their Real-Time Sturgeon Predictive model. This recommendation has been shared with the Corps' South Atlantic Division SARBO team for their consideration.

Pursuant to section 7 of the ESA, the U.S. Fish and Wildlife Service concurred with the Corps' effect determination, dated June 18, 2020, concluding that the recommended plan may affect but not likely to adversely affect the West Indian manatee. A no effect determination was made for all other ESA-listed species with the potential to occur in the action area (Section 5.5). There is no designated critical habitat in the project location (Appendix K).

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

Pursuant to section 7 of the ESA, the NMFS issued the 2020 SARBO, dated July 30, 2020, that determined that operations and maintenance dredging in accordance with the 2020 SARBO will not jeopardize the continued existence of the ESA-listed species in the action area. The 2020 SARBO is a programmatic opinion that considers effects to the following species: sea turtles (Kemp's Ridley, green, hawksbill, leatherback, and loggerhead), sturgeon (shortnose and Atlantic), Nassau grouper, Giant manta ray, scalloped hammerhead shark, smalltooth sawfish, oceanic whitetip shark, whales (North Atlantic right, Blue, Fin, Sei, and Sperm), Johnson's seagrass, and corals (Boulder star, elkhorn, Lobed star, Mountainous star, Pillar, rough cactus, and staghorn). The 2020 SARBO, which replaced the sea turtle centric 1997 SARBO, is a multi-species approach that covers all dredging techniques in Federal waters in the Southeast from the North Carolina/Virginia border south to the U.S. Virgin Islands. As such, restrictions on the timing of actions reflect a balancing of the risk to all ESA-listed species in the region. All project design criteria, terms and conditions, and reasonable and prudent measures in the 2020 SARBO shall be implemented in order to avoid and minimize effects to endangered species.

With regards to USFWS-regulated species, pursuant to section 7 of the ESA, the Corps has made a may affect, but not likely to adversely affect determination for the West Indian manatee for the O&M preferred alternative. USFWS has concurred with this determination in their letter dated September 10, 2021 (Appendix K). A no effect determination was made for all other USFWS-regulated ESA-listed species with the potential to occur in the action area (Section 5.5). There is no designated critical habitat in the project location.

Estuary Protection Act of 1968 (16 U.S.C. § 1221 et. seq.)

Modification study – Recommended Plan

The protection and conservation of estuaries were considered in the study and coordinated with State and Federal resource agencies. Project implementation as described will not adversely impact surrounding estuaries.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

The protection and conservation of estuaries were considered in this EA. Any future planning for the use or development of water or land resources affecting estuaries will be coordinated with local, State and Federal resource agencies in accordance with NEPA regulations.

Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. §§ 661-665; 665a; 666; 666a-666c)

Modification study – Recommended Plan

Pursuant to the Fish and Wildlife Coordination (FWCA) Act of 1934, on May 20, 2020, the USFWS provided the Corps with the final FWCA Evaluation, which has been incorporated into the IFR/EA. USFWS found no significant effects to species under their jurisdiction for the recommended plan for the proposed modifications. The final FWCA Evaluation can be found in Appendix K of the IFR/EA.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

For the O&M preferred alternative, USFWS proved FWCA comments in their letter dated September 10, 2021 (Appendix K). USFWS provided comments regarding the beneficial use of dredged material and opined that the new work material is likely to be of better quality for beneficial use than O&M material. Additionally, the FWCA comments provided suggestions on how beneficial use of new work material may be shown to meet the Federal Standard. The Corps will consider these comments in future stages of design for the new work and for future projects that may benefit from the use of O&M dredged material.

Flood Control Act of 1944, as amended, Section 4 (16 U.S.C. § 460d)

Modification study – Recommended Plan

State and Agency review, as required under this Act for proposed water resources projects, will occur prior to approval of the Chief's Report.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative
Not applicable since congressional authorization already exists for routine O&M of the Brunswick Harbor Navigation Project.

Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 *et. seq.*)

Modification study – Recommended Plan

NMFS provided a letter dated July 8, 2020 and provided no conservation recommendations, therefore the substantive requirements of the MSA have been met. The MSA correspondence letter can be found in Appendix G of the IFR/EA.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

For the O&M preferred alternative, NMFS provided a letter dated July 21, 2021 that included a conservation recommendation for an adaptive management process for obtaining and incorporating new information about environmental windows into a risk management framework for managing dredge operations. The 2020 SARBO switches from a static conservation measure to an adaptive management approach to ensure decisions are made scientifically allowing ways to try to continue to reduce take to all species including fish species, while considering new research and data. This recommendation is consistent with risk assessment process that would be followed in accordance with the process outlined in the 2020 SARBO, Section 2.9.2. Additionally, the process referenced in the NMFS letter include collaborative engagement with local stakeholders. The Corps will convene, on a yearly basis for five years, a Georgia stakeholder session on the implementation and risk assessment lessons learned in regard to implementation of the 2020 SARBO, and integration of EFH considerations. Therefore, the substantive requirements of the MSA have been met. Corps' November 4, 2021 response to the conservation recommendation can be found in Appendix G.

Marine Mammal Protection Act of 1972, as amended (16 U.S.C. § 1361 *et. seq.*)

Modification study – Recommended Plan

Impacts to marine mammals in the project area were coordinated with State and Federal resource agencies (GADNR, USFWS, NMFS). Project implementation as described, following agency recommended and required protective measures, is not expected to adversely impact listed mammals. Compliance is described in the FWCA evaluation. The improvements would not result in the take of marine mammals (Appendix K)

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

Contract specifications for future O&M dredging activities will include marine mammal protective measures required in the 2020 SARBO and the BHMS USFWS FWCA evaluation, as updated on September 10, 2021 (Appendix K). The continued O&M will not result in take of marine mammals.

Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. § 1401 et. seq.)

Modification study – Recommended Plan

Not applicable. Project does not involve the transportation or placement of dredged material into ocean waters.

O&M Dredging of the Brunswick Harbor Federal Navigation Project – Agency Preferred Alternative

O&M dredging of some channel reaches include placement into the harbor's ODMDS. Pursuant to Section 102 and 103 of the Act, no ocean placement of dredged sediments will occur unless all requirements of the MPRSA have been met and testing of the proposed dredged sediments have been determined suitable for ocean placement.

Migratory Bird Conservation Act of 1928, as amended (16 U.S.C. § 715)

Modification study – Recommended Plan

Migratory Bird Treaty Act and Migratory Bird Conservation Act Measures will be taken to protect migratory birds. USFWS in their FWCA evaluation dated May 20, 2020 provided measures should dredged material be used for beneficial use, such as creation of bird islands or habitat restoration. These measures include timing restrictions to avoid conflicts with bird nesting season. Alternately, impacts to nesting shore and seabirds, and brown pelicans should be recognized and possibly mitigated for if the placement occurs during nesting season (See Appendix K). Should the Corps conduct beneficial use activities in the future, we would coordinate with USFWS to determine any minimization measures needed, i.e. timing restrictions or avoidance of nesting sites. Therefore, this action is in compliance with this act.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

USFWS in their FWCA evaluation dated May 20, 2020 provided measures should dredged material be used for beneficial use, such as creation of bird islands or habitat restoration. These measures include timing restrictions to avoid conflicts with bird nesting season. Alternately, impacts to nesting shore and seabirds, and brown pelicans should be recognized and possibly mitigated for if the placement occurs during nesting season. USFWS, reiterated in the letter dated September 10, 2021 their recommendations for the Corps to continue to evaluate placement of dredged material for beneficial use such as bird island creation or habitat enhancement (See Appendix G and K). Should the Corps conduct beneficial use activities in the future, we would coordinate with USFWS to determine any minimization measures needed, i.e. timing restrictions or avoidance of nesting sites. Therefore, this action is in compliance with this act.

Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712)

Modification study – Recommended Plan

The study has identified migratory birds protected under the Act. Contract specifications for project implementation will include all protection and avoidance measures necessary to avoid and minimize impacts to migratory birds during placement operations in the

Andrews Island DMCA. This Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. The Corps does not anticipate that migratory birds would be adversely (directly or indirectly) affected by the proposed action. For a detailed description of this assessment please see the US Fish and Wildlife Service Coordination Act Evaluation (Appendix K). .

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

This Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. The Corps does not anticipate that migratory birds would be adversely (directly or indirectly) affected by the proposed action. Contract specifications for future O&M dredging activities that include placement operations into a DMCA or other upland placement site will include all protection and avoidance measures necessary to avoid and minimize impacts to migratory birds.

National Environmental Policy Act of 1969, as amended (42 U.S.C. § 4321 *et. seq.*)

Modification study – Recommended Plan

Compliance with NEPA is accomplished through the preparation of this IFR/EA and FONSI.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

Compliance with NEPA is accomplished through the preparation of this IFR/EA and FONSI.

National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101 *et. seq*)

Modification study – Recommended Plan

The recommended plan has been coordinated with the State Historic Preservation Office (SHPO) and consulting Indian Tribes (letter dated June 9, 2020). A Programmatic Agreement (PA) was executed on October 21, 2020 (Appendix H). The PA will allow any mitigation to be completed if impacts to historic properties and other cultural resources are unavoidable. One outstanding stipulation of the PA is the investigation of two magnetic anomalies. Investigations will be performed in accordance with the PA.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

There are no known historic properties and/or cultural resources in this area that may be impacted by O&M activities. Any inadvertent discoveries would be handled according to all applicable cultural resources laws and regulations as they are discovered.

Native American Graves and Repatriation Act (25 U.S.C. § 3001 et. seq)

Modification study – Recommended Plan

Tribes consulted through a letter dated June 9, 2020. One tribal response received. The Catawba Nation requested to be informed of any NAGPRA concerns. Federal or Tribal lands are not involved and there are no known cultural resources sites with NAGPRA association located in this area. Any inadvertent discoveries of human remains and/or associated funerary objects will be coordinated with tribes.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

Federal or Tribal lands are not involved. No known cultural resources sites with NAGPRA association are located in this area. Any inadvertent discoveries of human remains and/or associated funerary objects will be coordinated with tribes.

River and Harbor and Flood Control Act of 1970, Sections 209 and 216 (PL 91-611; see generally 33 U.S.C. § 701 et. seq.)

Modification study – Recommended Plan

A comprehensive review of all potential benefits is included in Chapter 3 and includes a review of NED, EQ, RED, and OSE.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

Since Congressional authorization for the Brunswick Harbor, Georgia Project exists, benefits related to the current project were already analyzed and previously approved.

Sunken Military Craft Act of 2004 (10 U.S.C. §§ 113 et.seq.)

Modification study – Recommended Plan

Project coordinated with the State Historic Preservation Office (SHPO). A Programmatic Agreement (PA) was executed on October 21, 2020 (Appendix H). The PA will allow any mitigation to be completed if impacts to historic properties and other cultural resources, such as sunken military craft, are unavoidable. There are currently no known sunken military craft in the project area.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

There are no known sunken military craft that may be impacted by O&M activities. Any inadvertent discoveries would be handled according to all applicable cultural resources laws and regulations as they are discovered.

7.2 Executive Orders

Executive Order 11593, Protection and Enhancement of the Cultural Environment, 13 May 1971.

Modification study – Recommended Plan

Coordination with the State Historic Preservation Officer demonstrates compliance.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

There are no known cultural resources that may be impacted by O&M activities. Any inadvertent discoveries would be handled according to all applicable cultural resources laws and regulations as they are discovered.

Executive Order 11988, Floodplain Management, 24 May 1977 amended by Executive Order 12148, 20 July 1979.

Modification study – Recommended Plan

This EO states that Federal agencies shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibilities. As indicated by hydrodynamic modeling, the proposed project would have no adverse impacts to floodplain management.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

The project is not located within a floodplain and O&M activities would have no adverse impacts to floodplain management.

Executive Order 11990, Protection of Wetlands, 24 May 1977.

Modification study – Recommended Plan

The Corps anticipates no impacts to wetlands from implementation of the recommended plan since modifications would occur in areas with no wetlands and dredged material would be disposed of in the existing DMCA.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

The Corps anticipates no impacts to wetlands from continued O&M dredging of the Brunswick Harbor, Georgia Project.

Executive Order 12898, Environmental Justice, 11 February 1994.

Modification study – Recommended Plan

In accordance with this EO, the Corps has determined that no group of people would bear a disproportionately high share of adverse environmental consequences resulting from the proposed work.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

In accordance with this EO, the Corps has determined that no group of people would bear a disproportionately high share of adverse environmental consequences resulting from the proposed work.

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, 21 April 1997.

Modification study – Recommended Plan

The project is not expected to create a disproportionate environmental health or safety risk for children.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

The project is not expected to create a disproportionate environmental health or safety risk for children.

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, 6 November 2000.

Modification study – Recommended Plan

Tribes consulted through a letter dated June 9, 2020. One tribal response received. The Catawba Nation requested to be informed of any NAGPRA concerns. Continued consultation with Indian Tribal Governments will occur, where applicable, and consistent with executive memoranda, DoD Indian policy, and USACE Tribal Policy Principals signifies compliance.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

Federal or Tribal lands are not involved. There are no known Indian Sacred Sites that may be impacted by O&M activities. Any inadvertent discoveries will be coordinated with tribes. Tribes will be kept apprised of project updates.

Executive Order 13112, Invasive Species Control, 3 February 1999.

Modification study – Recommended Plan

Regarding invasive species, the alternatives being evaluated as part of this study are not expected to cause an increase or decrease in proliferation or recruitment for these species. The project will not introduce invasive species to the project area and is therefore compliant with the EO.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative

The project will not introduce invasive species to the project area and is therefore compliant with the EO.

Executive Order 13186, Protection of Migratory Birds, 10 January 2001.

Modification study – Recommended Plan

The study considered beneficial use dredged sediments for bird island restoration and creation. Migratory Bird Treaty Act and Migratory Bird Conservation Act Measures will be taken to protect migratory birds, i.e. avoiding nesting sites. Compliance with these acts demonstrates compliance with the EO.

O&M Dredging of the Brunswick Harbor, Georgia Project – Agency Preferred Alternative
Future O&M dredging activities will consider bird island restoration and/or creation through beneficial use of dredged sediments in accordance with all applicable laws and policies. Migratory Bird Treaty Act and Migratory Bird Conservation Act Measures will be taken to protect migratory birds, i.e. avoiding nesting sites. Compliance with these acts demonstrates compliance with the EO.

8. Public Involvement and Review

8.1 Public Comments

A draft of the IFR/EA was released to the public for a 30-day review and comment period on June 9, 2020. The draft IFR/EA including appendices was placed on the Savannah District's external website, a public notice, and a press release inviting public comments was issued. Additionally, the Corps sent notification letters to the following:

- Tribes
 - Alabama-Quassarte Tribal Town
 - Seminole Tribe of Florida
 - Thlopthlocco Tribal Town
 - Chickasaw Nation
 - Cherokee Nation
 - Catawba Indian Nation
 - Seminole Nation of Oklahoma
 - Muscogee (Creek) Nation
 - Poarch Band of Creek Indians
 - Coushatta Tribe of Louisiana
 - Kialegee Tribal Town
- Federal Agencies
 - Environmental Protection Agency
 - National Marine Fisheries Services- Protected Resources Division
 - National Marine Fisheries Services-- Habitat Conservation Division
 - U.S. Fish and Wildlife Service
- State Agencies
 - GADNR Historic Preservation Division
 - GADNR-CRD
 - GADNR-EPD
 - GADNR-WRD

Eleven comment letters were received regarding the June 2020 draft IFR/EA. Comments and the Corps responses to comments are found in Appendix F. Comments were received from the Catawba Tribe's Tribal Historic Preservation Office, Federal (USFWS, EPA, NMFS) and state agencies (GA- WRD, EPD, CRD and SHPO), the NFS (GPA), and two individuals. In general, Federal and State agencies provided comments regarding the resource impact analysis, permitting requirements, and environmental compliance.

Three supportive public comments were received. Supportive comments were received from GPA, the NFS, Brunswick Bar Pilots' Association,, and a private citizen. Supportive comments described the proposed work as substantially improving the efficiency of the Port, as well as helping ships to navigate through the sound towards the terminals of Brunswick and Colonel's Island.

On June 21, 2021, the Corps released a revised IFR/EA and draft FONSI for an additional 30-day comment period. The revised IFR/EA provided additional analysis regarding the impacts of continued O&M. The draft IFR/EA including appendices was placed on the Savannah District's external website, notification letters were sent to Federal and state agencies, a public notice was posted, and a press release inviting public comments was issued. Notification letters were sent to:

- Federal Agencies
 - Environmental Protection Agency
 - National Marine Fisheries Services- Protected Resources Division
 - National Marine Fisheries Services-- Habitat Conservation Division
 - U.S. Fish and Wildlife Service
- State Agencies
 - GADNR Historic Preservation Division
 - GADNR-CRD
 - GADNR-EPD
 - GADNR-WRD

This comment period resulted in letters from EPA, GADNR-CRD, NMFS-HPD, Jekyll Island Authority, Southern Environmental Law Center, and the Brunswick Bar Pilots' Association. In addition, 914 email comments were received in response to an email campaign organized by One Hundred Miles. Approximately half of these comments had unique messages included with the standard form letter. Comments are addressed in Appendix F.1.

8.2 Agencies Consulted

The following provides a history of consultation for the both the harbor (project improvements) improvements and the continued O&M of the navigation channel. A Planning Charrette for the study was held on May 16-17, 2019. Representatives from GADNR, EPA, USFWS, NMFS, GPA, GADOT, and the USCG attended, either in person or via phone. Discussions were held on environmental topics such as beneficial use, environmental compliance issues, and preferred dredging methods. Subsequently, EPA, NMFS, USFWS, and GADNR were formally invited (emails dated May 23, 2019, Appendix G) to participate as cooperating agencies. GADNR (WRD and CRD), USFWS, and EPA officially accepted.

Under authority of the FWCA, the USFWS was requested to provide support in evaluating project goals, objectives, and management actions in the form of a Planning Aid Letter or Planning Aid Report for the harbor improvements. A statement of work was provided to USFWS, and a draft evaluation was provided to the Corps by USFWS on February 18, 2020. The final evaluation was received May 20, 2020. This evaluation focused on impacts from the harbor improvements. The Corps responses to USFWS final recommendations have been incorporated into Appendix K. USFWS provided FWCA comments on the continued O&M in a letter dated September 10, 2021 (Appendix K). Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), NMFS responded by letter dated July 8, 2020 and provided no

conservation recommendations concerning the harbor improvements, therefore the substantive requirements of the MSA have been met. For continued O&M, NMFS provided comments on EFH and conservation recommendation in a letter dated July 21, 2021. The Corps' November 4, 2021 detailed response to the conservation recommendation can be found in Appendix G. This response meets the requirements of the MSA.

Discussions with NMFS relating to compliance with Section 7 of the ESA were initiated in October 2019. Due to the routine and predicted effects from the location and prescribed construction of the project, an informal, expedited consultation was recommended for the harbor improvements. This informal consultation based in the Corps determination that the project may affect but is not likely to affect listed species, was concluded with NMFS on May 24, 2021. Consultation with the USFWS was completed June 18, 2020. ESA Section 7 consultation with NMFS for the continued O&M is covered by the 2020 SARBO. The Corps coordinates regularly with NMFS regarding implementation of the 2020 SARBO. Correspondence can be found in Appendices G and I.

There was early coordination with EPA on the suitability for beneficial use and placement of the sediments proposed for removal during construction of harbor improvements. EPA requested a summary of previous relevant sediment testing to aid in that determination. That summary was provided on November 13, 2019. Later, in November 2020, site-specific geotechnical samples were collected as part of the feasibility-level engineering design phase (Ardaman & Associates, Inc., 2021b). In addition to physical characteristics needed for design, chemical constituents were analyzed as a requirement of the project's GADNR-EPD October 2020 401 WQC (Ardaman & Associates, Inc., 2021a). Results of the analysis were shared with EPA and GADNR-EPD on February 25, 2021 and will be the basis from which beneficial use and placement options will be decided. EPA was invited to provide comments on the revised IFR/EA on June 21, 2021, which included the additional analysis regarding continued O&M. In response, EPA provided comments on July 11, 2021 and did not have any major concerns with the action, see appendix F.1. Other correspondence can be found in Appendices G and L.

The Corps initiated Section 106 of the NHPA coordination on the recommended plan for harbor improvements with the GA HPD and 11 Tribal Historic Preservation Officers (THPOs) on November 4, 2019. In the correspondence to the GA HPD and THPOs the Corps provided information regarding previous surveys, recorded cultural resources in the APE, nearby recorded cultural resources, and the types of impacts this undertaking would potentially have on cultural resources and historic properties. The Corps recommended execution of a PA as a way to fulfill its Section 106 compliance requirements. Correspondence can be found in Appendix H. Section 106 consultation was not necessary for the continued O&M of the existing navigation channel, as it is not an undertaking with potential to affect historic properties. GA HPD was provided notice on June 23, 2021 of the comment period for the revised draft IFR/EA.

The Corps notified the Advisory Council on Historic Preservation (ACHP) of its intent to prepare a PA for the harbor improvements on January 29, 2020. The ACHP declined to participate in consultation as the criteria for participation had not been met. A PA between the Corps and the GA HPD was executed on October 21, 2020 for this project (Appendix H). This agreement includes Phase I investigations to identify archaeological sites and shipwrecks in areas previously not surveyed where dredging will occur, including a buffer for mooring and anchoring and side-slopes. Any resources found during the surveys will be evaluated for inclusion on the NRHP. Mitigation would be required for NRHP-eligible resources if the project cannot avoid them. Previously recorded historic properties that might be impacted would be mitigated if avoidance is not possible. Surveys will be conducted to relocate the two anomalies in the turning basin, and divers will perform investigations of the anomalies to determine if they are significant cultural resources.

None of the tribes expressed interest in being a consulting party for this undertaking or requested concurring party status to the PA. The Catawba Indian Nation requested notification in the event of an inadvertent discovery.

Pursuant to CZMA, the Corps has consulted with GADNR-CRD. On February 10, 2021, the Corps provided GADNR-CRD with Coastal Zone CZMA), Federal Consistency Review Determination. GA-DNR solicited public comments advertising the Corps' Federal Consistency Determination from March 12, 2021 to March 29, 2021 and received over 1,500 public comments, primarily form letters. Every comment received opposed hopper dredging outside the previously authorized December 15 - March 31 winter dredge window. GA-DNR CRD provided a conditional concurrence with the Corps' consistency determination on April 23, 2021 (Appendix J). The Corps objects to the conditions and has determined that the proposed action is fully consistent with the enforceable policies of the management program or, alternatively, that the proposed action is consistent to the maximum extent practicable with the enforceable policies of the management program. The Corps provided a response on May 21, 2021, Appendix J.1.

Section 7.0 provides a summary of the Corps compliance with CZMA and additional information can be found in Appendix J and Appendix J.1. This coordination was conducted for both harbor improvements and continued O&M. Additionally, the Corps on September 8, 2021 shared the Pre-Construction Risk Assessment for Maintenance Dredging of Wilmington, Morehead City, Charleston, Savannah, and Brunswick Harbors in Fiscal Year 2022 (Appendix G).

In compliance with the Clean Water Act, the Corps has consulted with GANDR-EPD and the EPA. GADNR-EPD provided comments on the June 2020 draft IFR/EA. In response to those comments, the Corps held a pre-filling meeting on July 20, 2020 regarding the need for a 401 WQC with GADNR-EPD and EPA. On August 25, 2020, the Corps submitted an application for a 401 WQC to GADNR-EPD. Corps received the 401 WQC on October 26, 2020. The Corps in compliance with the October 26, 2020 401 WQC, provided a report on the sediment sampling to GADNR-EPD and EPA on February 25, 2021. This coordination included both the harbor improvements and the

continued O&M. Correspondence can be found in Appendix G and L. GA-EPD was informed of the opportunity to comment on the revised draft IFR/EA on June 21, 2021 (Appendix G). No response was received.

9. Recommendations

The following text outlines the Corps' recommendations for approval of the recommended plan and authorization for implementation.

To achieve the project objectives, I recommend implementation of Alternative 8 for modifications to the Brunswick Harbor, Georgia Project. Alternative 8 consists of the expansion of a turning basin near Colonel's Island Terminal, the expansion of a bend widener at Buoy 24 near the Cedar Hammock Range, and the creation of a vessel meeting area at St. Simons Sound. Alternative 8 includes dredging of the turning basin expansion and the bend widener to a depth equal to the existing Federal channel (-36 feet MLLW) with an estimated dredged volume of 551,600 cubic yards. Material would be disposed at Andrews Island DMCA. The meeting area at St. Simons Sound would take advantage of naturally deep water and would not require dredging.

Alternative 8 is the National Economic Development Plan. The average annual equivalent cost is \$632,000 while the average annual equivalent benefit is \$2,956,000. The recommended plan has \$2,324,000 in net benefits and a benefit-to-cost ratio of 4.7. The construction cost (project first cost) for Alternative 8 is \$14,369,000 (FY22). Implementation would be cost shared at a Federal contribution of \$9,447,900 and non-Federal sponsor contribution of \$5,031,100.

The non-Federal sponsor, Georgia Ports Authority, supports this plan and there is no Locally Preferred Plan. It is anticipated that Georgia Ports Authority will be the non-Federal sponsor for the Preconstruction, Engineering, and Design phase, and for the Construction phase of the project.

In addition, I support the preferred alternative identified in Chapter 4 that incorporates the South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (2020 SARBO) into Operations and Maintenance (O&M) of the Brunswick Harbor, Georgia Project. This includes replacing environmental windows for hopper dredging with a risk assessment and management process to balance impacts to multiple species covered under the 2020 SARBO. This approach is consistent with direction provided in the 2020 SARBO.

My recommendation is subject to cost sharing and other applicable requirements of Federal laws, regulations, and policies. Federal implementation of the project for commercial navigation includes, but is not limited to, the following items of local cooperation to be undertaken by the non-Federal sponsor in accordance with applicable Federal laws, regulations, and policies:

a. Provide the non-Federal share of construction costs, as further specified below:

1) Provide, during design, 25 percent of the costs of design for the general navigation features of the project in accordance with the terms of the design agreement for the project;

2) Provide, during construction, 25 percent of the costs of the general navigation facilities allocated to that portion of the project with a channel depth in excess of 20 feet but not in excess of 50 feet.

b. Provide all real property interests, including those required for relocations and dredged material placement facilities, acquire or compel the removal of obstructions, and perform or ensure the performance of all relocations, including utility relocations, as determined by the Federal government to be necessary for the construction, operation, and maintenance of the general navigation features;

c. Pay, with interest over a period not to exceed 30 years following completion of construction of the general navigation features, an additional amount equal to 10 percent of the construction costs of the general navigation features less the amount of credit afforded by the Federal government for the value of the real property interests and relocations, including utility relocations, provided by the non-Federal sponsor for the general navigation features, except for the value of the real property interests and relocations provided for mitigation, which is included in the construction costs of the general navigation features;

d. Ensure that the local service facilities are constructed, operated, and maintained at no cost to the Federal government, and that all applicable licenses and permits necessary for construction, operation, and maintenance of such work are obtained;

e. Give the Federal government a right to enter, at reasonable times and in a reasonable manner, upon the real property interests that the non-Federal sponsor owns or controls for the purpose of operating and maintaining the project;

f. Hold and save the Federal government free from all damages arising from design, construction, operation and maintenance of the project, except for damages due to the fault or negligence of the Federal government or its contractors;

g. Perform, or ensure performance of, any investigations for hazardous, toxic, and radioactive wastes (HTRW) that are determined necessary to identify the existence and extent of any HTRW regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, and any other applicable law, that may exist in, on, or under real property interests that the Federal government determines to be necessary for construction, operation and maintenance of the general navigation features;

h. Agree, as between the Federal government and the non-Federal sponsor, to be solely responsible for the performance and costs of cleanup and response of any

HTRW regulated under applicable law that are located in, on, or under real property interests required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination, without reimbursement or credit by the Federal government;

i. Perform the non-Federal sponsor's responsibilities in a manner that will not cause HTRW liability to arise under applicable law to the maximum extent practicable; and

j. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. 4630 and 4655) and the Uniform Regulations contained in 49 C.F.R Part 24, in acquiring real property interests necessary for construction, operation, and maintenance of the project including those necessary for relocations, and placement area improvements; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program or the perspective of higher review levels within the executive branch. Consequently, the recommendation may be modified before it is transmitted to the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to the Congress, the State of Georgia, the non-Federal sponsor (the Georgia Ports Authority), interested Federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

Date

Joseph R. Geary, PhD, PE
Colonel, U.S. Army
Commanding

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