

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** Areas of Controversy - Executive Summary MOBILE Harbor GRR  
**Date:** Monday, July 2, 2018 9:08:00 AM  
**Attachments:** [areas of controversy.docx](#)

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All: I have updated the Areas of Controversy in the executive summary (changes highlighted in yellow) to include the locations in the report where the issue was addressed. Please let me know if I need to make changes or additions.

(b)(6)

## AREAS OF CONTROVERSY AND UNRESOLVED ISSUES

Areas of Controversy: The public has raised a number of issues through letters, e-mails and public involvement meetings. They include the following:

*Channel dredging disrupts the sediment transport to Dauphin Island.* Impacts of channel dredging on Dauphin Island remains a controversial issue. (b)(5)

(b)(5)

(b)(5)

(b)(5) See Section 5.3.3 Sediment Transport within the main report and Section 6.3.1, Appendix A for additional information.

*Placement location of Bar Channel material.* The placement location of the material dredged from the Bar Channel, in particular during maintenance operations, is an area of controversy. Dauphin Island residents and members of the public have expressed concerns that the material dredged from the Bar Channel during maintenance is not placed in an area that benefits the island. This study includes an assessment of a proposed extension to the SIBUA. See Section 4.2.2.3 SIBUA for the Bar Channel within the main report for additional information.

*Placement of new work dredged material within the Relic Shell Mined Area.* The public has expressed concern that the proposed placement of material within the formerly shell mined area could impact fishing. They also have concerns that material placed in the site may drift out of the relic shell mined area onto the living oyster reefs within the bay. (b)(5)

(b)(5)

See Sections 4.2.1 New Work Material Placement Options, 4.2.3 Construction Methodology, 5.4.2 Soils, 5.4.4 Sediment Quality, 5.7 Dredged and Placement Areas, 5.8.7 Essential Fish Habitat, 5.8.9 Benthic Invertebrates, 5.12 Fisheries Resources, 5.17 Cultural and Historic Resources, and 6.1 Cumulative Impacts within the main report for additional information.

*Environmental impacts caused by channel modifications.* The results of the modeling data and environmental impact analysis are another area of controversy. (b)(5)

(b)(5)

*Shoreline erosion caused by ship wake.* Shoreline erosion and impacts to aquatic resources caused by the ship wake of larger vessels transiting the channel is an area of concern. (b)(5)

(b)(5)

Additional information can be found in Section 5.3.1 Waves in the main report and Section 6.4, Appendix A.

*Impacts to Environmental Justice Communities.* Impacts associated with the growth of the harbor on the air quality, traffic, and safety of the environmental justice communities adjacent to the harbor remain an area of concern. (b)(5)

(b)(5)

(b)(5) ee Sections 2.5.12 Air Quality, 2.5.13 Hazardous and Toxic Materials, 2.5.14 Noise, 2.5.19 Socioeconomics, and 2.5.20 Transportation for additional information on the existing conditions. See Sections 5.14 Air Quality, 5.15 Hazardous and Toxic Materials, 5.16 Noise, 5.20 Socioeconomics, and 5.21 Transportation for additional information on the environmental effects of the TSP.

Issues to be Resolved: The USACE, Mobile District will continue to coordinate the proposed action and the associated impacts identified above as well as any new concerns that are identified during the review period with the USACE, South Atlantic Division and Headquarters, as well as the NFS, state and Federal agencies, stakeholders, and concerned public. Several commitments require additional coordination with resource agencies. They include:

- Further consideration of potential beneficial use of dredged material projects
- Location and analysis of oyster reefs not documented by the Alabama Department of Conservation and Natural Resources, Marine Resources Division
- Cultural resource survey in the widened area of the bay channel and bend easings
- Certification of the proposed extensions to the SIBUA and the ODMDS
- Certification of the Relic Shell Mined Area

In addition, there are several Design (Preconstruction Engineering and Design) phase commitments that will be required prior to construction. They include:

- Continued coordination with environmental agencies and the public for beneficial use opportunities with the new work dredged material
- A refined ship simulation analysis to ensure widening measures safely accommodate meeting vessels and to determine if the magnitude of modifications could be reduced in the bend easing and turning basin
- Sediment testing of the new work material prior to placement within the proposed locations
- Additional geotechnical investigation within the navigation channel
- Surveys to confirm that there are no underwater utilities/pipeline crossing obstructions

## **AREAS OF RESIDUAL RISK**

Risk and uncertainty exists in the potential fluctuation of the Federal interest rate, changes in vessel operating costs, deviations from vessel or cargo forecasts, and unexpected construction costs. (b)(5)

(b)(5)

(b)(5)



**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** Emailing: Joly Briefing 02 Jul 2018.pptx  
**Date:** Monday, July 2, 2018 8:59:00 AM  
**Attachments:** [Joly Briefing 02 Jul 2018.pptx](#)

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Joly Briefing 02 Jul 2018.pptx

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# MOBILE HARBOR GRR

## With Integrated Supplemental Environmental Impact Statement

Update Briefing For  
COL Sebastien Joly  
District Commander  
02 July 2018



*“The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation.”*



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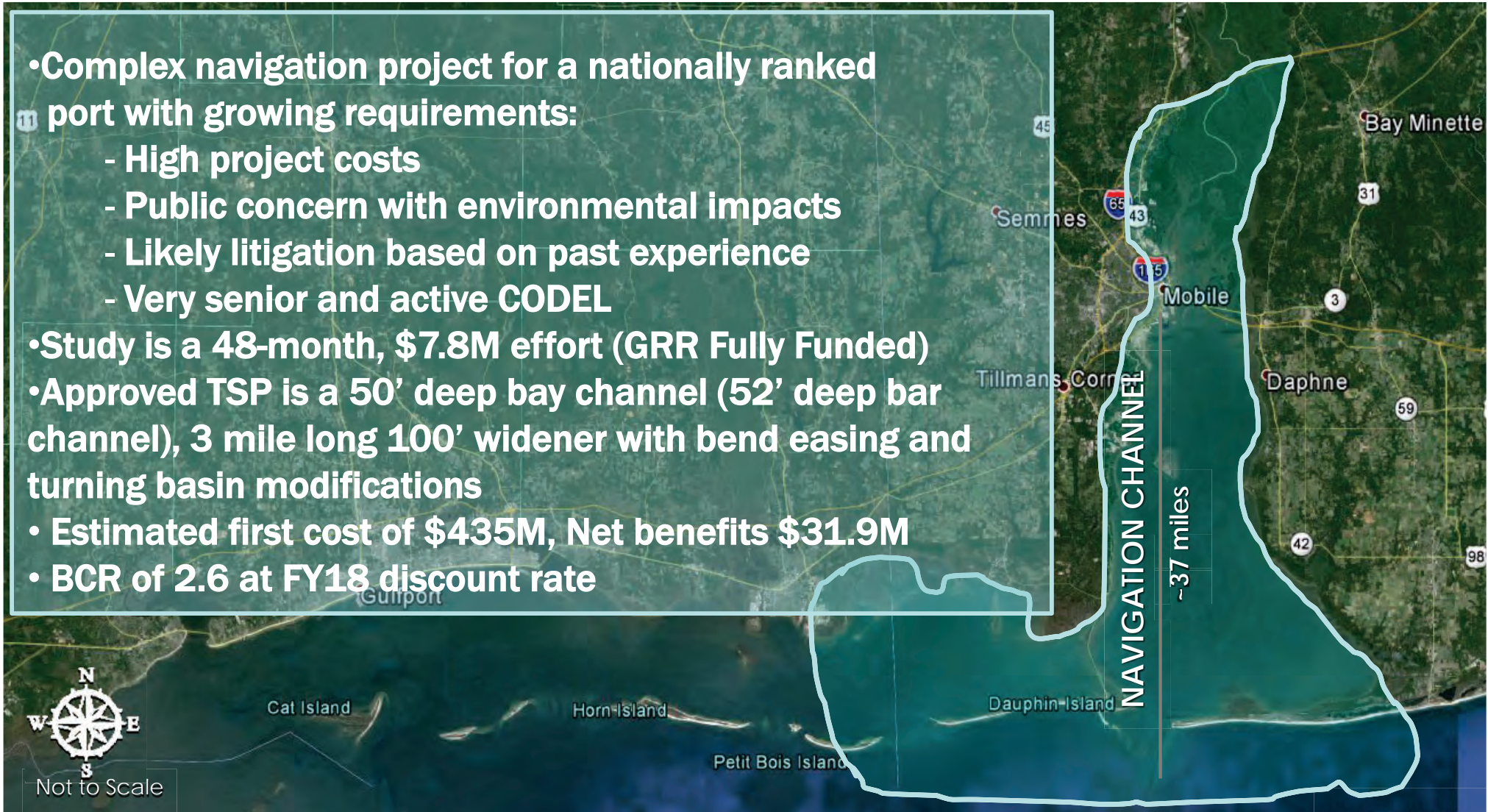




# MOBILE HARBOR GRR

## BOTTOM LINE UP FRONT

- Complex navigation project for a nationally ranked port with growing requirements:
  - High project costs
  - Public concern with environmental impacts
  - Likely litigation based on past experience
  - Very senior and active CODEL
- Study is a 48-month, \$7.8M effort (GRR Fully Funded)
- Approved TSP is a 50' deep bay channel (52' deep bar channel), 3 mile long 100' widener with bend easing and turning basin modifications
- Estimated first cost of \$435M, Net benefits \$31.9M
- BCR of 2.6 at FY18 discount rate



# MOBILE HARBOR GRR BACKGROUND

*“Modernizing the Port of Mobile is necessary because 2/3<sup>rds</sup> of the Port of Mobile’s vessel traffic today is restricted or delayed directly impacting shipper costs and competitiveness.”*

*- James K. Lyons, ASPA Director*

## Full Service Seaport

- ✓ 10<sup>th</sup> Largest in the U.S.
- ✓ 58M+ Tons of Cargo Handled Port-wide

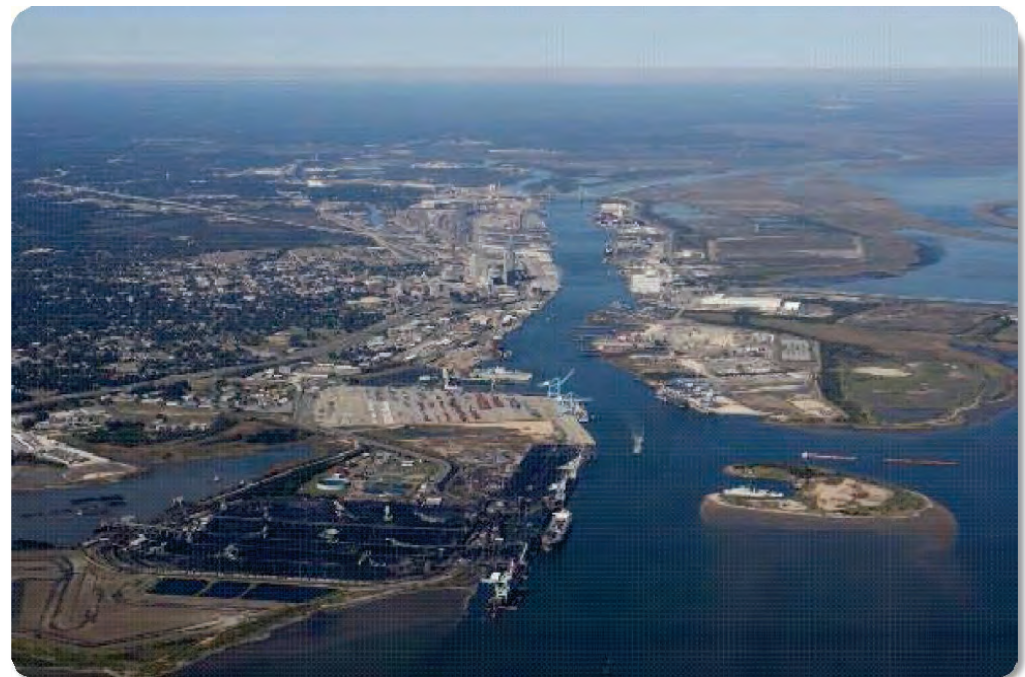
## Growth Steadily Climbs

- ✓ Record 2017 20% Container Growth
- ✓ Ranked #2 Steel Port in U.S.
- ✓ Ocean Carriers continue to add service

## Strong Exporter of U.S Materials and Goods

## Contributes Significantly to the Economy

- ✓ 153,000+ Jobs
- ✓ \$25.1B in economic value





# MOBILE HARBOR GRR

## AGENCY COORDINATION

- Charrette Jan 28-29, 2015
- Cooperating Agency Meetings Dec 2015, Mar 2016, Sep 2016, Feb 2017, Sep 2017, and Feb 2018
- Beneficial Use Meetings May 2016 and Jan 2018

### GENERAL NATURE OF AGENCY CONCERNS

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>➤ <b>Effects on Physical Parameters</b> <ul style="list-style-type: none"> <li>- Water circulation</li> <li>- Salinity</li> <li>- Dissolved Oxygen</li> <li>- Sedimentation</li> <li>- Shoreline Erosion</li> <li>- Storm Surge</li> </ul> </li> <li>➤ <b>Beneficial Use Opportunities</b></li> <li>➤ <b>Accurately Capturing Baseline Conditions</b></li> </ul> | <ul style="list-style-type: none"> <li>➤ <b>Natural Resources</b> <ul style="list-style-type: none"> <li>- Fisheries</li> <li>- Essential Fish Habitat</li> <li>- Submerged Aquatic Vegetation</li> <li>- Oysters</li> <li>- Marshes and Wetlands</li> <li>- Protected Species</li> <li>- Benthic Communities</li> <li>- Shoreline Erosion</li> </ul> </li> <li>➤ <b>Cultural Resources</b></li> </ul> |
|---|--|

### FEDERAL AND STATE COOPERATING AGENCIES

- Alabama Department of Environmental Management
- Alabama Department of Conservation and Natural Resources
- Alabama State Historic Preservation Office
- Alabama Department of Transportation
- Geological Survey of Alabama
- U.S. Fish and Wildlife Service
- NOAA National Marine Fisheries Service
- Environmental Protection Agency
- U.S. Geological Survey
- Federal Emergency Management Agency
- Mobile Bay National Estuary Program



# MOBILE HARBOR GRR

## PUBLIC ENGAGEMENT

- Public scoping meeting Jan 2016
- Public Meetings Mar 2017, Sep 2017, and Feb 2018
- Focus Group Meetings with Seafood Interests, Environmental NGOs, Dauphin Island Interests, and Environmental Justice Communities
- Bi-weekly Updates, Quarterly Newsletters, Social Media, Listserv

### GENERAL NATURE OF PUBLIC COMMENTS

- Erosion impacts to Dauphin Island
- Placing material on eroding shorelines
- Interruption of coastal processes
- Reestablishment of sand transport to Dauphin Island
- Beneficial use of dredged material
- Impacts to wildlife
- Impact to oysters and other commercial fisheries
- Impacts to recreational fishing
- Creating unwanted islands
- Climate change
- Impacts to cultural resources
- Support for project



# MOBILE HARBOR GRR TENTATIVELY SELECTED PLAN

- ❑ Channel Deepening: 50 feet
  - ❑ Channel Widening: 3 mi. long, 100 ft wide\*
  - ❑ Turning Basin Modification
  - ❑ Bar Channel Bend Easing
- \* Environmental impact analysis is based on a 100 foot widener for a distance of 5 miles

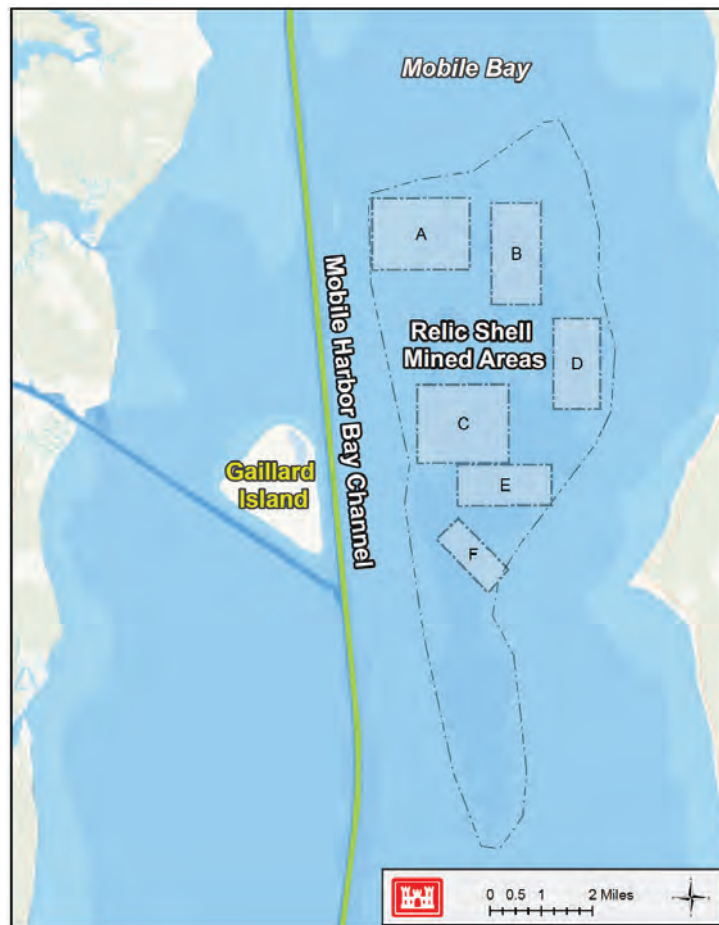




# MOBILE HARBOR GRR DREDGED MATERIAL PLACEMENT

## Proposed Placement:

- ❑ Formerly Relic Shell Mined Area
- ❑ Sand Island Beneficial Use Area
- ❑ Pelican/Sand Island Complex
- ❑ Ocean Dredged Material Disposal Site





# MOBILE HARBOR

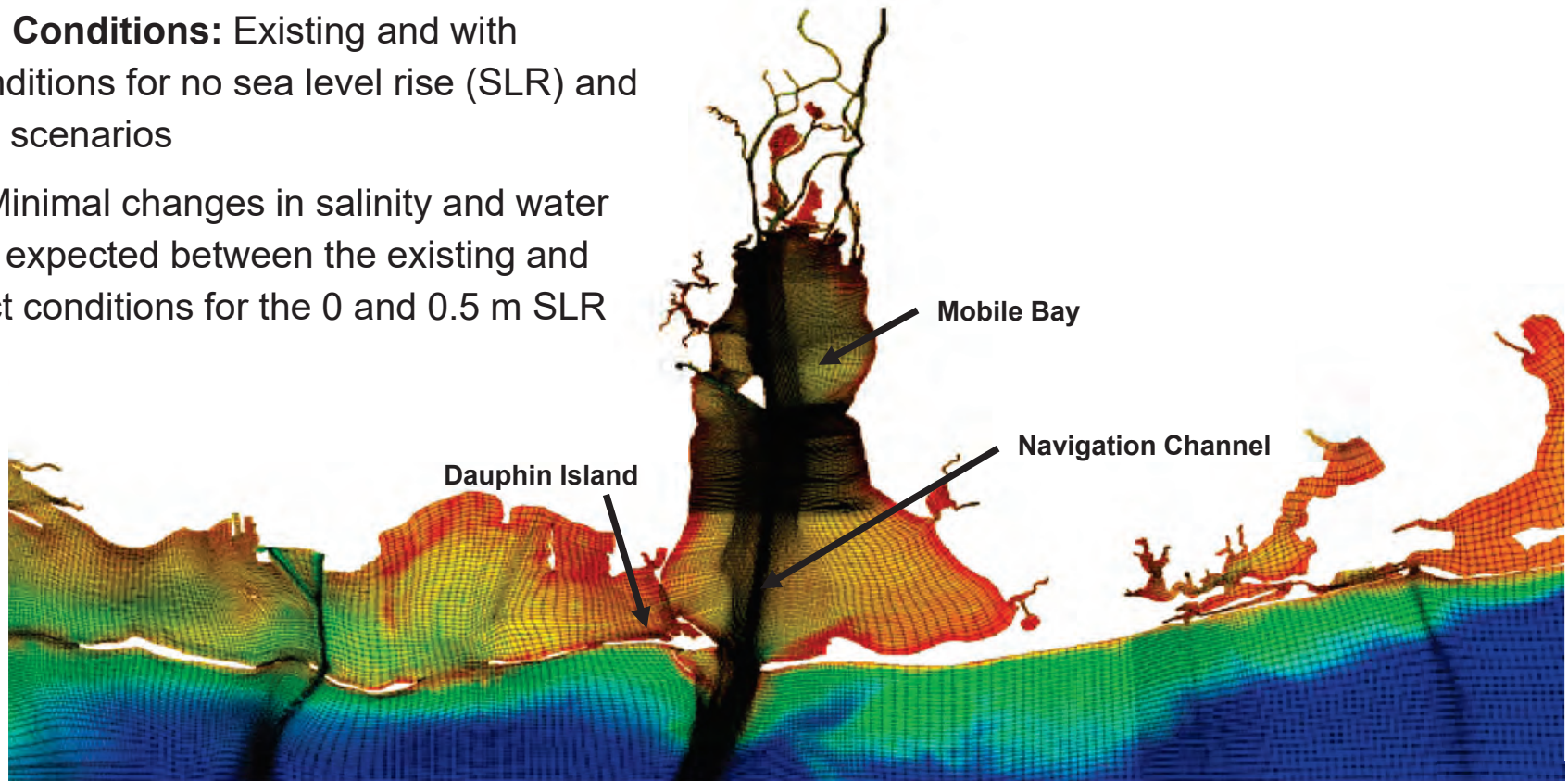
## HYDRODYNAMIC & WATER QUALITY MODELING

**Approach:** Conduct hydrodynamic and water quality modeling to (1) characterize the physical conditions and processes of the study area and (2) determine the relative changes due to widening and deepening the channel (i.e., 5' deeper for the entire channel with a 100' wide x 5 mile long widener in the southern Bay).

**Simulation Period:** January 2010 – December 2010

**Simulated Conditions:** Existing and with project conditions for no sea level rise (SLR) and 0.5 m SLR scenarios

**Results:** Minimal changes in salinity and water quality are expected between the existing and with project conditions for the 0 and 0.5 m SLR cases.



Model Extents



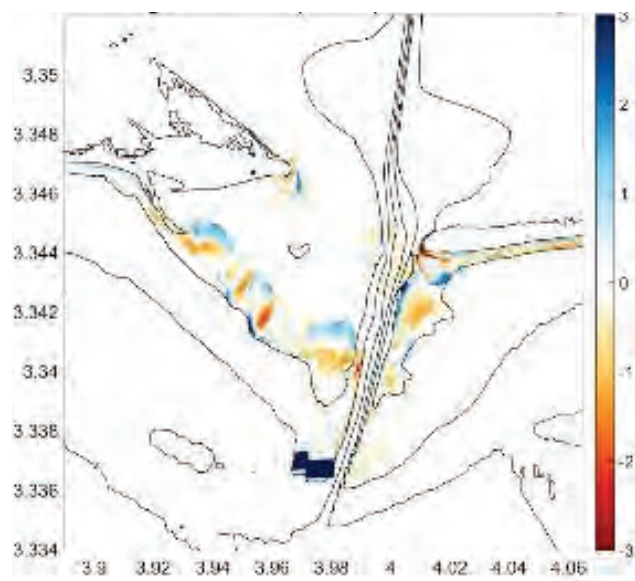
# MOBILE HARBOR SEDIMENT TRANSPORT MODELING

**Approach:** Conduct estuarine (fine-grained) and coastal (coarse-grained) sediment transport modeling to evaluate possible effects of widening and deepening the channel on sediment transport in Mobile Bay and on the ebb-tidal shoal/nearshore coastal areas.

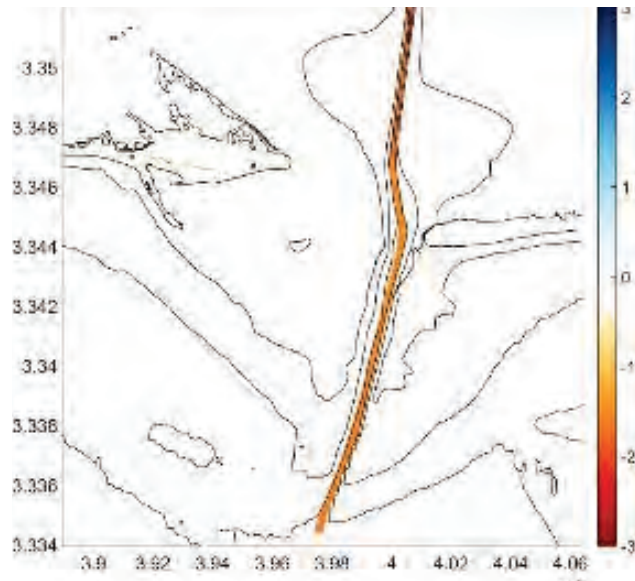
**Simulation Period:** Estuarine (January 2010 – December 2010)  
Coastal (10-yr simulation derived from data spanning from 1998 – 2016)

**Simulated Conditions:** Existing and with project conditions for no sea level rise (SLR) and 0.5 m SLR scenarios

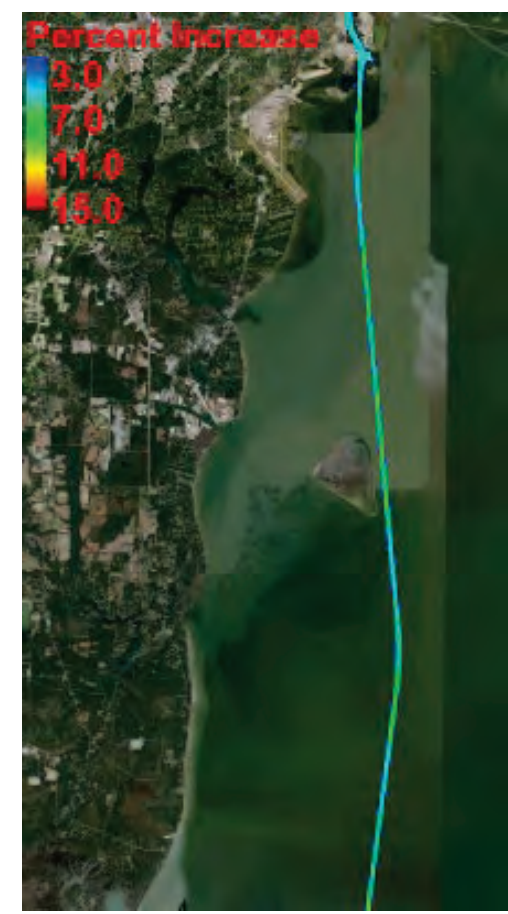
**Results:** Minimal bed level changes expected between the existing and with project conditions in the bay and on ebb-tidal shoal. Shoaling rates are expected to increase between 5 – 15%.



With Project Condition 10 Year Simulation  
Bed Level Change (+/- Erosion/Deposition, m)



With Project - Existing Condition  
Bed Level Change (+/- Erosion/Deposition, m)



With Project Simulation  
Percent Increase in Channel Shoaling





# MOBILE HARBOR

## FUTURE MAINTENANCE MATERIAL PLACEMENT

**Approach:** Compare short and long-term changes in bathymetry to quantify sediment transport rates and identify transport pathways along the ebb-tidal shoal to determine if adequate disposal capacity exists for future maintenance material placement in the Sand Island Beneficial Use Area (SIBUA).

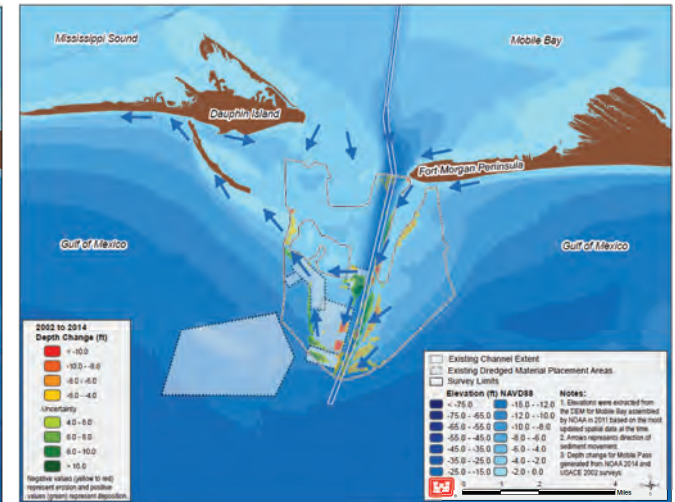
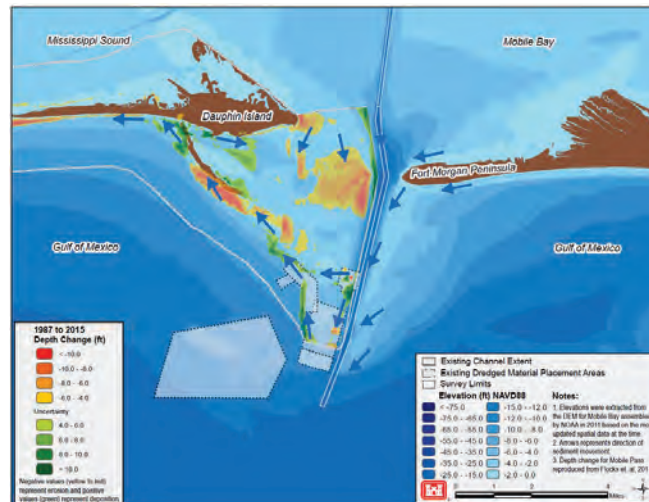
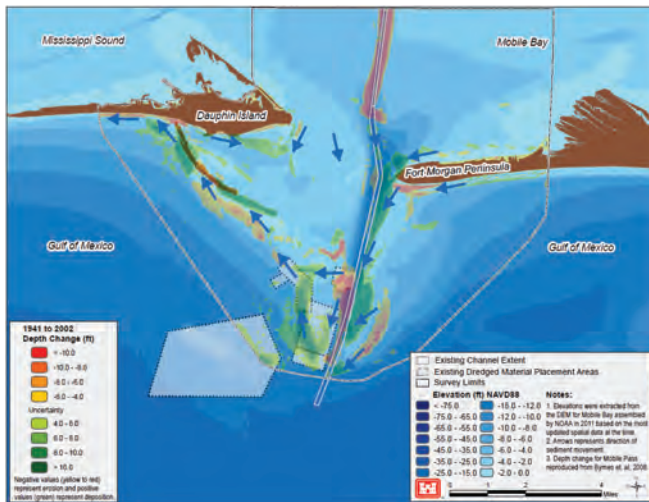
**Analysis Period:** 1941 – 2015

**Results:** Consistent sediment transport pathways are observed over the short and long-term periods. Material placed in SIBUA is in the active transport system; however, since placement in SIBUA was initiated in 1999, material has left the site at a lower rate than it has been placed in the site resulting in a need for expansion in the north/northwest direction to accommodate future needs.

Mobile Pass Bed Level Change 1941 to 2002

Mobile Pass Bed Level Change 1987 to 2015

Mobile Pass Bed Level Change 2002 to 2014



Depth change reproduced from Byrnes et. al, 2008 "Evaluation of Channel Dredging on Shoreline Response at and Adjacent to Mobile Pass, Alabama"

Depth change reproduced Flocks, et. al, 2017 "Analysis of Seafloor Change around Dauphin Island, Alabama, 1987–2015" Open-File Report 2017–1112.

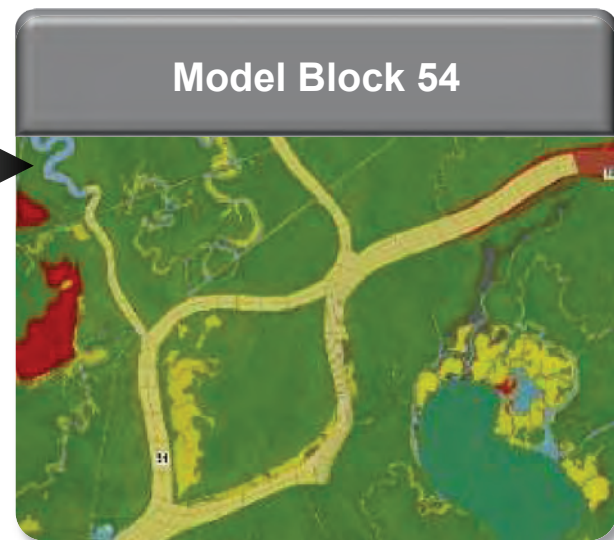
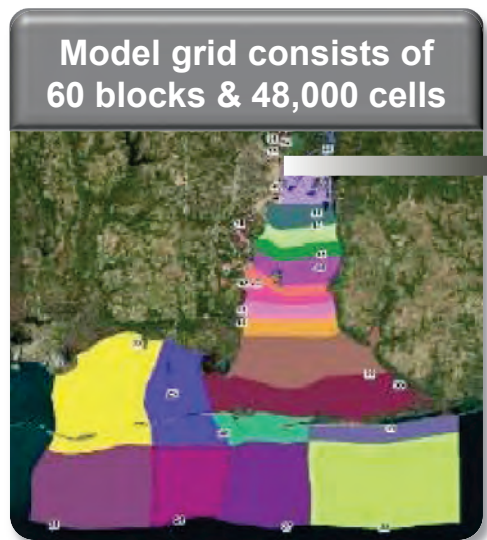
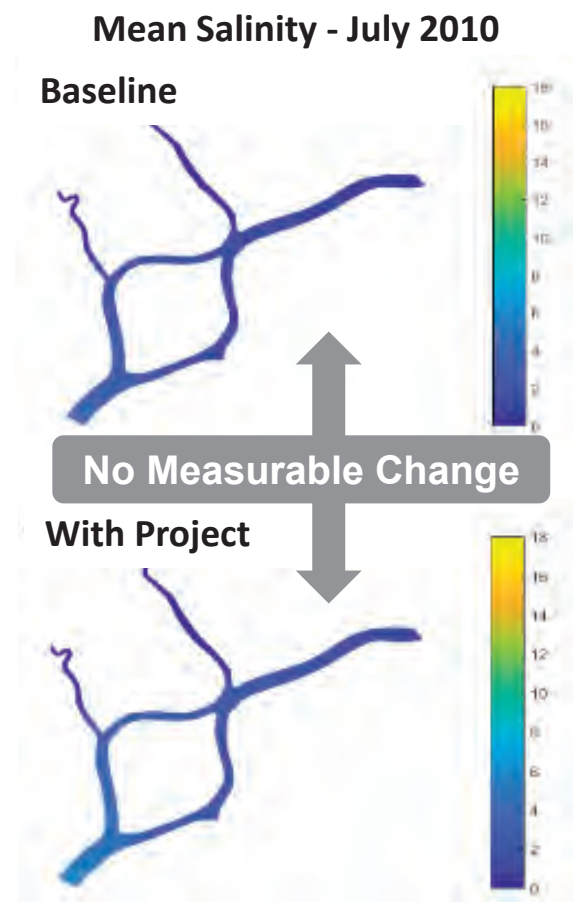
Depth change generated from USACE 2002 and NOAA 2014 surveys.



# MOBILE HARBOR GRR AQUATIC RESOURCES ASSESSMENT

## Overview

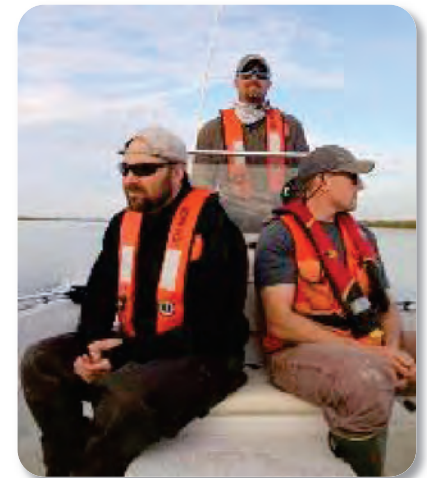
- Assessing potential impacts to wetlands, submerged aquatic vegetation, benthic invertebrates, oysters, fish
- Model outputs predicting changes in water quality (salinity, dissolved oxygen) comparing existing and post-project conditions
- Sea level rise scenario - 0.5 meter intermediate projection per USACE guidance at Dauphin Island



# MOBILE HARBOR GRR

## AQUATIC RESOURCES ASSESSMENT SUMMARY

- No major impacts (i.e., loss of resources) anticipated for:
  - ✓ Wetlands
  - ✓ Submerged Aquatic Veg.
  - ✓ Oysters
  - ✓ Benthic Invertebrates
  - ✓ Fish
- Project impacts remain negligible under 0.5 meter sea level rise scenario





# MOBILE HARBOR GRR

## KEY RISKS/UNCERTAINTIES

Task	Risk Description	Risk Rating	Task	Risk Description	Risk Rating
<i>Cultural Resource Surveys</i>	Cultural resource survey limited to widening only. New discovery or discovery during construction could impact construction cost.	L	<i>Ship Simulations</i>	Limited ship simulations may not adequately capture dimensions required for safe and efficient travel. PED phase investigation could impact construction costs and plan selection.	M
<i>Sediment Testing</i>	Sediment testing delayed until PED phase. Construction cost for removal and placement of contaminated material could impact construction cost.	M	<i>Pipeline Crossings</i>	Unknown/undetected pipeline crossings could impact construction cost.	M
<i>Geotechnical data</i>	Limited geotechnical investigation performed in study phase. PED phase investigation could impact construction cost.	L	<i>Vessel Generated Wave Energy (i.e., Ship Wake) Assessment</i>	The assessment is ongoing; therefore, the effects are currently unknown and mitigation coordination (if necessary) has not begun.	M
<i>Disposal Capacity</i>	Expansion of both ODMDS and SIBUA dependent upon WQC & CZC certifications from the State and ESA, EFH, and NHPA concurrences.	M	<i>Public Acceptance</i>	Litigation on environmental/ Dauphin Island impacts could affect project schedule.	H

# MOBILE HARBOR GRR

## WHAT'S NEXT

- **Release Draft Report with NEPA for Public, Technical, Policy, and Legal Review (Jul 2018)**
- **Public Meeting on Draft Report (Aug 2018)**
- **Agency Decision Milestone (Nov 2018)**



# MOBILE HARBOR GRR

## QUESTIONS?



US Army Corps  
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**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** FW: Chief meeting with SEN Shelby  
**Date:** Monday, July 2, 2018 1:08:00 PM  
**Attachments:** [Mobile Harbor Paper - April 2018 pft.docx](#)

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This is the latest that I have...

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Sunday, April 22, 2018 7:36 PM  
**To:** (b)(6)  
(b)(6)  
(b)(6)  
(b)(6)  
**Cc:** DeLapp, James Andrew (Jim) COL USARMY CESAM (US) <James.A.Delapp@usace.army.mil>  
**Subject:** FW: Chief meeting with SEN Shelby

Guys - Here are my recommended edits (in track changes) to the Mobile Harbor info paper in response to (b)(6) questions. Pls review/verify I've stated properly, in particular the part about how this satisfies the NFS's goals of wider/deeper at less than \$400M. (b)(6) need to fill in the PED amount (I left it as \$XM for PED). Will call in the AM before I fly. Thanks.

(b)(6)

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Sunday, April 22, 2018 4:35 PM  
**To:** (b)(6)  
(b)(6)  
(b)(6)  
(b)(6)  
**Subject:** Fwd: Chief meeting with SEN Shelby

Fyi

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From: (b)(6)

Date: April 22, 2018 at 2:28:06 PM PDT

To: (b)(6)

(b)(6)

(b)(6)

(b)(6)

Cc: (b)(6) DeLapp, James

Andrew (Jim) COL USARMY CESAM (US) <James.A.Delapp@usace.army.mil>, (b)(6)

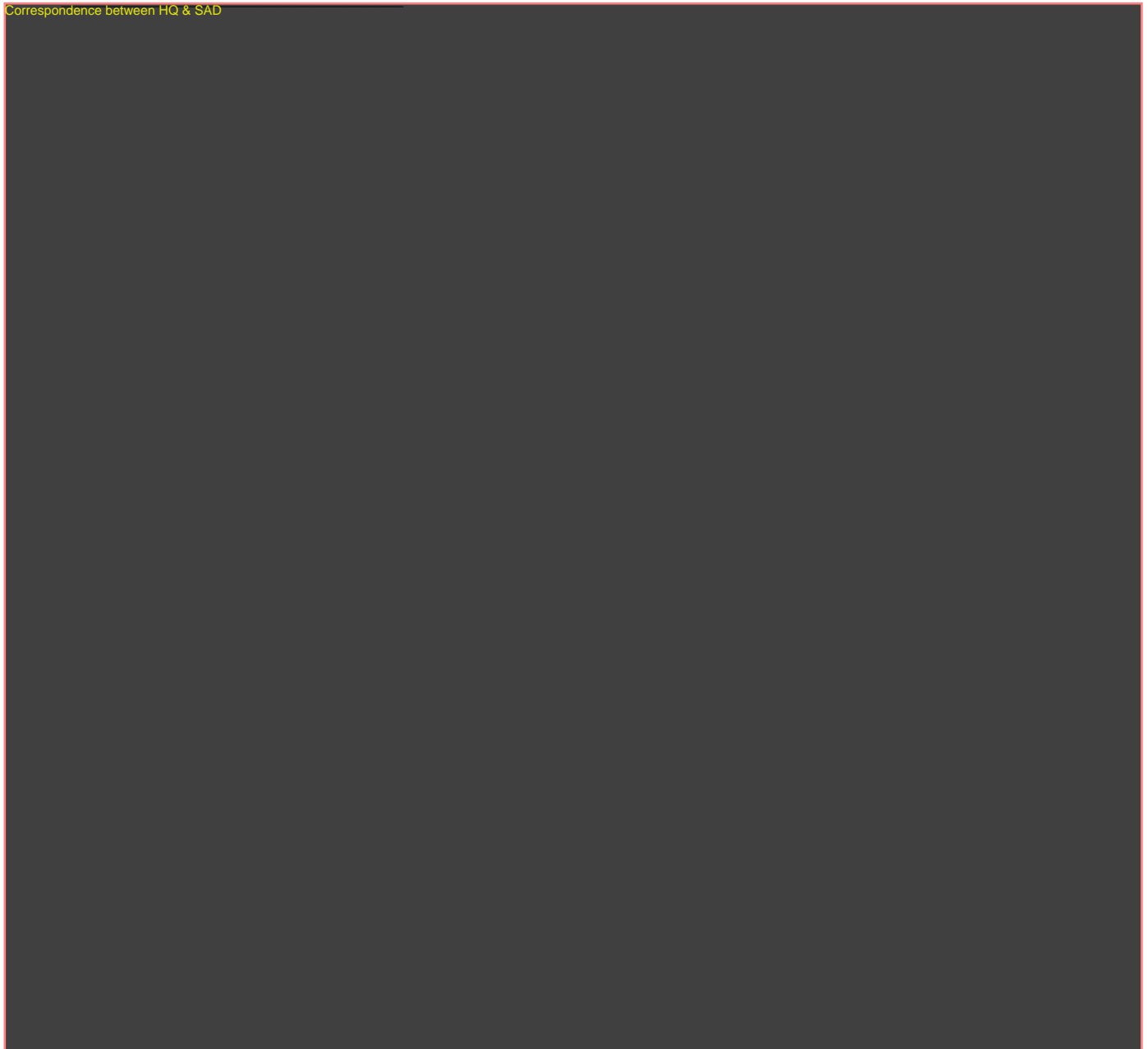
(b)(6)

Subject: RE: Chief meeting with SEN Shelby

(b)(6) I'll start to revise later when I can get on my computer. One nuance we need to clarify for this paper...while we don't have the final decision, email this week indicated HQ is agreeable to delegation of report approval to the MSC...since there is no 902 issue, there isn't a requirement (as we originally thought) for a Director's Report.

(b)(6)

Correspondence between HQ & SAD



Pages 3 through 6 redacted for the following reasons:

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Correspondence between HQ & SAD



# MOBILE HARBOR GENERAL REEVALUATION REPORT (GRR)

As of: 19 April 2018

U.S. ARMY CORPS OF ENGINEERS

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## INFORMATION PAPER: Mobile Harbor General Reevaluation Report (GRR)

**STUDY BACKGROUND:** The Water Resources Development Act of 1986 (PL 99 – 662, Ninety-ninth Congress, Second Session), approved 17 November 1986, and amended by Section 302 of the Water Resources Development Act of 1996, authorized improvements to the existing Federal project for Mobile Harbor. This act provided authorization for improvements to the existing project to include channel dimensions of: a) 57 feet by 700 feet for a distance of 7.4 miles across the Mobile Bar; b) 55 feet by 550 feet for a distance of 27.0 miles in the bay; c) 55 feet by 650 feet for a distance of 4.2 miles in the bay; d) provision of a 55 foot deep anchorage and turning basin in the vicinity of Little Sand Island; and e.) deepening the Mobile River channel to 55 feet to a point about 1 mile below the Interstate 10 and U.S. 90 highway tunnels. The project has not been constructed to its fully authorized dimensions. The project is currently maintained at a 45 foot depth and 400 foot width in the Bay Channel and a 47 foot depth and 600 foot width in the Bar Channel.

The Corps and Alabama State Port Authority (ASPA) executed a design agreement for a Mobile Harbor Channel Widening Limited Reevaluation Report (LRR) on 14 August 2012. The LRR was evaluating an approximate 5-mile section of the lower bay channel up to the authorized width of 550 feet and to widen an approximate 2-mile section of the bar channel to its authorized width of 700 feet (all work was within the existing project authorization).

In June 2014, the ASPA requested Mobile District halt the LRR and instead initiate a study to evaluate widening and deepening Mobile Harbor to its fully authorized dimensions. The preliminary scoping effort for this study began with a charrette involving federal and state agencies on 28 January 2015. As a result of this charrette, the District prepared an exemption request (from 3X3X3 criteria) to conduct the study in 48 months at a cost of \$7.8M (\$5.906M Fed, \$1.894M non-Fed). The time and cost in excess of 3 years and \$3M was largely needed to adequately quantify the environmental impacts various alternatives will have on Mobile Bay, which is a nationally significant estuary. The Corps' Senior Leadership approved the exemption request on 9 October 2015.

The study is on schedule with the Tentatively Selected Plan (TSP) Milestone occurring on 28 March 2018. The TSP consists of a 4 foot deepening of the channel, or a 51 foot Bar Channel, 49 foot deep Bay Channel, and a 3-mile long by 100 foot channel widener

in the bay with bend easings and turning basin modifications. The benefit to cost ratio is estimated to be 3.0 at the FY18 discount rate, estimated first costs are currently \$360M. The TSP meets the NFS's need to deepen the channel and provide limited channel widening at a total cost not to exceed \$400M. Mobile District is currently preparing the integrated GRR/SEIS with release for agency and public review scheduled for June 2018.

Assuming HQ delegation of GRR approval to the MSC Commander, the GRR will be complete after SAD Commander approval scheduled for May 2019. To ensure a seamless transition from GRR approval to construction, Mobile District would then execute a Design Agreement with the ASPA to proceed with Pre-Construction Engineering and Design (PED). PED duration is estimated at one year at a total cost of \$XM (cost shared 75%/25% with the NFS). Under this scenario, PED could begin as early as May 19 (assuming funding availability) and construction could begin as early as FY20.

**MOBILE HARBOR FACTS:** Mobile Harbor's ranking as a global trading port is consistently in the top twelve nationally. In 2016, the Mobile Harbor ranked 10<sup>th</sup> in terms of tonnage, and 20<sup>th</sup> in terms of container Twenty-Foot Equivalent Units. Other major cargo handled by the port includes coal, steel, petroleum and general cargo.

In 2016, Mobile handled a total of 58 million tons of commerce making it the 10<sup>th</sup> largest port in the United States in terms of total tonnage. Based on the most recent five years of available data (2012 – 2016), foreign shipments averaged 33.1 million short tons. Coal shipments have varied over the period, but remain the largest commodity with 36% of total commerce. Of the total, petroleum products averaged about 23% of the total and crude materials being 12% of total shipments. Primary manufactured goods accounted for 19% of total shipments and chemicals and farm products accounting for 5% and 3% of total shipments.

There is opportunity to deepen and widen the navigation channel at Mobile Harbor to use current vessels more efficiently and accommodate larger vessels. Particularly important is the increase in the deployment of larger containerships which is occurring now and expected to increase as a result of the completion of the Panama Canal Expansion Project. These larger vessels are expected to comprise greater percentages of vessel fleet composition over the next several decades. This transition to larger vessels is expected to occur rapidly.

The coal shipments are currently utilizing cape/post-Panamax size vessels. At the current depth, vessels cannot fully utilize their capacity. Coal shippers forecast that availability of deeper drafts along with the expanded Panama Canal would increase the US coal competitiveness in Asia. Container traffic is currently utilizing panama/post-Panamax vessels. This traffic is also expected to transition to the larger vessels. This expectation is reflected by the permitted expansion plans for the terminal and the operator's delivery of two super post-Panamax cranes.

In addition to the economic opportunities afforded by a larger channel, there are also safety and potential environmental opportunities. Hazards of traffic moving in and out of the port as well as navigation features of the channel would be improved by a larger channel. There is also potential for beneficial use of sediment material that would be obtained from the channel dredging.

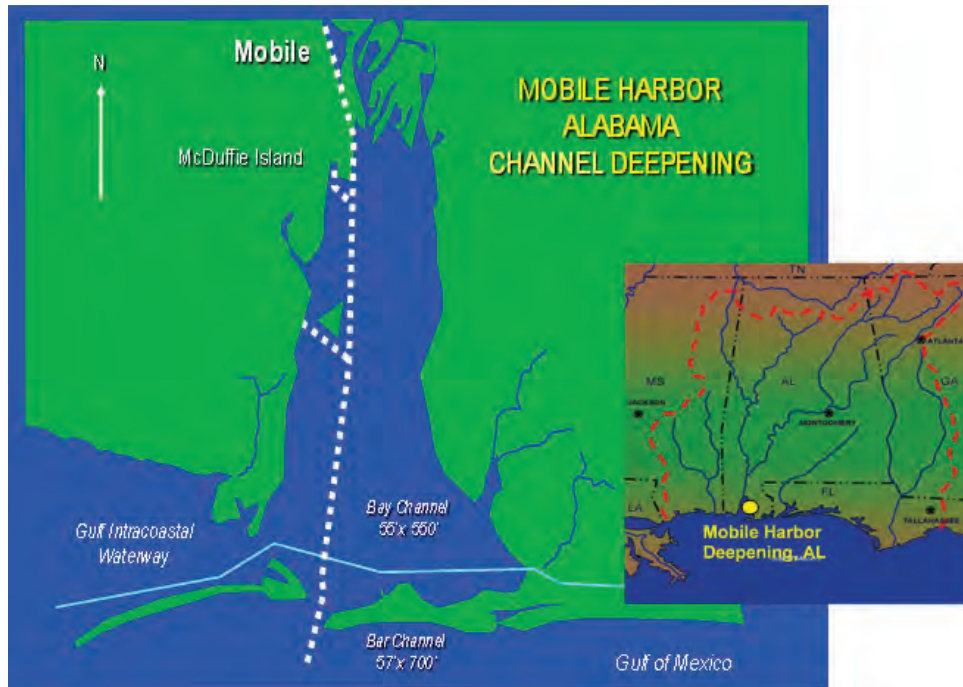
**FUNDING HISTORY:**

FY15 Budget	\$	-	
<b>FY15 Total Allocation</b>	<b>\$</b>	<b>600,000</b>	Reallocation (\$600,000)
FY16 Budget	\$	400,000	
<b>FY16 Total Allocation</b>	<b>\$</b>	<b>1,488,000</b>	Work Plan (\$1,088,000)
FY17 Budget	\$	1,246,000	
<b>FY17 Total Allocation</b>	<b>\$</b>	<b>1,774,500</b>	Work Plan (\$378,500) & Reprogramming (\$150,000)
FY18 Budget	\$	0	
<b>FY18 Allocation</b>	<b>\$</b>	<b>49,900</b>	Reprogramming (\$49,900)
FY19 Budget	\$	-	

FY18 study efforts are being funded through a FY18 reprogramming (shown above) and funding, as required, during the Continuing Resolution period. Thus far, \$696,000 has been obligated on the study. Funding to complete the study, required in the Workplan (this includes the FY18 funding provided to date, is \$1.993 million. The Administration, through the ASACW has directed the Corps to fully fund the study to completion in the workplan.

**LOCAL INTEREST OR OPPOSITION:** The project will require action by Federal, State & local agencies (USFWS, NMFS, EPA, ADEM, ADCNR, SHPO, etc.). This includes preparation of a Supplemental Environmental Impact Statement, Section 7 Consultation, Section 103 Concurrence/Section 102 Designation, and a cultural resources assessment. Preliminary modeling results of environmental impacts from a wider/deeper channel have not identified any major concerns. Nevertheless, there is likely to be public dispute related to potential water quality changes and associated impacts to sensitive fish and wildlife habitat (oyster reefs, sea grasses, and wetlands) and, potential shoreline impacts along the western shore of Mobile Bay and Dauphin Island. Mobile Harbor has a significant litigation history in regard to the channel’s impacts on Dauphin Island.

**CONGRESSIONAL INTEREST:** SEN Richard Shelby (R-AL), SEN Doug Jones (D-AL), REP Bradley Byrne (R-AL-1)



**HQs POC:** Mr. Bradd Schwichtenberg, CECW-SAD, 202-761-1367,  
bradd.r.schwichtenberg@usace.army.mil

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** FW: Areas of Controversy - Executive Summary MOBILE Harbor GRR  
**Date:** Monday, July 2, 2018 9:15:00 AM  
**Attachments:** [areas of controversy.docx](#)

---

Please delete the first giant file, I intended to include just the areas of controversy and forgot to delete the rest of the report.

Also, I meant to include "6.1 Cumulative Impacts" for the Channel dredging disrupts the sediment transport to Dauphin Island.

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Monday, July 02, 2018 9:08 AM  
**To:** (b)(6)  
(b)(6)

**Subject:** Areas of Controversy - Executive Summary MOBILE Harbor GRR

All: I have updated the Areas of Controversy in the executive summary (changes highlighted in yellow) to include the locations in the report where the issue was addressed. Please let me know if I need to make changes or additions.

(b)(6)



## AREAS OF CONTROVERSY AND UNRESOLVED ISSUES

Areas of Controversy: The public has raised a number of issues through letters, e-mails and public involvement meetings. They include the following:

*Channel dredging disrupts the sediment transport to Dauphin Island.* Impacts of channel dredging on Dauphin Island remains a controversial issue. (b)(5)

(b)(5)

(b)(5) See Section 5.3.3 Sediment Transport within the main report and Section 6.3.1, Appendix A for additional information.

*Placement location of Bar Channel material.* The placement location of the material dredged from the Bar Channel, in particular during maintenance operations, is an area of controversy. Dauphin Island residents and members of the public have expressed concerns that the material dredged from the Bar Channel during maintenance is not placed in an area that benefits the island. This study includes an assessment of a proposed extension to the SIBUA. See Section 4.2.2.3 SIBUA for the Bar Channel within the main report for additional information.

*Placement of new work dredged material within the Relic Shell Mined Area.* The public has expressed concern that the proposed placement of material within the formerly shell mined area could impact fishing. They also have concerns that material placed in the site may drift out of the relic shell mined area onto the living oyster reefs within the bay. (b)(5)

(b)(5)

See Sections 4.2.1 New Work Material Placement Options, 4.2.3 Construction Methodology, 5.4.2 Soils, 5.4.4 Sediment Quality, 5.7 Dredged and Placement Areas, 5.8.7 Essential Fish Habitat, 5.8.9 Benthic Invertebrates, 5.12 Fisheries Resources, 5.17 Cultural and Historic Resources, and 6.1 Cumulative Impacts within the main report for additional information.

*Environmental impacts caused by channel modifications.* The results of the modeling data and environmental impact analysis are another area of controversy. (b)(5)

(b)(5)

*Shoreline erosion caused by ship wake.* Shoreline erosion and impacts to aquatic resources caused by the ship wake of larger vessels transiting the channel is an area of concern. (b)(5)

(b)(5)

Additional information can be found in Section 5.3.1 Waves in the main report and Section 6.4, Appendix A.

*Impacts to Environmental Justice Communities.* Impacts associated with the growth of the harbor on the air quality, traffic, and safety of the environmental justice communities adjacent to the harbor remain an area of concern. (b)(5)

(b)(5)

(b)(5) ee Sections 2.5.12 Air Quality, 2.5.13 Hazardous and Toxic Materials, 2.5.14 Noise, 2.5.19 Socioeconomics, and 2.5.20 Transportation for additional information on the existing conditions. See Sections 5.14 Air Quality, 5.15 Hazardous and Toxic Materials, 5.16 Noise, 5.20 Socioeconomics, and 5.21 Transportation for additional information on the environmental effects of the TSP.

Issues to be Resolved: The USACE, Mobile District will continue to coordinate the proposed action and the associated impacts identified above as well as any new concerns that are identified during the review period with the USACE, South Atlantic Division and Headquarters, as well as the NFS, state and Federal agencies, stakeholders, and concerned public. Several commitments require additional coordination with resource agencies. They include:

- Further consideration of potential beneficial use of dredged material projects
- Location and analysis of oyster reefs not documented by the Alabama Department of Conservation and Natural Resources, Marine Resources Division
- Cultural resource survey in the widened area of the bay channel and bend easings
- Certification of the proposed extensions to the SIBUA and the ODMDS
- Certification of the Relic Shell Mined Area

In addition, there are several Design (Preconstruction Engineering and Design) phase commitments that will be required prior to construction. They include:

- Continued coordination with environmental agencies and the public for beneficial use opportunities with the new work dredged material
- A refined ship simulation analysis to ensure widening measures safely accommodate meeting vessels and to determine if the magnitude of modifications could be reduced in the bend easing and turning basin
- Sediment testing of the new work material prior to placement within the proposed locations
- Additional geotechnical investigation within the navigation channel
- Surveys to confirm that there are no underwater utilities/pipeline crossing obstructions

## **AREAS OF RESIDUAL RISK**

Risk and uncertainty exists in the potential fluctuation of the Federal interest rate, changes in vessel operating costs, deviations from vessel or cargo forecasts, and unexpected construction costs. (b)(5)

(b)(5)

(b)(5)

**From:** (b)(6)  
**To:** (b)(6)  
**Cc:**  
**Subject:** FW: IWR Deliverable: Mobile Harbor IEPR - Panel COI Statement  
**Date:** Monday, July 2, 2018 7:41:00 AM  
**Attachments:** [Mobile Harbor IEPR Panel Conflict of Interest.docx](#)

---

(b)(6) I'm okay with the attached COI. Let me (b)(6) know if you have any issues.

(b)(6) Responses are as follows:

1.) When will the review documents be available? It was noted in the PWS that they were anticipated to be available June 19th but we do like to confirm as this helps with the development of the schedule.

Response: Current anticipated delivery date for release of the DRAFT Report is 20 July.

2.) Are you and the PDT available for a kick-off meeting this Friday (between 11 am and 4pm ET) or any day next week except Wednesday (holiday)? (NOTE: I'm TDY this week and so can't participate. How are things looking for you next week?)?

Response: We will be available the week of 16 July for a kick-off meeting

3.) Has there been any change in the Public Review Comment period? The PWS stated it was anticipated to be 19 June – 7 Aug 2018.

Response: Current asnticipated dates are 20 July through 05 Sep 2018

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Wednesday, June 27, 2018 7:28 PM  
**To:**  
**Cc:** (b)(6)  
**Subject:** FW: IWR Deliverable: Mobile Harbor IEPR - Panel COI Statement

H (b)(6)

Please see attached. Need you and your PDT to review the draft COI form and provide any feedback before COB, 3 July. I have reviewed the form and don't have any comments but need your local perspective on nearby/related studies, projects, etc.

Also, Battelle submitted the following questions I need your feedback on:

\*When will the review documents be available? It was noted in the PWS that they were anticipated to be available June 19th but we do like to confirm as this helps with the development of the schedule.

\*Are you and the PDT available for a kick-off meeting this Friday (between 11 am and 4pm ET) or any day next week except Wednesday (holiday)? (NOTE: I'm TDY this week and so can't participate. How are things looking for you next week?)?

\*Has there been any change in the Public Review Comment period? The PWS stated it was anticipated to be 19 June – 7 Aug 2018.

Please take a look and let me know if you have any questions.

Thanks,

(b)(6)

-----Original Message-----

From: (b)(6)  
Sent: Wednesday, June 27, 2018 6:55 PM

To: (b)(6)  
Cc: (b)(6)

(b)(6)  
Subject: [Non-DoD Source] IWR Deliverable: Mobile Harbor IEPR - Panel COI Statement

Hi (b)(6)

One of the initial action items for this IEPR is to send you the conflict of interest (COI) screening statements for review. As you review the attached COI statements, please confirm we have not overlooked any related USACE projects, models that served as inputs to the project, or involvement with other cooperating agencies or sponsors that would preclude potential peer reviewers from serving on the panel. However, we do not want to present such rigorous screening criteria that would prevent a qualified individual from serving as a reviewer.

We request your review and feedback for these COI statements as soon as possible so we can continue with the recruiting process. Please also share these COI questions with the PDT members and any sponsors, if applicable. Please send back any suggested additions, changes, or the "all clear" to proceed with what we have by COB Monday, July 3, 2018 so that we can continue with recruiting.

Thanks in advance for your feedback and quick turnaround. If you have any questions, please feel free to contact me.

(b)(6)

(b)(6)

(b)(6)

Battelle

141 Longwater Drive

Suite 202

Norwell, MA 02061

Blocked<http://www.battelle.org> <Blocked<http://www.battelle.org/>>

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<Blocked<http://www.linkedin.com/company/battelle>>

Twitter <Blocked<http://www.twitter.com/Battelle>> | YouTube  
<Blocked<http://www.youtube.com/user/battelleinnovations>>

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P Please consider the environment before printing this e-mail.

## Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Mobile Harbor GRR and SEIS

<p>1. Previous and/or current involvement by you or your firm in the Mobile Harbor, Alabama, Draft Integrated General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS) and related projects.</p>	
<p>2. Previous and/or current involvement by you or your firm in deep draft navigation in Mobile Harbor, Alabama, specifically, at the junction of the Mobile River with the head of Mobile Bay.</p>	
<p>3. Previous and/or current involvement by you or your firm in the conceptual or actual design, construction, or operation and maintenance (O&amp;M) of any tasks related to the Mobile Harbor, Alabama, Draft Integrated GRR and SEIS or related projects.</p>	
<p>4. Current employment by the U.S. Army Corps of Engineers (USACE).</p>	
<p>5. Previous and/or current involvement with paid or unpaid expert testimony related to the Mobile Harbor, Alabama, Draft Integrated GRR and SEIS.</p>	
<p>6. Previous and/or current employment or affiliation with members of the cooperating agencies or local sponsors (<i>for pay or pro bono</i>). For Federal Agencies, we are only interested in work in the Mobile Alabama area.:</p> <ul style="list-style-type: none"> <li>• Alabama State Port Authority (ASPA)</li> <li>• U.S. Environmental Protection Agency Region 4,</li> <li>• Alabama Advisory Council on Historic Preservation (ACHP),</li> <li>• U.S. Fish and Wildlife Service – Southeast Region</li> <li>• Alabama State Historic Preservation Officer,</li> <li>• U.S. Coast Guard – District 8CR,</li> <li>• U.S. Maritime Administration (MARAD),</li> <li>• U.S. Geological Survey Southeast,</li> <li>• State of Alabama</li> </ul>	
<p>7. Past, current, or future interests or involvements (financial or otherwise) by you, your spouse, or your children related to Mobile Harbor, Alabama at the junction of the Mobile River with the head of Mobile Bay.</p>	
<p>8. Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically with the Mobile District.</p>	
<p>9. Previous or current involvement with the development or testing of models that will be used for, or in support of the Mobile Harbor, Alabama, Draft Integrated GRR and SEIS project.</p>	

## Panel Conflict of Interest (COI) Screening Questionnaire for the IEPR of the Mobile Harbor GRR and SEIS

<p>10. Current firm involvement with other USACE projects, specifically those projects/contracts that are with the Mobile District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please also clearly delineate the percentage of work you personally are currently conducting for the Mobile District. Please explain.</p>	
<p>11. Any previous employment by USACE as a direct employee, notably if employment was with the Mobile District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.</p>	
<p>12. Any previous employment by USACE as a contractor (either as an individual or through your firm) within the last 10 years, notably if those projects/contracts are with the Mobile District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.</p>	
<p>13. Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning deep draft navigation and include the client/agency and duration of review (approximate dates).</p>	
<p>14. Pending, current, or future financial interests in Mobile Harbor, Alabama, Draft Integrated GRR and SEIS related contracts/awards from USACE.</p>	
<p>15. Significant portion of your personal or office's revenues within the last three years came from USACE contracts.</p>	
<p>16. Significant portion of your personal or office's revenues within the last three years came from Alabama State Port Authority contracts.</p>	
<p>17. Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Mobile Harbor, Alabama, Draft Integrated GRR and SEIS.</p>	
<p>18. Participation in relevant prior and/or current Federal studies relevant to the Mobile Harbor, Alabama, Draft Integrated GRR and SEIS project.</p>	
<p>19. Previous and/or current participation in prior non-Federal studies relevant to the Mobile Harbor, Alabama, Draft Integrated GRR and SEIS project.</p>	
<p>20. Has your research or analysis been evaluated as part of the Mobile Harbor, Alabama, Draft Integrated GRR and SEIS.</p>	
<p>21. Is there any past, present, or future activity, relationship, or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe.</p>	



**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** RE: DCQ comments  
**Date:** Monday, July 2, 2018 9:24:00 AM

---

Okay. Thanks (b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Friday, June 29, 2018 4:28 PM

**To:** (b)(6)

(b)(6)

**Subject:** DCQ comments

(b)(6)

I have gotten through several of (b)(6) DCQ comments, but not all of them. Some will require some additional reading and research to answer.

The edits I have made to the Main Report and the Environmental Existing Conditions so far can be found at:

N: (b)(6)

N: (b)(6)

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** RE: Mobile Harbor GRR  
**Date:** Monday, July 2, 2018 9:36:00 AM

---

First thing next week works. We've reviewed all of [REDACTED] (b)(6) comments and incorporated most.

Yes, please get comments to us today.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 02, 2018 9:34 AM  
**To:** [REDACTED]  
**Cc:** [REDACTED] (b)(6)  
**Subject:** [Non-DoD Source] Re: Mobile Harbor GRR

Hi. [REDACTED] (b)(6) is out this week and I am taking off the later part of the week. I plan to get my final comments to you today. Can we set this up early next week. [REDACTED] (b)(6) picked up on some issues and I am finding issues. All resolvable, but [REDACTED] (b)(6) needs to be part of that meeting. [REDACTED] (b)(6)

Sent from my iPhone

> On Jul 2, 2018, at 9:29 AM, [REDACTED] (b)(6) wrote:

> [REDACTED] (b)(6) Will one of you please give me a call when you have a moment. I want to set up a review for later this week of the draft report before we release it (hopefully next week).

> [REDACTED] (b)(6)

>  
>  
>  
>

**From:**

(b)(6)

**To:**

**Subject:**

Joly Briefing 02 Jul 2018.pptx

**Date:**

Tuesday, July 3, 2018 2:00:00 PM

**Attachments:**

[Joly Briefing 02 Jul 2018.pptx](#)

---

# MOBILE HARBOR GRR

## With Integrated Supplemental Environmental Impact Statement

Update Briefing For  
COL Sebastien Joly  
District Commander  
02 July 2018



*“The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation.”*



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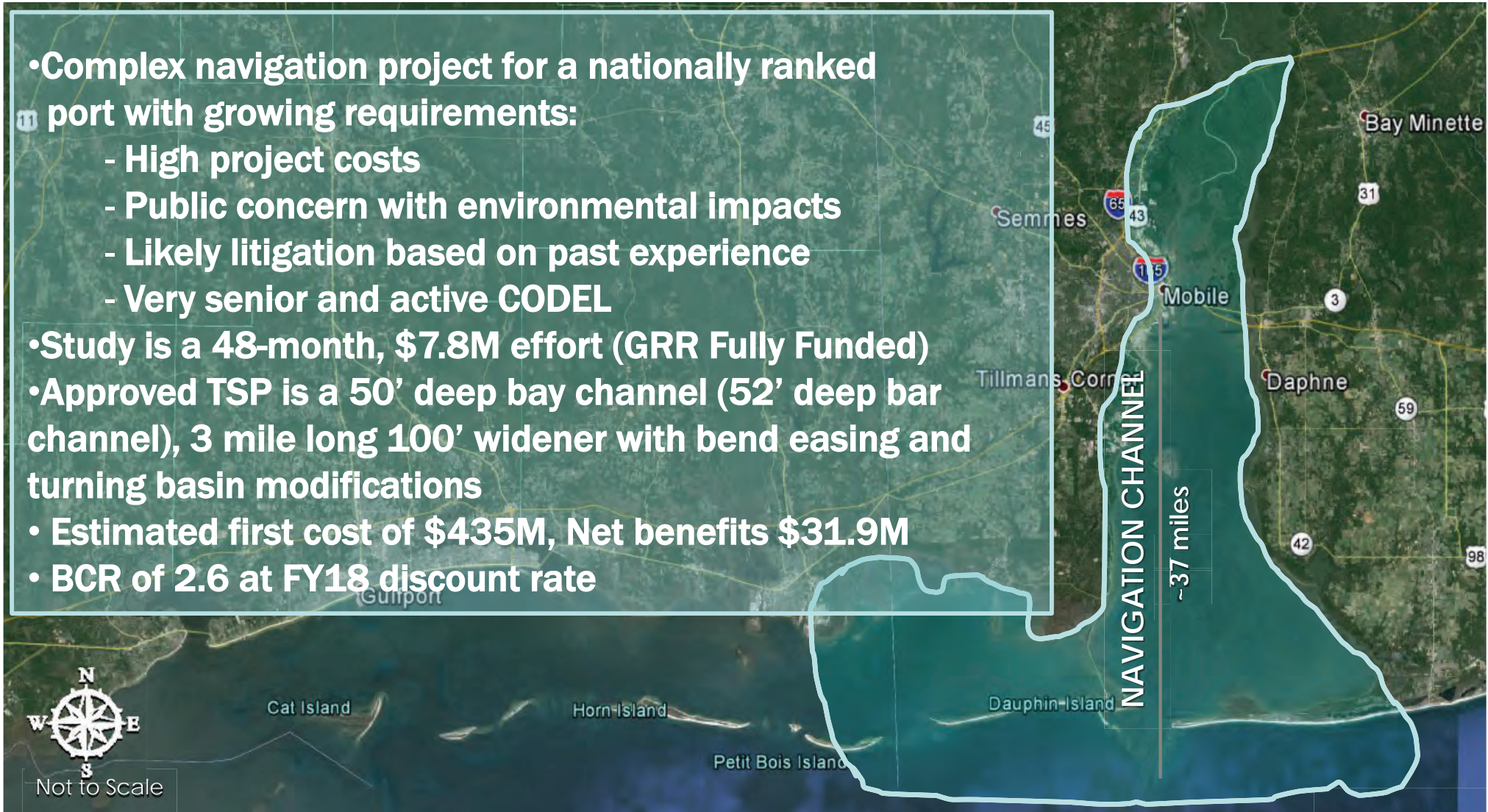




# MOBILE HARBOR GRR

## BOTTOM LINE UP FRONT

- Complex navigation project for a nationally ranked port with growing requirements:
  - High project costs
  - Public concern with environmental impacts
  - Likely litigation based on past experience
  - Very senior and active CODEL
- Study is a 48-month, \$7.8M effort (GRR Fully Funded)
- Approved TSP is a 50' deep bay channel (52' deep bar channel), 3 mile long 100' widener with bend easing and turning basin modifications
- Estimated first cost of \$435M, Net benefits \$31.9M
- BCR of 2.6 at FY18 discount rate



# MOBILE HARBOR GRR BACKGROUND

*“Modernizing the Port of Mobile is necessary because 2/3<sup>rds</sup> of the Port of Mobile’s vessel traffic today is restricted or delayed directly impacting shipper costs and competitiveness.”*

*- James K. Lyons, ASPA Director*

## Full Service Seaport

- ✓ 10<sup>th</sup> Largest in the U.S.
- ✓ 58M+ Tons of Cargo Handled Port-wide

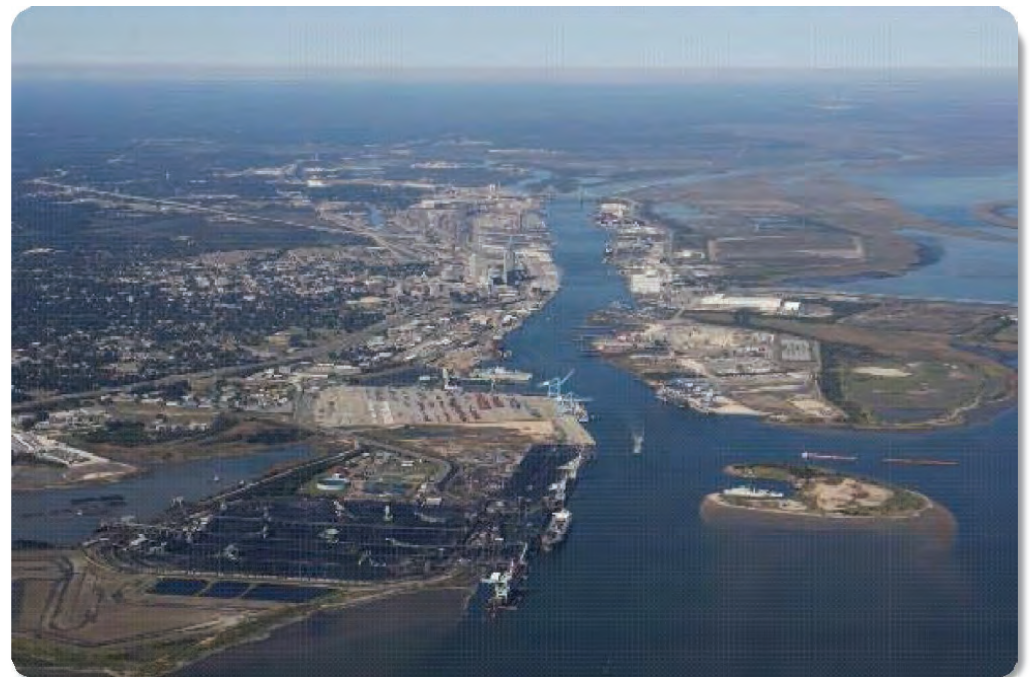
## Growth Steadily Climbs

- ✓ Record 2017 20% Container Growth
- ✓ Ranked #2 Steel Port in U.S.
- ✓ Ocean Carriers continue to add service

## Strong Exporter of U.S Materials and Goods

## Contributes Significantly to the Economy

- ✓ 153,000+ Jobs
- ✓ \$25.1B in economic value





# MOBILE HARBOR GRR

## AGENCY COORDINATION

- Charrette Jan 28-29, 2015
- Cooperating Agency Meetings Dec 2015, Mar 2016, Sep 2016, Feb 2017, Sep 2017, and Feb 2018
- Beneficial Use Meetings May 2016 and Jan 2018

### GENERAL NATURE OF AGENCY CONCERNS

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>➤ <b>Effects on Physical Parameters</b> <ul style="list-style-type: none"> <li>- Water circulation</li> <li>- Salinity</li> <li>- Dissolved Oxygen</li> <li>- Sedimentation</li> <li>- Shoreline Erosion</li> <li>- Storm Surge</li> </ul> </li> <li>➤ <b>Beneficial Use Opportunities</b></li> <li>➤ <b>Accurately Capturing Baseline Conditions</b></li> </ul> | <ul style="list-style-type: none"> <li>➤ <b>Natural Resources</b> <ul style="list-style-type: none"> <li>- Fisheries</li> <li>- Essential Fish Habitat</li> <li>- Submerged Aquatic Vegetation</li> <li>- Oysters</li> <li>- Marshes and Wetlands</li> <li>- Protected Species</li> <li>- Benthic Communities</li> <li>- Shoreline Erosion</li> </ul> </li> <li>➤ <b>Cultural Resources</b></li> </ul> |
|---|--|

### FEDERAL AND STATE COOPERATING AGENCIES

- Alabama Department of Environmental Management
- Alabama Department of Conservation and Natural Resources
- Alabama State Historic Preservation Office
- Alabama Department of Transportation
- Geological Survey of Alabama
- U.S. Fish and Wildlife Service
- NOAA National Marine Fisheries Service
- Environmental Protection Agency
- U.S. Geological Survey
- Federal Emergency Management Agency
- Mobile Bay National Estuary Program



# MOBILE HARBOR GRR

## PUBLIC ENGAGEMENT

- Public scoping meeting Jan 2016
- Public Meetings Mar 2017, Sep 2017, and Feb 2018
- Focus Group Meetings with Seafood Interests, Environmental NGOs, Dauphin Island Interests, and Environmental Justice Communities
- Bi-weekly Updates, Quarterly Newsletters, Social Media, Listserv

### GENERAL NATURE OF PUBLIC COMMENTS

- Erosion impacts to Dauphin Island
- Placing material on eroding shorelines
- Interruption of coastal processes
- Reestablishment of sand transport to Dauphin Island
- Beneficial use of dredged material
- Impacts to wildlife
- Impact to oysters and other commercial fisheries
- Impacts to recreational fishing
- Creating unwanted islands
- Climate change
- Impacts to cultural resources
- Support for project





# MOBILE HARBOR GRR TENTATIVELY SELECTED PLAN

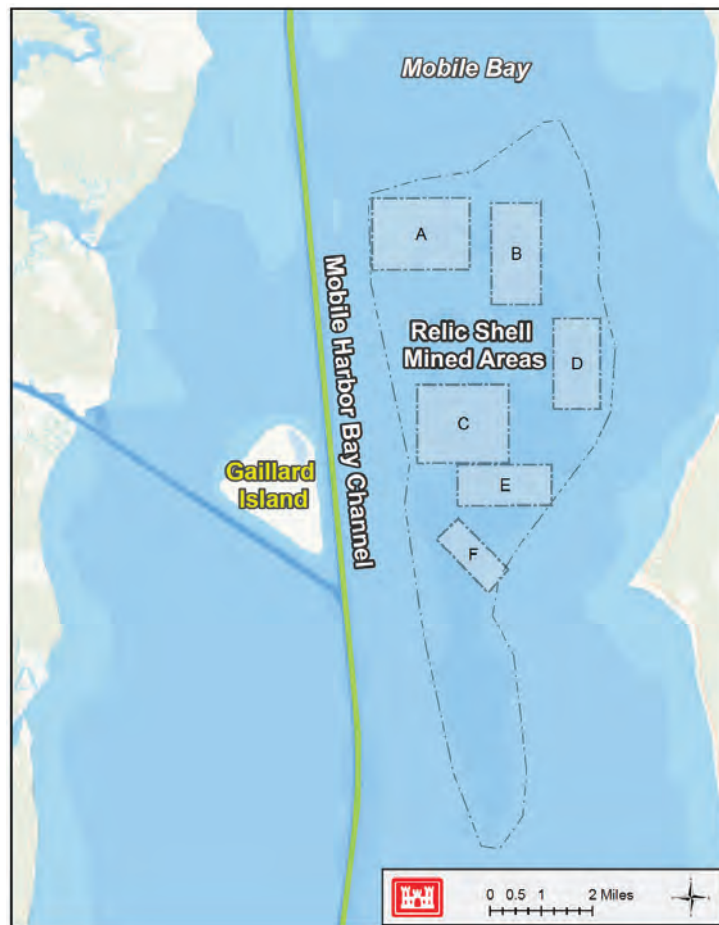
- ❑ Channel Deepening: 50 feet
  - ❑ Channel Widening: 3 mi. long, 100 ft wide\*
  - ❑ Turning Basin Modification
  - ❑ Bar Channel Bend Easing
- \* Environmental impact analysis is based on a 100 foot widener for a distance of 5 miles



# MOBILE HARBOR GRR DREDGED MATERIAL PLACEMENT

## Proposed Placement:

- ❑ Formerly Relic Shell Mined Area
- ❑ Sand Island Beneficial Use Area
- ❑ Pelican/Sand Island Complex
- ❑ Ocean Dredged Material Disposal Site





# MOBILE HARBOR

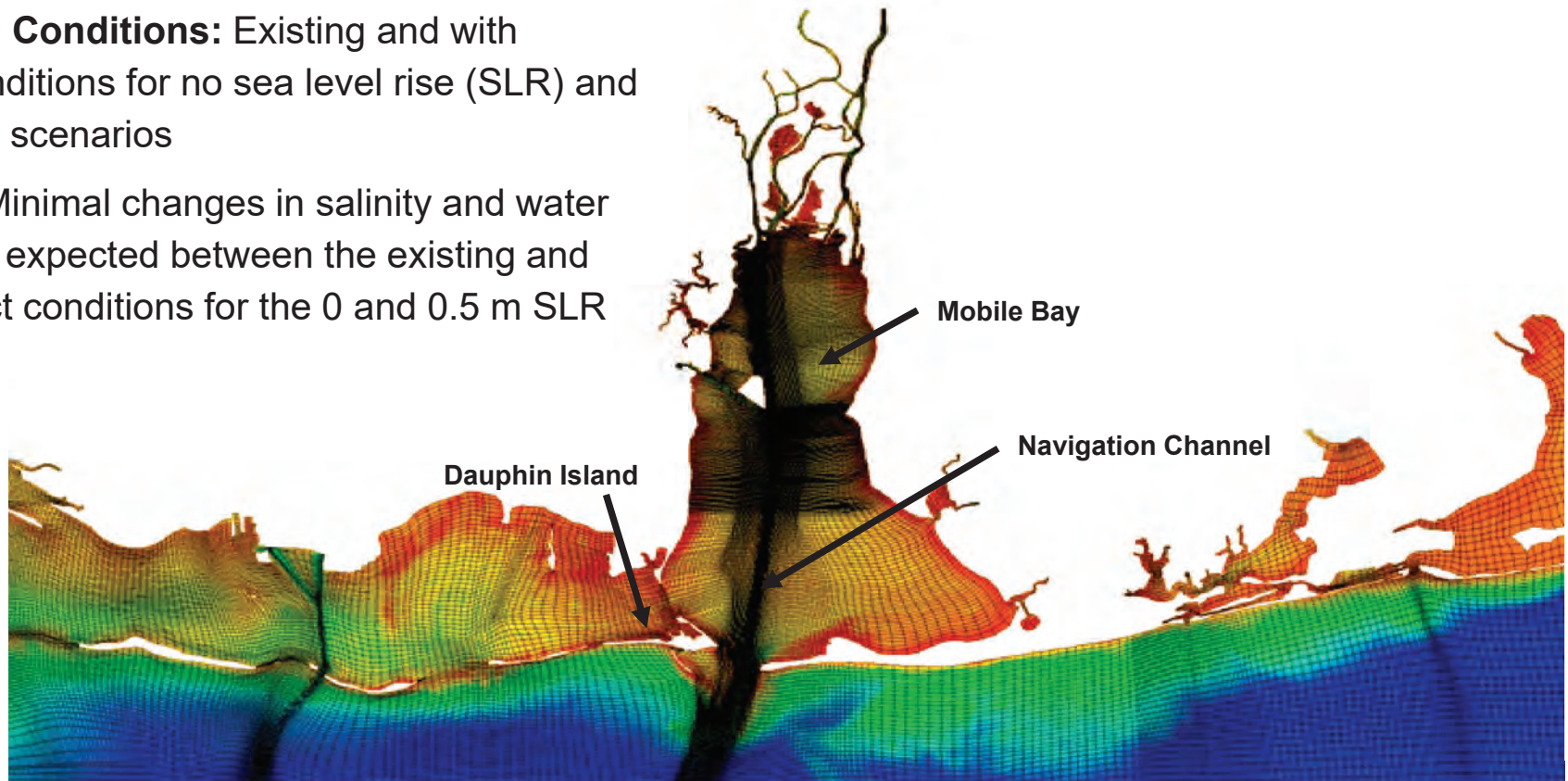
## HYDRODYNAMIC & WATER QUALITY MODELING

**Approach:** Conduct hydrodynamic and water quality modeling to (1) characterize the physical conditions and processes of the study area and (2) determine the relative changes due to widening and deepening the channel (i.e., 5' deeper for the entire channel with a 100' wide x 5 mile long widener in the southern Bay).

**Simulation Period:** January 2010 – December 2010

**Simulated Conditions:** Existing and with project conditions for no sea level rise (SLR) and 0.5 m SLR scenarios

**Results:** Minimal changes in salinity and water quality are expected between the existing and with project conditions for the 0 and 0.5 m SLR cases.



Model Extents

# MOBILE HARBOR

## SEDIMENT TRANSPORT MODELING

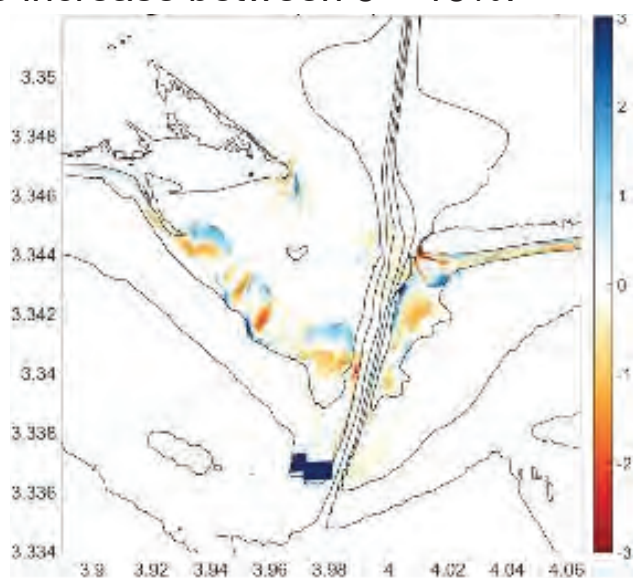
**Approach:** Conduct estuarine (fine-grained) and coastal (coarse-grained) sediment transport modeling to evaluate possible effects of widening and deepening the channel on sediment transport in Mobile Bay and on the ebb-tidal shoal/nearshore coastal areas.

**Simulation Period:** Estuarine (January 2010 – December 2010)

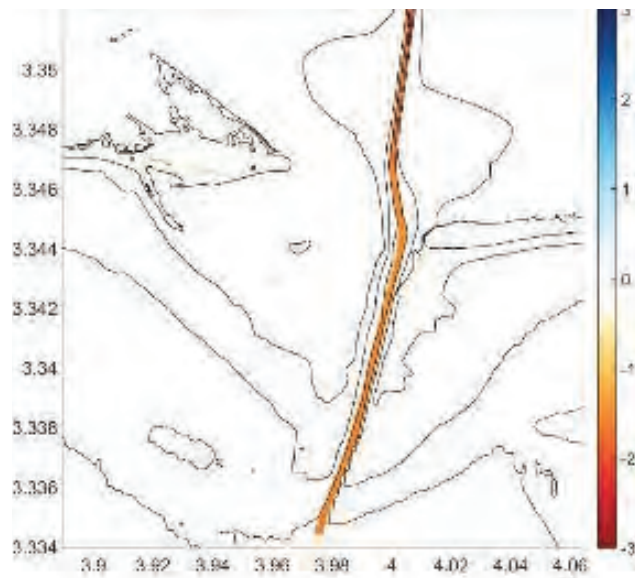
Coastal (10-yr simulation derived from data spanning from 1998 – 2016)

**Simulated Conditions:** Existing and with project conditions for no sea level rise (SLR) and 0.5 m SLR scenarios

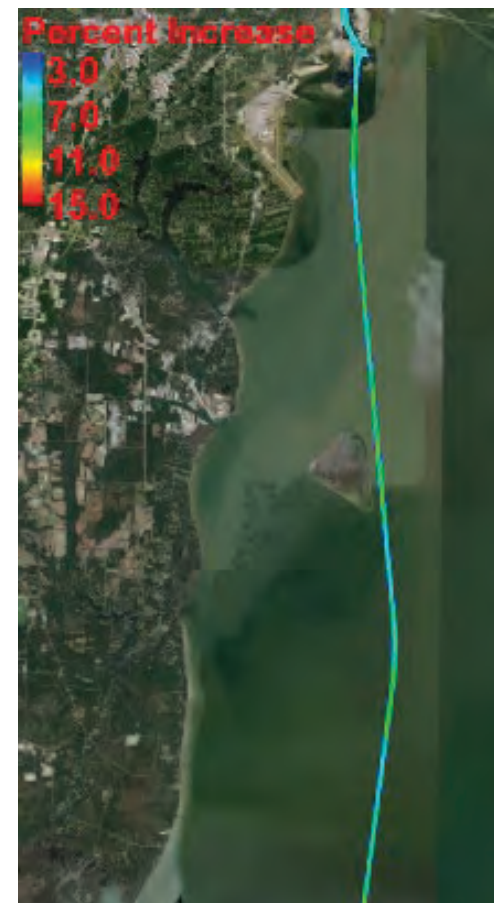
**Results:** Minimal bed level changes expected between the existing and with project conditions in the bay and on ebb-tidal shoal. Shoaling rates are expected to increase between 5 – 15%.



With Project Condition 10 Year Simulation  
Bed Level Change (+/- Erosion/Deposition, m)



With Project – Existing Condition  
Bed Level Change (+/- Erosion/Deposition, m)



With Project Simulation  
Percent Increase in Channel Shoaling



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# MOBILE HARBOR

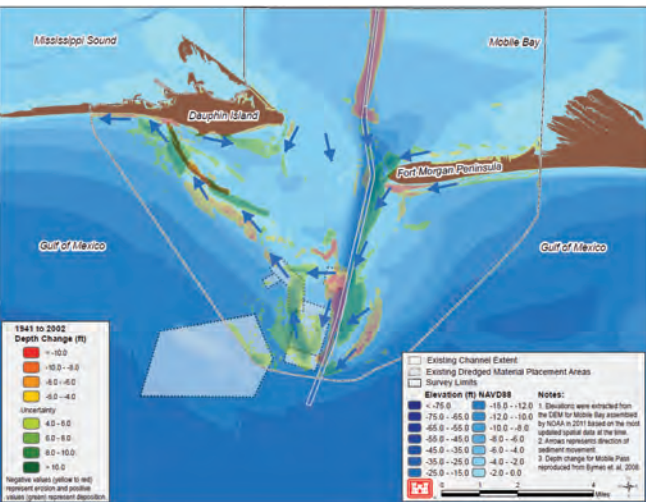
## FUTURE MAINTENANCE MATERIAL PLACEMENT

**Approach:** Compare short and long-term changes in bathymetry to quantify sediment transport rates and identify transport pathways along the ebb-tidal shoal to determine if adequate disposal capacity exists for future maintenance material placement in the Sand Island Beneficial Use Area (SIBUA).

**Analysis Period:** 1941 – 2015

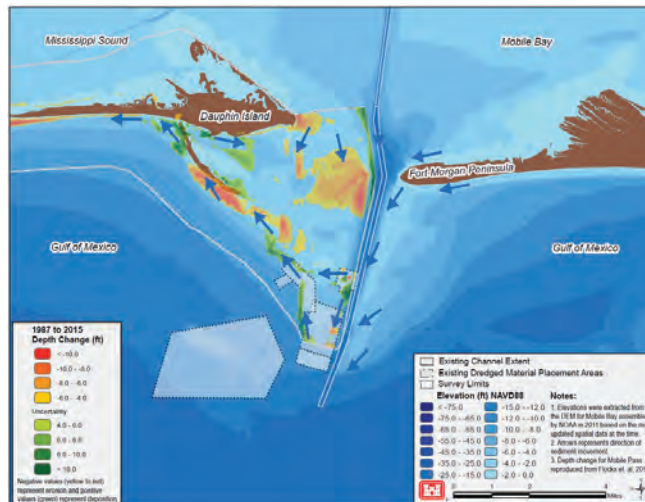
**Results:** Consistent sediment transport pathways are observed over the short and long-term periods. Material placed in SIBUA is in the active transport system; however, since placement in SIBUA was initiated in 1999, material has left the site at a lower rate than it has been placed in the site resulting in a need for expansion in the north/northwest direction to accommodate future needs.

Mobile Pass Bed Level Change 1941 to 2002



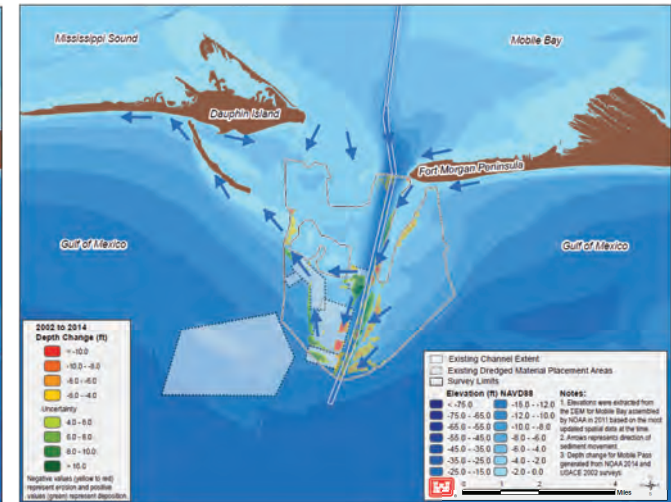
Depth change reproduced from Byrnes et. al, 2008 "Evaluation of Channel Dredging on Shoreline Response at and Adjacent to Mobile Pass, Alabama"

Mobile Pass Bed Level Change 1987 to 2015



Depth change reproduced Flocks, et. al, 2017 "Analysis of Seafloor Change around Dauphin Island, Alabama, 1987–2015" Open-File Report 2017–1112.

Mobile Pass Bed Level Change 2002 to 2014



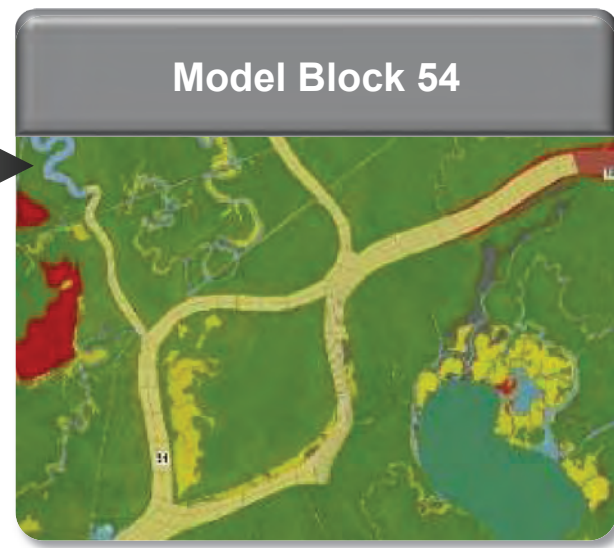
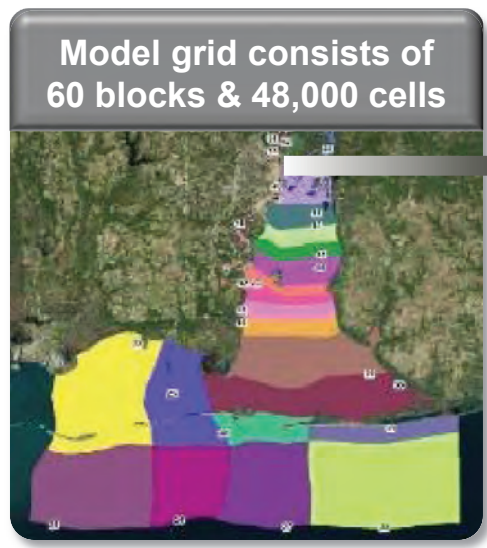
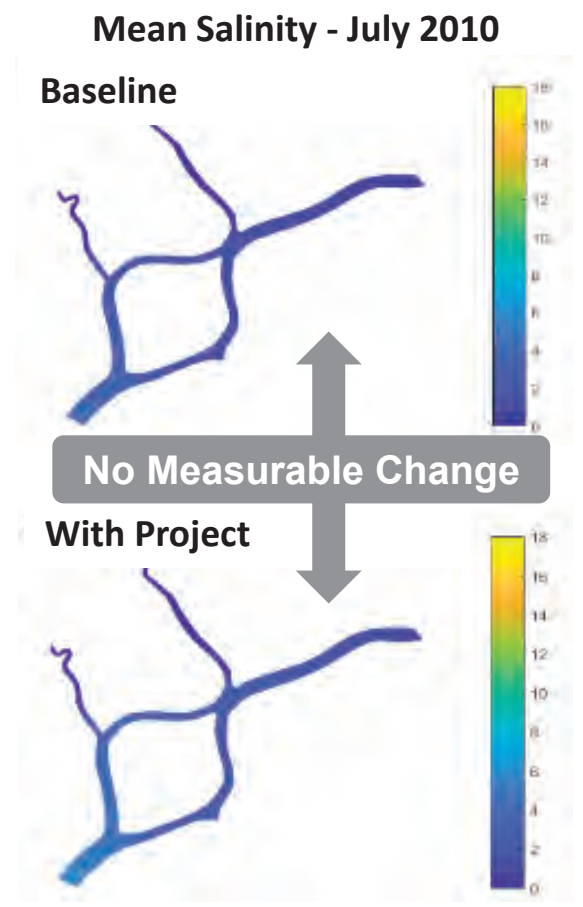
Depth change generated from USACE 2002 and NOAA 2014 surveys.



# MOBILE HARBOR GRR AQUATIC RESOURCES ASSESSMENT

## Overview

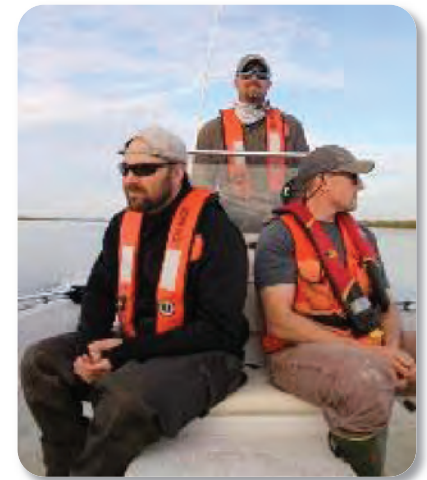
- Assessing potential impacts to wetlands, submerged aquatic vegetation, benthic invertebrates, oysters, fish
- Model outputs predicting changes in water quality (salinity, dissolved oxygen) comparing existing and post-project conditions
- Sea level rise scenario - 0.5 meter intermediate projection per USACE guidance at Dauphin Island



# MOBILE HARBOR GRR

## AQUATIC RESOURCES ASSESSMENT SUMMARY

- No major impacts (i.e., loss of resources) anticipated for:
  - ✓ Wetlands
  - ✓ Submerged Aquatic Veg.
  - ✓ Oysters
  - ✓ Benthic Invertebrates
  - ✓ Fish
- Project impacts remain negligible under 0.5 meter sea level rise scenario



US Army Corps  
of Engineers





# MOBILE HARBOR GRR

## KEY RISKS/UNCERTAINTIES

Task	Risk Description	Risk Rating	Task	Risk Description	Risk Rating
<i>Cultural Resource Surveys</i>	Cultural resource survey limited to widening only. New discovery or discovery during construction could impact construction cost.	L	<i>Ship Simulations</i>	Limited ship simulations may not adequately capture dimensions required for safe and efficient travel. PED phase investigation could impact construction costs and plan selection.	M
<i>Sediment Testing</i>	Sediment testing delayed until PED phase. Construction cost for removal and placement of contaminated material could impact construction cost.	M	<i>Pipeline Crossings</i>	Unknown/undetected pipeline crossings could impact construction cost.	M
<i>Geotechnical data</i>	Limited geotechnical investigation performed in study phase. PED phase investigation could impact construction cost.	L	<i>Vessel Generated Wave Energy (i.e., Ship Wake) Assessment</i>	The assessment is ongoing; therefore, the effects are currently unknown and mitigation coordination (if necessary) has not begun.	M
<i>Disposal Capacity</i>	Expansion of both ODMDS and SIBUA dependent upon WQC & CZC certifications from the State and ESA, EFH, and NHPA concurrences.	M	<i>Public Acceptance</i>	Litigation on environmental/ Dauphin Island impacts could affect project schedule.	H



# MOBILE HARBOR GRR

## WHAT'S NEXT

- **Release Draft Report with NEPA for Public, Technical, Policy, and Legal Review (Jul 2018)**
- **Public Meeting on Draft Report (Aug 2018)**
- **Agency Decision Milestone (Nov 2018)**



# MOBILE HARBOR GRR

## QUESTIONS?



US Army Corps  
of Engineers



**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** Re: Geotechnical Edits to Main Report  
**Date:** Tuesday, July 3, 2018 9:51:20 AM

---

Thanks (b)(6)

---

From (b)(6)  
Date: July 3, 2018 at 9:38:32 AM CDT  
To: (b)(6)  
(b)(6)  
Cc: (b)(6)  
(b)(6)  
Subject: Geotechnical Edits to Main Report

All,

I have reviewed the following sections in the main report and made changes (using track changes) to the latest report "Mobile Harbor Main Report 07-02-2018 ver2 JWP".

Reviewed and commented on Section 2.5.3.2

Revised Section 2.5.3.3

Revised Section 2.5.5 - Suggest removing last 2 paragraphs. Other information provided gives more general information on groundwater.

Reviewed and Commented on Sections 5.4.2, 5.4.3, and 5.6

Let me know if you have any questions.

Respectfully

(b)(6)

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)  
**Date:** Wednesday, July 4, 2018 10:01:00 AM

---

Okay. Just let me or [REDACTED] (b)(6) know what you need from us when you begin to add the pipeline crossings to the Engineering Appendix. From what I can tell, we only need to add the 4 Chevron Crossings. Will have to ask [REDACTED] (b)(6) about the Legacy and the Shell.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Wednesday, July 04, 2018 9:56 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Thanks. The table [REDACTED] (b)(6) provided is what I used to generate the table in the engineering appendix that is now being removed. The GIS data was added to the project geodatabase but overall the dataset is missing critical metadata for it to be a trusted source.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Wednesday, July 4, 2018 9:53 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)

Okay, works for me. I did find the attached GIS files that [REDACTED] (b)(6) sent that may have the exact locations of the pipelines.

[REDACTED] (b)(6)

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 04, 2018 9:18 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Since I am just now seeing this information I do not have time to digest and incorporate this appropriately within the engineering appendix given the current time frame we have to complete report revisions. We can leave the revisions as suggested at the moment, but I highly encourage the engineering appendix be updated at a later date.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 4, 2018 9:11 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

(b)(6) I am okay with the language.

(b)(6) Attached are e-mails with the minimum cover requirements from (b)(6) and the maps of the EXXON Pipeline crossings from (b)(6). I have also attached images of our Corps Maps with the correlating Exxon utility naming conventions and cross sections of those four pipeline borings (each boring carries several lines) that cross the channel. (b)(6) and I can work with you to answer any questions. (b)(6) with Exxon should be able to provide cadd files of any of the attached images that you need.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, July 03, 2018 5:38 PM

To: (b)(6)  
(b)(6)

Cc: (b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

My only comment is that we need to be specific on the identification of the as-built elevations of known pipelines and utilities and how these compare to required district specified clearances within the engineering appendix to be consistent with guidance and previous district engineering appendices concerning utility crossings on navigation projects.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, July 3, 2018 4:15 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: Pipeline Language

(b)(6)

Based on our discussion earlier regarding pipelines, I revised the sections below for consistency in how this subject is presented in other portions/appendices of this report. Let me know if you're good with the language.

#### 4.8 Pipeline Crossings

A search of design files, permit records, and state and federal databases indicate several utilities crossing are located within the project footprint. The locations of these pipelines have been identified; however, uncertainty associated with the locations was accounted for in the abbreviated risk analysis (as generally described in Section 7.1.4) and reflected in the overall cost contingency. Furthermore, surveys will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts. Details of the pipeline crossings coordination is provided in Appendix D – Real Estate.

REMOVE TABLE 4-4 FOR CONSISTENCY WITH RE APPENDIX

#### 7.1.4.1.3 Pipeline Crossings

Mobile Harbor Channel traverses an area where pipelines exist. The locations of all known pipelines have been identified; however, uncertainty associated with the pipeline locations (or unknown pipelines that may exist) was accounted for in the abbreviated risk analysis. The risk of unidentified pipelines will continue to be captured in the



CSRA of the Recommended Plan as the study progresses. Furthermore, surveys are included in and will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts.

(b)(6)

CLASSIFICATION: UNCLASSIFIED

CLASSIFICATION: UNCLASSIFIED

CLASSIFICATION: UNCLASSIFIED

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:** [REDACTED]  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)  
**Date:** Wednesday, July 4, 2018 9:52:00 AM  
**Attachments:** [Mobile Harbor Federal Nav Channel - Pipeline Crossings.msg](#)

---

Okay, works for me. I did find the attached GIS files that [REDACTED] (b)(6) sent that may have the exact locations of the pipelines.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Wednesday, July 04, 2018 9:18 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Since I am just now seeing this information I do not have time to digest and incorporate this appropriately within the engineering appendix given the current time frame we have to complete report revisions. We can leave the revisions as suggested at the moment, but I highly encourage the engineering appendix be updated at a later date.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Wednesday, July 4, 2018 9:11 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)

[REDACTED] (b)(6) I am okay with the language.

[REDACTED] (b)(6) Attached are e-mails with the minimum cover requirements from [REDACTED] (b)(6) and the maps of the EXXON Pipeline crossings from [REDACTED] (b)(6). I have also attached images of our Corps Maps with the correlating Exxon utility naming conventions and cross sections of those four pipeline borings (each boring carries several lines) that cross the channel [REDACTED] (b)(6) and I can work with you to answer any questions [REDACTED] (b)(6) with Exxon should be

able to provide cadd files of any of the attached images that you need.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, July 03, 2018 5:38 PM

To: (b)(6)

(b)(6)

(b)(6)

Cc: (b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

My only comment is that we need to be specific on the identification of the as-built elevations of known pipelines and utilities and how these compare to required district specified clearances within the engineering appendix to be consistent with guidance and previous district engineering appendices concerning utility crossings on navigation projects.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, July 3, 2018 4:15 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: Pipeline Language

(b)(6)

Based on our discussion earlier regarding pipelines, I revised the sections below for consistency in how this subject is presented in other portions/appendices of this report. Let me know if you're good with the language.

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REMOVE TABLE 4-4 FOR CONSISTENCY WITH RE APPENDIX

#### 7.1.4.1.3 Pipeline Crossings

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(b)(6)

CLASSIFICATION: UNCLASSIFIED  
CLASSIFICATION: UNCLASSIFIED

Type of Utility Line	Permit #	Depth	Crosses at Approximate Channel Station #	X/Y Coordinates	Utility Owner	Notes	Impacts to Deepening / Widening Limits	ALTERNATIVES
<p>Mobile District Existing Policy RE: Utility Crossings: Authorized channel depths of Upper and Lower Bay are 55 ft MLLW plus 2' of advanced maintenance and 2' of allowable overdepth. The authorized depths for the bar are 57 ft MLLW plus 2' of advanced maintenance and 2' of allowable overdepth. The minimum depth necessary for any lines crossing for authorized channel dimensions going off OPs policy memo would be 69 feet for the Upper and Lower bay (55 + 2 + 2 + 10 = 69' minimum depth) and 71 feet for the bar (57 + 2 + 2 + 10 = 71').</p> <p>Existing Bay Channel Width = 400'  Authorized Bay Channel Width = 550'  Existing Entrance Channel Width = 600'  Authorized Entrance Channel Width = 700'  Existing Channel Depths: 45' plus 2' of advanced maintenance and plus 2' of allowable overdepth.</p>								Notes: 7/27/17 The initial modification that will be evaluated is 50 feet depth along the entire channel with a 500 feet wide channel for a five-mile length in the lower bay.
<b>Mobile River (MR) Reach St. 242+43 to St. 0+00 (i.e. entrance to River @ Pinto Island north to AfricaTown Bridge)</b>								
10" Crude Oil Pipeline & 14" Crude Oil Pipeline	AL 1981 00436	60' below MLT	(b)(7)(f)		Shell Oil	Outside of Project Scope/Limits		
10" Fiber Optic Conduit Pipeline	AL 2000 00149	20' below riv. Bed			Unknown	Outside of Project Scope/Limits Note from EN Sheet: Buried just below 3 Mi. Creek in same trench as AL 3700042 pipes.		
Cable Communication/ 2 ea. / armored submarine cables	AL 1938 00026	45' below MLT			Unknown	Outside of Project Scope/Limits		
4" Steel Conduit	Unknown	Approx. 65' below			Bellsouth	Outside of Project Scope/Limits		
Fiber Optic Cable	AL 2000 03970	60' below/buried			Unknown			
12" Gas Pipeline	Unknown	Approx. 140'			Mobile Gas?			
2" Water Main Pipeline	AL 1923 00007	Feet Unknown / submerged/buried			MAWSS			
14" Fiber Optic Conduit	AL 1999 01382	60' below Mean Low			Unknown			
20" Water Line MAWSS	AL 1957 00073	45' below Mean Low			MAWSS			
Bankhead Tunnel	AL 1939 00049	40'			State of AL			
George Wallace Tunnel	AL 1996 00039	40'			State of AL			
<b>Mobile Upper Bay (MU) Reach St. 1055+43 to 244+66 (i.e. just south of Gaillard running north to river entrance w/ Pinto Island to the east)</b>								
<b>NONE IDENTIFIED / LOCATED</b>								
<b>Mobile Lower (ML) St. 1760+10 to 1055+43 (i.e. Bay entrance to just south of Gaillard Island)</b>								
Exxon-Mobil Pipeline Bundle #14 from Platform MB-62A to Platform MB63-AB	AL-2001-00585	77' MLLW (deepest point @ channel centerline)			Exxon-Mobile Oil Exploration & Producing Southeast, Inc. (MOEPSI)	Crosses Channel in Mineral Block (MB) 63 Total of Four 4" Pipelines in Bundle		
Exxon-Mobil Pipeline Bundle #22 8" Pipeline from Platform MB-62A to Platform MB63-AB (Same Bore as above)	AL-2004-00789	77' MLLW (deepest point @ channel centerline)			Same as above	74 below MLLW for a distance of 275' on each side of centerline of ship channel		
ExxonMobil (previously Legacy) 12", 10", 8", 6", 6" Bundle from Platform MB76A to MB77B	AL 1984 00248	98' MLLW at channel C/L			ExxonMobile (previ	See permit; Runs from platform 76-AUX to platform 77-B to platform 95-E		



20" Gas Pipeline w/ one 6" line for sweet gas, two 4"-16" utility lines	AL89-00628-0	N/A	(b)(7)(f)	Mobile Oil Exploration & Producing Southeast, Inc. (MOEPSI)	Above Line Connects to/from Permit No. AL1981 00253 (24", 8", 6", 4", 6" pipeline gathering system running north/south from mainland plant site  L69-1992(NOAA record) This line crosses the GIWW and Pelican Island and West Fowl River but does NOT appear to cross the Mob Har Channel and does NOT run too close to authorized width.	
Mobile Bar (MB) Reach St.2189+59 to 1760+10 (i.e. offshore to Bay entrance)						
Submarine Telephone Cables from Cedar Pt. to Ft. Gaines to Ft. Morgan	AL 1942 00045	N/A		Unknown	Abandoned 10/4/79 per file record (Unknown if Abandoned in place or removed) It is likely this cable line was removed since it is circa 1940's and previous dredge would have impacted	
Exxon Mobil 4" H2O Produce As-Built Line		140' below mean		ExxonMobil	See ExxonMobil Map: 4" H2O Produce Line Block 114 "CC" B.O.R. to Block 76"A" Drill Drawing No: 1400510 dated 10/15/14	
Per Operation Project Map: Hydrocarbon 20" pipeline from the outer cont. shelf to the gas treatmt plant on Delchamps Rd in So.Mo.Co.	AL 1993 02574	Unknown		See Above?	This line appears to have a discrepancy w/ the line above. Line runs just north of Sand Island Lighthouse (N688664.43/E1794538.00)	
ExxonMobil Gas/Water Bundle 4", 4", 4", 6", 16" Offshore Gathering System	Unknown	Depth at C/L= 74'		ExxonMobil/ Mobile Oil Exploration & Producing Southeast, Inc. (MOEPSI)	Per NOAA maps: L1580-2000 (Blks 112-115)  Per Exxon Asbuilt Maps: NW Gulf Area Block 113 & North Central Gulf Area Block 114. AL West Zone; NAD 1927; Exxon Drawing No AB-344	
Fieldwood Energy: 8" Bulk Gas Pipeline	Unknown	90' below MLLW		Previously Devon Energy Production Co., LP; Previously Shell Oil; Now owned by Fieldwood	L689-2009 (per NOAA) 8-inch Bulk Gas and Supply Line (H2S) Lease Term Pipeline; Pipeline Segment numbers 17473; Lease OCS-G-26176, Mobile Area, Block 826 OCS Federal Waters, Gulf of Mexico, Offshore Alabama; Installation compltd 12/8/2008; Identified on NOAA charts as a H2S sour gas pipeline; The pipeline was installed below the Mobile Bay Entrance Channel: 90 feet below MLLW and 35 feet below the channel floor via Horizontal Directional Drill (HDD). See two pdf sheets provided by Fieldwood POC	
Fieldwood Energy; 2' Supply Line	Unknown	90' below MLLW		Previously Devon Energy Production Co., LP; Previously Shell Oil; Now owned by Fieldwood	See comments above b/c this line runs in support of line above	
20" Gas pipeline	BP154362-64	N/A		BP	20" Gas pipeline Mo822 to Mo916 as-builts (see pdf in file) missing pages of as-builts done by Offshore Pipelines International LTD. <b>This pipeline appears to be just outside (south of) of the project scope.</b>	

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)  
**Date:** Wednesday, July 4, 2018 9:10:00 AM  
**Attachments:** [RE ExxonMobile Mobile Harbor GRR Meeting Minutes.msg](#)  
[Non-DoD Source Pipeline Maps.msg](#)  
[63AB to 62A.jpg](#)  
[77B to 76A.jpg](#)  
[CC to 76A.jpg](#)  
[NCG to NWG.jpg](#)  
[STA 1055 to STA 1760.jpg](#)  
[STA 1760 to STA 2189.jpg](#)

---

(b)(6) I am okay with the language.

(b)(6) Attached are e-mails with the minimum cover requirements from (b)(6) and the maps of the EXXON Pipeline crossings from (b)(6). I have also attached images of our Corps Maps with the correlating Exxon utility naming conventions and cross sections of those four pipeline borings (each boring carries several lines) that cross the channel. (b)(6) and I can work with you to answer any questions. (b)(6) with Exxon should be able to provide cadd files of any of the attached images that you need.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Tuesday, July 03, 2018 5:38 PM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

My only comment is that we need to be specific on the identification of the as-built elevations of known pipelines and utilities and how these compare to required district specified clearances within the engineering appendix to be consistent with guidance and previous district engineering appendices concerning utility crossings on navigation projects.

[REDACTED] (b)(6)

(b)(6)

-----Original Message-----

From (b)(6)

Sent: Tuesday, July 3, 2018 4:15 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: Pipeline Language

(b)(6)

Based on our discussion earlier regarding pipelines, I revised the sections below for consistency in how this subject is presented in other portions/appendices of this report. Let me know if you're good with the language.

#### 4.8 Pipeline Crossings

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REMOVE TABLE 4-4 FOR CONSISTENCY WITH RE APPENDIX

#### 7.1.4.1.3 Pipeline Crossings

Mobile Harbor Channel traverses an area where pipelines exist. The locations of all known pipelines have been identified; however, uncertainty associated with the pipeline locations (or unknown pipelines that may exist) was accounted for in the abbreviated risk analysis. The risk of unidentified pipelines will continue to be captured in the CSRA of the Recommended Plan as the study progresses. Furthermore, surveys are included in and will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts.

(b)(6)

CLASSIFICATION: UNCLASSIFIED

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** RE: ExxonMobile Mobile Harbor GRR Meeting Minutes  
**Date:** Wednesday, May 31, 2017 9:20:16 AM

---

Minimum cover requirement is 10ft but the minimum depth requirement is the deepest depth of potential dredging +10ft. So if Exxon wants to install a pipe under Mobile Bar Channel, the authorized depth of 57' + 2' advanced maintenance + 2' of allowable overdepth = 61' + 10' so a minimum depth of a pipeline crossing the bar channel is 71' MLLW.

-----Original Message-----

From: (b)(6)  
Sent: Wednesday, May 31, 2017 9:10 AM  
To: (b)(6)  
Subject: FW: ExxonMobile Mobile Harbor GRR Meeting Minutes

Crap, meant to include you on e-mail below!!!

-----Original Message-----

From: (b)(6)  
Sent: Wednesday, May 31, 2017 9:09 AM  
To: (b)(6)

(b)(6)

Subject: ExxonMobile Mobile Harbor GRR Meeting Minutes

All,

The meeting with the ExxonMobile Team yesterday went very well. Following are the minutes of the meeting in regards to the pipeline crossings on the Mobile Harbor Ship Channel:

- 1.) Attendees: (b)(6)  
(b)(6)
- 2.) There are essentially four pipeline corridors that ExxonMobile owns/operates that cross the channel:
  - a.) Pipeline bundle 77B to 76A has about 16' of cover (about 100' width clearance) if channel is modified to 54' depth, 550' width.
  - b.) Pipeline bundle CC to 76A has 86' cover (greater than 100' width clearance) if channel is modified to 54' depth, 550' width.
  - c.) Pipeline bundle 63AB to 62A has 23' cover (about 252' width clearance) if channel is modified to 54' depth, 550' width.
  - d.) Pipeline bundle NCG to NWG has at least 10' cover (about 160' width clearance) if channel is modified to 54' depth, 550' width.
- 3.) Assuming sufficient cover, none of the pipelines will need to be relocated.
- 4.) There is only one other known pipeline that crosses the channel that the location will need to be confirmed (owned by Shell).

Questions:

- 1.) what are minimum cover requirements?
- 2.) Would dredging operations impact operational use (will pressurized pipes need to be shut down during dredging)

?

Actions Items:

- 1.) Corps to provide boring log data in areas of pipeline locations.
- 2.) ExxonMobile to provide maps showing pipeline locations.
- 3.) Mobile district to place exact pipeline locations on our drawings for RE/Ops.

A large rectangular area of the document is redacted with a solid black fill. The text "(b)(6)" is centered within this redacted area in a yellow font.

(b)(6)



**From:** [Redacted]  
**To:** (b)(6)  
**Cc:**  
**Subject:** [Non-DoD Source] Pipeline Maps  
**Date:** Wednesday, May 31, 2017 9:46:37 AM  
**Attachments:** [MBO Area map 5280.pdf](#)  
[2011-12-16 Pipeline Corrosion Map.pdf](#)

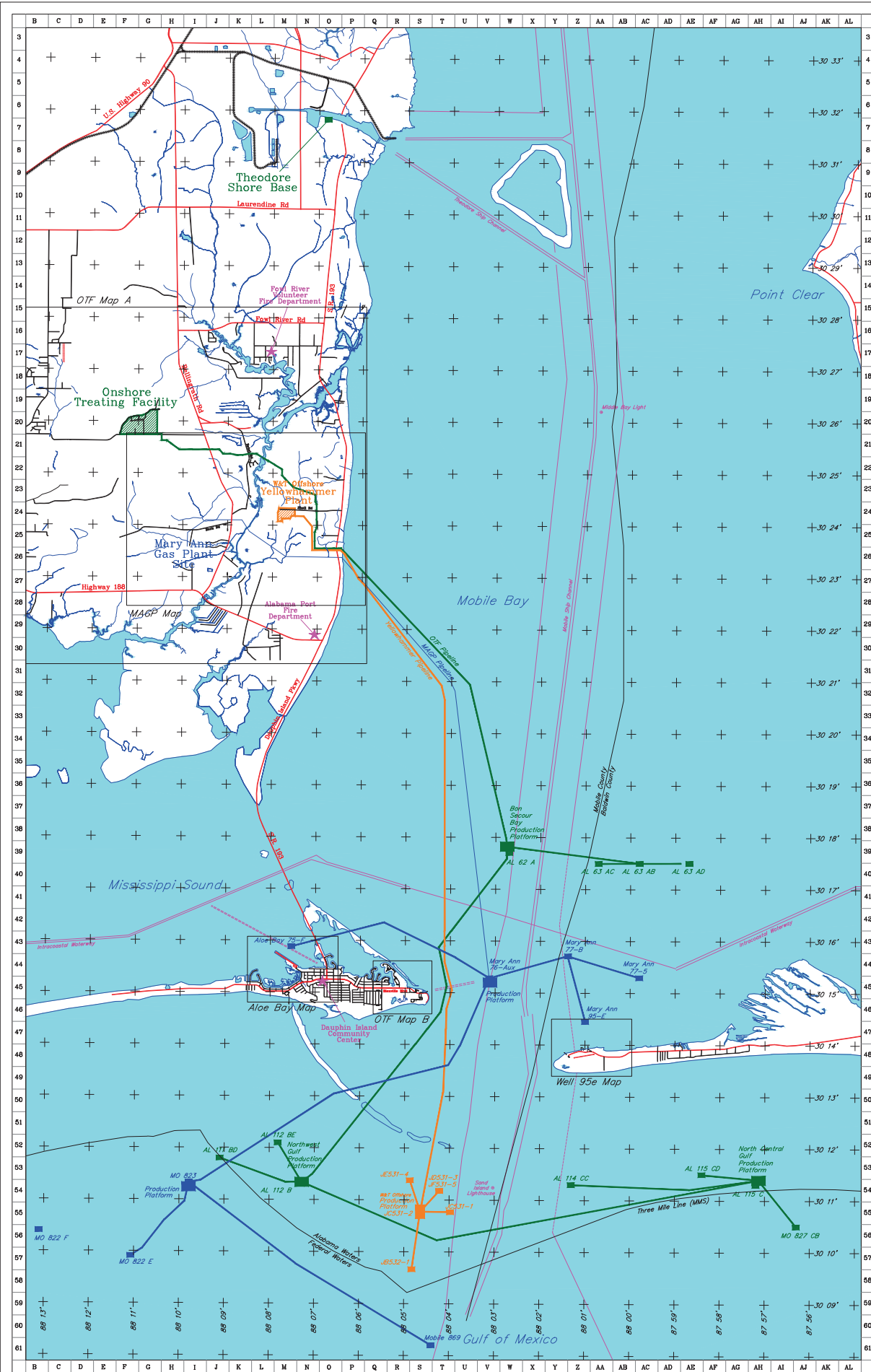
---

(b)(6)

I have attached the two maps in which we were using in yesterday's meeting. I agree with (b)(6) that the meeting was very productive with most questions being answered. Some follow ups still to come.

Regards,

(b)(6)



ExxonMobil Production  
 Mobile Bay Operations  
 Platform & Well  
 Area Map  
 South Mobile County, Alabama



Scale 1 Inch = 1 Mile  
 1 0 1 2 3 Miles  
 Revised November 2016

Copyright 2016  
 Hale Consulting, LLC  
 9273 Whitehouse Fork Rd Ext  
 Bay Minette, AL 36507-9005  
 856.828.4244

**Legend**

- Water Feature
- Highway
- Paved Road
- ★ Care & Reception Center

**Facilities and Pipelines**

- Onshore Treating Facility
- Yellowhammer
- Mary Ann Gas Plant

-----  
(b)(7)(f)

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** RE: Water Quality Write-up (UNCLASSIFIED)  
**Date:** Wednesday, July 4, 2018 11:05:00 AM

---

Thank you, (b)(6) This was the last piece of the puzzle.

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Wednesday, July 04, 2018 10:39 AM  
**To:** (b)(6)  
**Cc:** (b)(6)  
(b)(6)  
**Subject:** Water Quality Write-up (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Please find attached water quality write up for your review and use in the report. This includes revisions to the salinity in response to DQC comments we discussed. There was not much in the way of nutrients or TSS that we can pull from reports or data to conduct GIS mapping or tell a good story. What is available is documented in the ERDC final draft report posted to (b)(6)

(b)(6) In general we see increases in TSS and nutrients with the larger river flows as shown in a few point source data sets and simulation time series plots in figures 78 to 80 and 82 of the ERDC report. As with temperature and DO there were no discernable changes to plot spatial difference maps.

Please let me know if you should have any questions or concerns. When I get the final field data collection report I can add additional information but this will be limited to the delta.

Sincerely,

(b)(6)

CLASSIFICATION: UNCLASSIFIED

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** RE: Water Quality Write-up (UNCLASSIFIED)  
**Date:** Wednesday, July 4, 2018 11:15:00 AM

---

Okay, will talk to (b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Wednesday, July 04, 2018 11:11 AM  
**To:** (b)(6)  
**Subject:** RE: Water Quality Write-up (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Welcome. Sorry it was later than I had hoped. I have so many technical pieces I am trying to make sure the story is told well with adequate revisions to address DQC comments that I was just having trouble knocking them all out. I am about to finish the climate change in the EN appendix and will turn it over to (b)(6) to make sure everything is consistent with the main report. I recommend that you and (b)(6) consider beefing up the main report relative to climate change as well based on what I have documented in the EN appendix as I have found the ATR and policy reviewers want to see good documentation in the main report and not just in an appendix to showcase it was considered in plan formulation.

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Wednesday, July 4, 2018 11:05 AM  
**To:** (b)(6)  
**Subject:** RE: Water Quality Write-up (UNCLASSIFIED)

Thank you, (b)(6) This was the last piece of the puzzle.

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Wednesday, July 04, 2018 10:39 AM  
**To:** (b)(6)  
**Cc:** (b)(6)  
**Subject:** Water Quality Write-up (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Please find attached water quality write up for your review and use in the report. This includes revisions to the



salinity in response to DQC comments we discussed. There was not much in the way of nutrients or TSS that we can pull from reports or data to conduct GIS mapping or tell a good story. What is available is documented in the ERDC final draft report posted to [REDACTED]

[REDACTED] In general we see increases in TSS and nutrients with the larger river flows as shown in a few point source data sets and simulation time series plots in figures 78 to 80 and 82 of the ERDC report. As with temperature and DO there were no discernable changes to plot spatial difference maps.

Please let me know if you should have any questions or concerns. When I get the final field data collection report I can add additional information but this will be limited to the delta.

Sincerely,

[REDACTED]

(b)(6)

CLASSIFICATION: UNCLASSIFIED  
CLASSIFICATION: UNCLASSIFIED

**From:** [REDACTED] (b)(6)  
**To:** [REDACTED] (b)(6)  
**Subject:** FW: Areas of Controversy - Executive Summary  
**Date:** Thursday, July 5, 2018 2:46:00 PM  
**Attachments:** [areas of controversy 7-3-18-Lp.docx](#)

---

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Tuesday, July 03, 2018 10:12 AM  
**To:** [REDACTED] (b)(6)  
**Subject:** RE: Areas of Controversy - Executive Summary

[REDACTED] (b)(6) my suggested changes to the environmental impacts part is attached

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 2, 2018 9:08 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** Areas of Controversy - Executive Summary

All: I have updated the areas of controversy paragraph for the executive summary (changes highlighted in yellow) to include where in the report that we address the issues. Please review and let me know if you want to make changes.

[REDACTED] (b)(6)

## AREAS OF CONTROVERSY AND UNRESOLVED ISSUES

Areas of Controversy: The public has raised a number of issues through letters, e-mails and public involvement meetings. They include the following:

*Channel dredging disrupts the sediment transport to Dauphin Island.* Impacts of channel dredging on Dauphin Island remains a controversial issue. (b)(5)

(b)(5)

(b)(5)

See Section 5.3.3 Sediment Transport within the main report and Section 6.3.1, Appendix A for additional information.

*Placement location of Bar Channel material.* The placement location of the material dredged from the Bar Channel, in particular during maintenance operations, is an area of controversy. Dauphin Island residents and members of the public have expressed concerns that the material dredged from the Bar Channel during maintenance is not placed in an area that benefits the island. This study includes an assessment of a proposed extension to the SIBUA. See Section 4.2.2.3 SIBUA for the Bar Channel within the main report for additional information.

*Placement of new work dredged material within the Relic Shell Mined Area.* The public has expressed concern that the proposed placement of material within the formerly shell mined area could impact fishing. They also have concerns that material placed in the site may drift out of the relic shell mined area onto the living oyster reefs within the bay. (b)(5)

(b)(5)

See Sections 4.2.1 New Work Material Placement Options, 4.2.3 Construction Methodology, 5.4.2 Soils, 5.4.4 Sediment Quality, 5.7 Dredged and Placement Areas, 5.8.7 Essential Fish Habitat, 5.8.9 Benthic Invertebrates, 5.12 Fisheries Resources, 5.17 Cultural and Historic Resources, and 6.1 Cumulative Impacts within the main report for additional information.

*Environmental impacts caused by channel modifications.* The results of the modeling data and environmental impact analysis are another area of controversy. (b)(5)

(b)(5)

(b)(5)

Comments received by Environmental Non-Governmental Organizations express the desire for the study to address the impacts associated with prolonged drought conditions. *Shoreline erosion caused by ship wake.* Shoreline erosion and impacts to aquatic resources caused by the ship wake of larger vessels transiting the channel is an area of concern. (b)(5)

(b)(5)

Additional information can be found in Section 5.3.1 Waves in the main report and Section 6.4, Appendix A.

*Impacts to Environmental Justice Communities.* Impacts associated with the growth of the harbor on the air quality, traffic, and safety of the environmental justice communities adjacent to the harbor remain an area of concern (b)(5)

(b)(5)

(b)(5) See Sections 2.5.12 Air Quality, 2.5.13 Hazardous and Toxic Materials, 2.5.14 Noise, 2.5.19 Socioeconomics, and 2.5.20 Transportation for additional information on the existing conditions. See Sections 5.14 Air Quality, 5.15 Hazardous and Toxic Materials, 5.16 Noise, 5.20 Socioeconomics, and 5.21 Transportation for additional information on the environmental effects of the TSP.

Issues to be Resolved: The USACE, Mobile District will continue to coordinate the proposed action and the associated impacts identified above as well as any new concerns that are identified during the review period with the USACE, South Atlantic Division and Headquarters, as well as the NFS, state and Federal agencies, stakeholders, and concerned public. Several commitments require additional coordination with resource agencies. They include:

- Further consideration of potential beneficial use of dredged material projects
- Location and analysis of oyster reefs not documented by the Alabama Department of Conservation and Natural Resources, Marine Resources Division
- Cultural resource survey in the widened area of the bay channel and bend easings
- Certification of the proposed extensions to the SIBUA and the ODMDS
- Certification of the Relic Shell Mined Area

In addition, there are several Design (Preconstruction Engineering and Design) phase commitments that will be required prior to construction. They include:

- Continued coordination with environmental agencies and the public for beneficial use opportunities with the new work dredged material
- A refined ship simulation analysis to ensure widening measures safely accommodate meeting vessels and to determine if the magnitude of modifications could be reduced in the bend easing and turning basin
- Sediment testing of the new work material prior to placement within the proposed locations
- Additional geotechnical investigation within the navigation channel
- Surveys to confirm that there are no underwater utilities/pipeline crossing obstructions

## AREAS OF RESIDUAL RISK

Risk and uncertainty exists in the potential fluctuation of the Federal interest rate, changes in vessel operating costs, deviations from vessel or cargo forecasts, and unexpected construction costs. (b)(5)

(b)(5)



**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** FW: Mobile Harbor IEPR - USACE/Battelle Kick-off Meeting  
**Date:** Thursday, July 5, 2018 11:17:00 AM  
**Attachments:** [Mobile Harbor IEPR Battelle and USACE kickoff meeting.pdf](#)

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-----Original Message-----

**From:** (b)(6)  
**Sent:** Thursday, July 05, 2018 11:00 AM  
**To:** (b)(6)  
(b)(6)  
(b)(6)  
**Cc:** (b)(6)  
**Subject:** [Non-DoD Source] Mobile Harbor IEPR - USACE/Battelle Kick-off Meeting

Hello,

Please find attached the slides for today's kick-off meeting. I will be displaying them on the webinar but in case we have technical problems I am providing this pdf of the slides as a back-up.

Talk to you shortly,

(b)(6)

(b)(6)

Battelle

141 Longwater Drive

Suite 202

Norwell, MA 02061

Blocked<http://www.battelle.org> <Blocked<http://www.battelle.org>>

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<Blockedhttp://www.youtube.com/user/battelleinnovations>

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P Please consider the environment before printing this e-mail.

# **USACE and Battelle Kick-Off Meeting for the Independent External Peer Review (IEPR) of the Mobile Harbor, Alabama, Draft Integrated General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS)**

IWR Task Order # W912HQ18F0078

**Thursday, July 5, 2018**

**2:00 am – 3:00 pm Eastern Time**

Call-in Information: *see meeting request for latest details*

# Introductions – Who’s Who

BATTELLE	ROLE	PHONE	EMAIL
(b)(6)	<p>Program Manager, Project Manager</p> <p>Project Manager, Backup DrChecks Administrator</p>	(b)(6)	(b)(6)

USACE	ROLE	PHONE	EMAIL
(b)(6)	<p>IEPR Deep Draft Navigation Planning Center of Expertise (DDN-PCX) Lead, Technical Representative, New Orleans District</p> <p>DDNPCX - USACE Alternate Technical Point of Contact</p> <p>Mobile Harbor GRR, Project Delivery Team (PDT), Project Manager, Mobile District</p> <p>Mobile Harbor GRR, PDT Planning Lead, Mobile District</p> <p>IWR IEPR Program Manager</p>	(b)(6)	(b)(6)

# Objective and Purpose

- The objective of this project is to conduct an Independent External Peer Review (IEPR) of the Mobile Harbor
- Conducted in accordance with procedures described in
  - USACE (2018). Water Resources Policies and Authorities: Review Policy for Civil Works. Engineer Circular (EC) 1165-2-217. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. February 20.
  - OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, D.C. Memorandum M-05-03. December 16.
- IEPRs are required by public law
  - Water Resources Development Act (WRDA) 2007 (Public Law 110-114), Section 2034
  - Section 1044 of the Water Resources Reform and Development Act (WRRDA) 2014 amends Section 2034 of WRDA 2007
  - Must be conducted by an outside eligible 501(c)(3) organization



# Battelle's Role

- Will only manage the peer review.
- Will not influence the Panel's comments, but will attempt to help the Panel present their views both as individuals and as a group.
- Will maintain records of discussion, differences of opinion, and resolutions associated with developing final panel comments for the review.
- Will deliver a Final IEPR Report for the review that meets OMB and USACE guidance.
- Will facilitate the comment/response process for the review with the goal of reaching "concurrence" on as many Final Panel Comments as possible.
- Will attend and represent the Panel at the ADM.

# Documents to be Provided by USACE

Review Documents	Subject Experts				
	No. of Review Pages	Civil Works Planner/Economics	Environmental	Hydraulic/Coastal Engineer	Geotechnical Engineer
Draft Integrated GRR and SEIS	200	200	200	200	200
Appendix A: Engineering	75			75	75
Appendix A, Attachment 1: ERDC Modeling Report	100			100	100
Appendix A, Attachment 2: USGS Modeling Report	30				30
Appendix A, Attachment 3: Ship Simulation Report	90	90		90	90
Appendix A, Attachment 4: Wave Energy Assessment	90			90	90
Appendix A, Attachment 5: Data Collection Report	30			30	30
Appendix A, Attachment 6: Boring Logs	300				300
Appendix B: Economics	50	50			
Appendix C: Environmental	80		80		
Appendix D: Real Estate	60	60	60		
Public Review Comments**	100	100	100	100	100
<b>Total Number of Review Pages</b>	<b>1205</b>	<b>500</b>	<b>440</b>	<b>685</b>	<b>1015</b>
Supplemental Information					
Risk Register*	20	20	20	20	20
<b>Total Number of Reference Pages</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>

# Documents Provided by Battelle

- Reference Documents

- EC 1165-2-217, Review Policy for Civil Works (20 February 2018)
- Office of Management and Budget's Final Information Quality Bulletin for Peer Review (16 December 2004)
- Foundations of SMART Planning
- Feasibility Study Milestones (PB 2017-013)
- SMART – Planning Overview
- USACE Planning Modernization Summary
- Engineering and Construction Bulletin (ECB) 2012-18: Engineering Within the Planning Modernization Paradigm
- USACE Climate Change Adaptation Plan (June 2014)
- ETL 1100-2-1 – Procedures to Evaluate SLR Change Impacts Responses Adaptation
- ER 1100-2-8162 – Incorporating SLR Change in CW Programs

# Task 1 – Work Plan to Conduct IEPR

- Battelle will submit a draft Work Plan that describes the process for conducting the IEPR, including:
  - Screening criteria for, and selection of, panel members (including a detailed conflict of interest [COI] questionnaire)
  - Schedule
  - Charges to peer panel members
  - Information on communication and meetings
  - Quality control standards and activities
  - Details on the compilation and dissemination of Panel comments
- A conference call (if necessary) to discuss USACE comments on the draft Work Plan.
- The final work plan will be submitted after USACE review and final review documents are available.

# Task 2 – IEPR Panel Experts

- Using the selection criteria provided in the work plan, Battelle will select no more than 5 experts with the following areas of expertise:
  - One expert in Civil Works planning/economics
  - One expert in environmental
  - One expert in hydraulic/coastal engineering
  - One expert in geotechnical engineering
- The list of experts (in addition to biographical information) will be provided to USACE for feedback and confirmation of no conflicts of interest.
- Following this confirmation, Battelle will establish subcontracts with the panel members at agreed-upon rates and hours to secure participation.
  - Potential panel members will be asked to sign COI forms.
  - Non-disclosure agreement language is included in the reviewer's subcontract.

# Establishment of Panels

- WRRDA 2014 Section 1044(c)(4)(B)(iii) includes language on Public Information and Web posting
  - Congressional and Public Notification
    - “Prior to initiation of the review by the panel of experts, the Chief of Engineers shall... make publicly available, including on the Internet, information on... the names and qualifications of the panel of experts.”
    - Implementation Guidance for Section 1044 – Independent Peer Review  
<http://cdm16021.contentdm.oclc.org/utils/getfile/collection/p16021coll5/id/311>
  - Panel members sign a form prior to the review that acknowledges this notification (found in Work Plan – Appendix C)



# Task 3 – Meetings

- Three kickoff meetings will be held:
  - (1) Battelle will convene a kickoff meeting with USACE (this teleconference).
  - (2) Battelle will convene a kickoff meeting with the panel members to discuss what is expected of them, the IEPR process, the schedule, and communication procedures.
  - (3) USACE will convene a kickoff meeting (typically 1-hour) with Battelle and the panel members in order to provide project information and background and to answer questions from the panel members.
- Battelle will convene a mid-review teleconference with USACE and the panel members. This teleconference will allow the panel members to ask additional questions and clarify remaining issues. A table with questions generated by the Panel may be submitted by Battelle prior to the call, to allow USACE time to review and prepare for the call.
- Agency Decision Milestone Meeting will be held after the Public Comment Period and Task 6 of this IEPR are complete. The Battelle Project Manager and all panel members will attend the meeting via teleconference. Battelle will be prepared to discuss any significant comments at the ADM.

# Task 3 – Meetings, continued

## USACE/Panel Kickoff Presentation Content

The USACE kickoff presentation should include the following elements to ensure a comprehensive briefing of the project:

- **Background:**
  - Study area (with map and Google flyover, if possible)
  - Problem, purpose, and objectives
- **Project implementation schedule:**
  - By phase (feasibility study; preconstruction engineering design (PED), construction)
- **Public/agency involvement:**
  - Public, agency, event/item and date
- **SMART planning process as it relates to project**
  - Review risk register and decision log
  - Summarize activities being postponed/scheduled for the PED
- **Plan Formulation:**
  - Risk register, decision log
  - Future without-project
  - Objective formulation (including site identification, evolution, plan identification)
  - Alternatives and management measures considered (table)
  - Results of screening
  - Plan benefits
  - Plan justification, including incremental justification
  - Non-structural measures
  - Plan total cost

# Task 4 – IEPR Conducted

- Battelle will provide the panel members the applicable review documents, supporting documents, and the final charge.
- Within the schedule outlined in the work plan, the panel members will complete their review and prepare and submit individual written comments in response to the charge questions.
- A mid-review teleconference (mentioned earlier) with USACE and Battelle will be held during the review period to provide the Panel with an opportunity to ask clarifying questions of USACE and clarify uncertainties.
- Following receipt of the comments, Battelle will identify key issues or topics for the review that were deemed particularly significant by the panel members.
- A panel review teleconference will be held to discuss the review, identify the issues important enough to be developed into four-part Final Panel Comments, and assign the development of final panel comments to specific panel members.

# Task 4 – IEPR Conducted, continued

- Final Panel Comments
  - The four parts of a Final Panel Comment include (1) a clear statement of the concern; (2) the basis for the comment; (3) the significance of the comment (defined below); and (4) recommendations to resolve the comment.

## Significance definitions are as follows

**High:** There is a fundamental issue within study documents or data that will influence the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

**Medium/High:** There is a fundamental issue within study documents or data that has a strong probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

**Medium:** There is a fundamental issue within study documents or data that has a low probability of influencing the technical or scientific basis for selection of, justification of, or ability to implement the recommended plan.

**Medium/Low:** There is missing, incomplete, or inconsistent technical or scientific information that affects the clarity, understanding, or completeness of the study documents, and there is uncertainty whether the missing information will affect the selection of, justification of, or ability to implement the recommended plan..

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

# Final Panel Comment – Example

## Final Panel Comment 2:

**Project documentation is not clear with regard to plans for actual construction and operation of new port facilities, and relies too much on secondary sources.**

### Basis for Comment:

The net project benefits are contingent on operation of the dormant cement terminal and on construction and operation of terminals for export scrap metal and import biofuels (ethanol). The report appears to rely heavily on secondary sources throughout (e.g., the Port Authority) for information on the construction and operation of these port facilities. The status of those terminals is not entirely clear. In particular, it is not clearly stated whether the scrap metal and biofuels facilities will be built and operated in the absence of the overall project, or whether the terminal facility owners would consider other plans or locations for those facilities (e.g., Stockton).

The owner of the dormant cement facility, Cemex, also owns the primary facility. The planned activation date of the secondary facility and the market coverage and import tonnage split between primary and secondary facilities are all under Cemex's control. Information on expected cement tonnage through the POWS facility should therefore have been obtained directly from Cemex wherever possible.

### Significance – Medium:

Project benefits are contingent on the opening and operation of the scrap metal, biofuels, and cement facilities, and the report needs to be as clear and definitive as possible on those issues.

### Recommendations for Resolution:

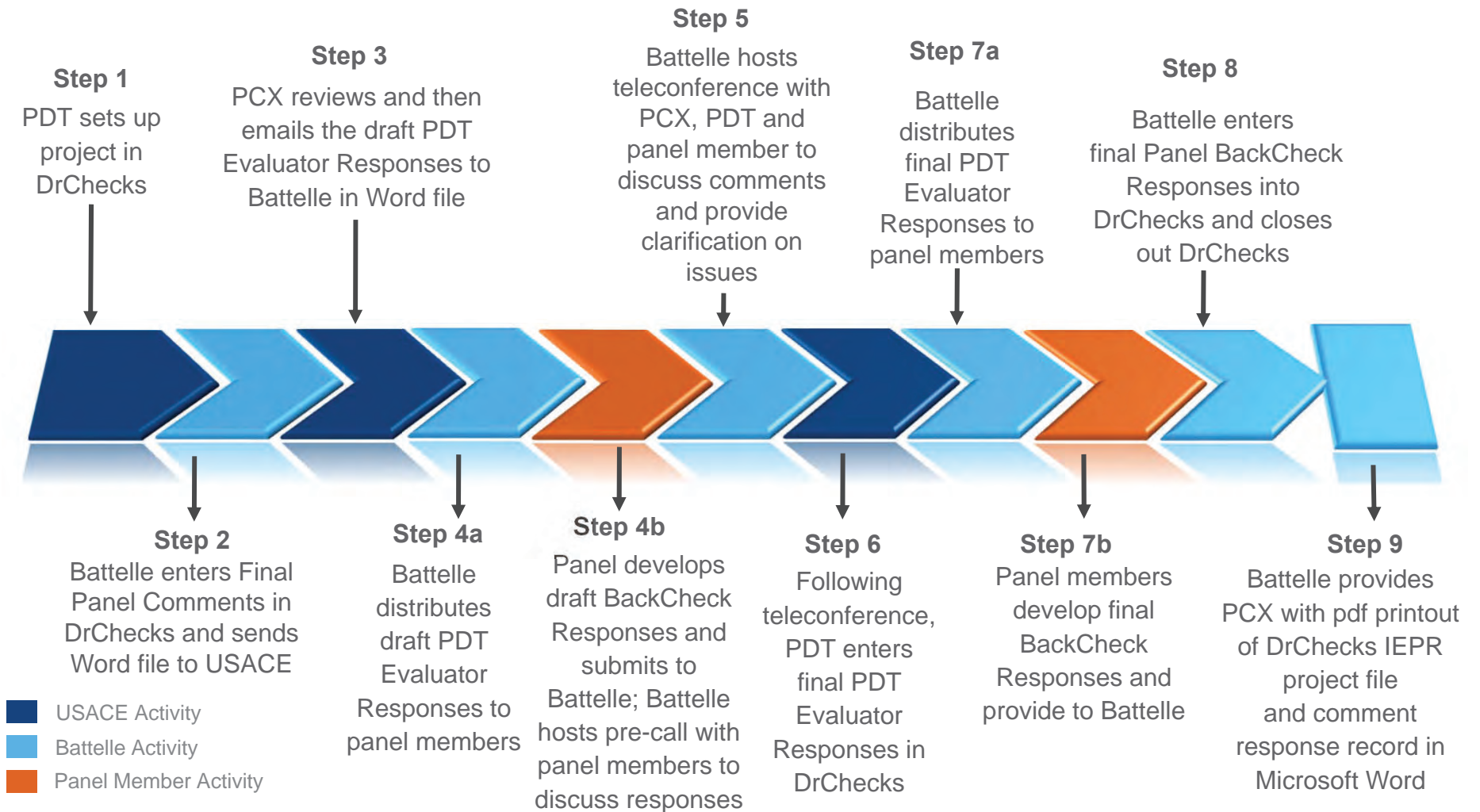
1. Contact cement, ethanol, and scrap metal projects sponsors directly to clarify the nature and status of their facility and operations plans.
2. Obtain information confirming or correcting report statements regarding plans, timelines, and tonnage, and make any necessary report changes.
3. Determine the planned split of business between the Cemex terminal and the secondary terminal owned by the same

# Task 5 – IEPR Report

- Battelle will prepare and submit the Final IEPR Report which will include the following:
  - A list of the Final Panel Comments developed by the panel members (Main Report).
  - A discussion of the panel members' findings (Executive Summary/Main Report)
  - A description of the methods used to conduct the IEPR (Appendix A)
  - A summary of the panel members and their qualifications (Appendix B)
- As part of the Final IEPR Report, the Panel will prepare/contribute to the Overall Comment Statement that addresses the Panel's "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used." This statement is a high level summary of the specific technical issues (plan formulation, economics, engineering, environmental) identified by the Panel.
- No "working drafts" of the Final Panel Comments or draft version of the final report will be submitted. USACE comments and edits to the report would remove the "independence" that is called for in USACE guidance, EC 1165-2-217.
- **USACE PCX will indicate acceptance of this report. [Time has been added to the schedule to account for this.](#)**



# Comment Response Process Flowchart



# Task 6 – Comment Response Process

- Following acceptance of Final IEPR Report, Battelle provides an MS Word file to the PCX to assist the PDT prepare and enter text for their draft Evaluator Responses
- Concurrently with this Word file, Battelle holds a guidance call (**See flowchart on next slide**) with the PCX/PDT to review the Comment Response process.
  - *One of the best ways to maintain the schedule is to make sure all parties involved understand how to develop draft Evaluator and BackCheck Responses*
- USACE will set the project up in **DrChecks\*** (**see Step 1 next slide**)
  - USACE District sets up DrChecks review on behalf of Battelle. IEPR is a separate review in the overall/overarching project.
  - Battelle staff should be added as Commenters (not Evaluators or Viewers)
  - Battelle enters comments on behalf of the IEPR Panel. *Peer reviewers do not need access to DrChecks.* Battelle will enter the panel members' Final Panel Comment statements into DrChecks with the full four-part comment provided as an attachment.

**The following Battelle staff need access to this project in DrChecks:**

(b)(6)

# Task 6 – Comment Response Process

Battelle offers a short (30 minute) comment response “guidance call” which has been proven to help minimize questions and avoid misunderstandings during this phase of the IEPR.

- Guidance for Providing PDT Evaluator Responses (draft and final)
  - DrChecks requires a response of “concur” or “non-concur” when the Final Panel Comment is posted. This response is directed to the issue presented in the Final Panel Comment, and whether USACE agrees that this is an issue that needs to be addressed (i.e., concur) or not addressed (i.e., non-concur).
  - Headquarters requires the PDT to respond to each numbered recommendation for resolution. The PDT response can consist of an “adopt” (which can mean: “adopt now” or “adopt in future”), or “not adopt”. It is possible to concur with a Final Panel Comment, but not adopt one or more recommendations because of USACE policy, budget constraints, or other reasons.
  - The “concur” or “non-concur” should be the first text in the response with a detailed explanation to the comment, followed by individual responses to each recommendation. Recommendation responses should also provide the following:
    - Adopt – indicate what actions will be taken now or in the future
    - Not Adopt – explain why the recommendation(s) is not being adopted
  - **All Evaluator Responses should include both “concur” or “non-concur” and “adopt” or “not adopt”**

# Draft Evaluator/BackCheck Response

## Before

Recommendation for Resolution	
<ol style="list-style-type: none"> <li>1. Present information in the report that more convincingly supports the growth rates in light of the recent declines and how other competing ports have been taken into account.</li> <li>2. Address whether the Hanjin bankruptcy may affect commodity forecasts.</li> </ol>	
PDT <input type="checkbox"/> Draft / Final Evaluator Response (FPC 2)	
<input type="checkbox"/> Concur	<input type="checkbox"/> Non-Concur
<p>Please <b>enter an X</b> in front of your selection above. A concur should be provided if the PDT will revise the document or conduct activities to address the issue presented in the Final Panel Comment (statement and Basis for Comment). Please note that agreeing with the statement does not constitute a "concur," unless an action is provided. A non-concur should be provided if the PDT does not agree that the issue presented in the Final Panel Comment (statement and Basis for Comment) should be addressed and will not revise the document or conduct other activities in response to this issue.</p> <p>Explanation:</p>	
<b>Recommendation 1:</b>	<input type="checkbox"/> Adopt <input type="checkbox"/> Not Adopt
<p>Please <b>enter an X</b> in front of your selection above. For each recommendation, please indicate whether the PDT will 'adopt' or 'not adopt' each recommendation and provide an explanation. If 'adopt', please provide information on how this recommendation will be adopted. If 'not adopt', please explain why.</p> <p>Explanation:</p>	
<b>Recommendation 2:</b>	<input type="checkbox"/> Adopt <input type="checkbox"/> Not Adopt
<p>Explanation:</p>	
Panel <input type="checkbox"/> Draft / Final BackCheck Response (FPC 2)	
<input type="checkbox"/> Concur	<input type="checkbox"/> Non-Concur
<p>Please <b>enter an X</b> in front of your selection above. Based on the PDT response, the Panel has provided the following response. Explanation:</p>	

This is a screen capture of the Word document that Battelle sends to USACE. This example depicts an FPC with two recommendations.

There are instructions for the PDT to enter their draft (and later, their final) Evaluator Response under each Final Panel Comment.

The last row includes instructions for the Panel members to enter their draft BackCheck Response.

# Draft Evaluator/BackCheck Response

## After

PDT <b>Draft</b> /Final Evaluator Response (FPC 2)		
<input checked="" type="checkbox"/>	Concur	<input type="checkbox"/> Non-Concur
<p>Explanation: Further support for the commodity forecast will be provided in the economics appendix. This will include both quantitative evidence of tonnage growth consistent with the forecast used in the analysis and qualitative reasoning behind the forecasted growth rates.</p>		
<p><b>Recommendation 1:</b>    <input checked="" type="checkbox"/> Adopt    <input type="checkbox"/> Not Adopt</p>		
<p>Explanation: The following will be included in the economics appendix to further support the commodity forecast used in the analysis:</p> <p>From 2010-2016, throughput tonnage fell at a negative compound annual growth rate of approximately 7 percent. In that time, TEU totals fell from 1.9 million to 1.05 million. The drop in tonnage began to slow in 2014, with TEU totals only dropping by 4 percent. Dock-specific data for 2015 and 2016 is currently not available (October 2016), but for all trade to docks under the XYZ Agreement between 2010 and 2015, TEU totals grew by 4.6 percent. As of November 2016, year-to-date TEU totals are 2015 year-to-date totals.</p>		
<p><b>Recommendation 2:</b>    <input type="checkbox"/> Adopt    <input checked="" type="checkbox"/> Not Adopt</p>		
<p>Explanation: Company X is currently under contract at Terminal Y. Terminal Y is outside of the waterway. The analysis modeled and forecasted tonnage for Terminal Y, and it was determined that Terminal Y would not accrue benefits under any alternative plan. Company X's bankruptcy were to reduce the total tonnage delivered on routes to City Z, this will not affect benefits, as Terminal Y will not receive improvements under the NED or LPP plan.</p>		
Panel <b>Draft</b> /Final BackCheck Response (FPC 2)		
<input checked="" type="checkbox"/>	Concur	<input type="checkbox"/> Non-Concur
<p>Explanation: USACE agrees to include additional information in the FR/EA to support the commodity growth rates.</p>		

This is a screen capture of the Word document that USACE sends back to Battelle after the PCX/RMC reviews the PDT responses.

Battelle forwards this file to the Panel.

This file guides the Comment Response teleconference. The instructions can be removed at this point.

This example includes the BackCheck Response added by the panel member.

# Task 6, continued – DrChecks screen capture

<<First < Prev Viewing 1 of 17 Items Next > Last>>

**Comment Status ID: 5087576**  
Comment Status is: **'Non-Concur'**  
Backcheck Status is: **'Closed Issue'**

**Comment ID: 5087576 (display only)**  
a. **Comment Classification:** For Official Use Only (FOUO)  
b. **Design Discipline:** Economics  
c. **Coordinating Discipline:** None  
d. **Section/Figure** n/a  
e. **Page Number / Line Number** N/a  
f. **Attachment:** [Encinitas-SB\\_FPC1.doc](#)  
g. **Is Critical:** **No**  
h. **Comment Text:** The UDV method may not accurately represent the actual recreation benefits attributable to the project.

Submitted by [Corey Wisneski](#) (phone: +1 (781) 952-5296) [wisneskic@battelle.org](mailto:wisneskic@battelle.org) on Mar 15 2013.

**Evaluation 1. (display only)**  
a. **Status:** Non-concur  
b. **Impact** No impact identified.  
c. **Evaluation Text:** **Explanation:**  
Can be found in the attached document.  
**Recommendation #1:  X Adopt  Not adopt**  
**Explanation:** Additional information has been added to Appendix E, Section 4.8.2 and is attached to this comment.  
**Recommendation #2:  X Adopt  Not adopt**  
**Explanation:** See explanation to Recommendation #1  
d. **Attachment:** [FPC 1 Response and Revised Section 4 8 2.docx](#)

Submitted by [Heather Schlosser](#) SPL Coastal Studies Group 213-452-3810 [heather.r.schlosser@usace.army.mil](mailto:heather.r.schlosser@usace.army.mil) on Apr 02 2013

**Eval. 1 - Edit Backcheck 1**  
a. **Backcheck On** Apr 18 2013  
b. **Status (req.)**  Open  Closed  
c. **Flag for followup (req.)**  Yes  No  
d. **Discussion (req.)** (?)  
Concur.

e. **Attachment (opt.)**



# Draft Schedule

Task	Action	Due Date Working Days
1	Award/Effective Date	6/26/2018
	Review documents available	6/19/2018
	Public comments received from USACE	9/12/2018
	Battelle submits draft Work Plan*	7/6/2018
	USACE provides comments on draft Work Plan	7/13/2018
	Battelle submits final Work Plan*	7/18/2018
2	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	6/29/2018
	USACE provides comments on COI questionnaire	7/3/2018
	Battelle submits list of selected panel members*	7/13/2018
	USACE confirms the panel members have no COI	7/18/2018
	Battelle completes subcontracts for panel members	7/27/2018
	Subcontractors complete mandatory Operations Security (OPSEC) training	8/26/2018
3	Battelle convenes kick-off meeting with USACE	7/3/2018
	Battelle sends review documents to panel members	7/30/2018
	Battelle convenes kick-off meeting with panel members	7/31/2018
	Battelle convenes kick-off meeting with USACE and panel members	8/1/2018
	Battelle convenes mid-review teleconference for panel members to ask clarifying questions of USACE	8/16/2018
	Battelle participates in the ADM Meeting	11/1/2018
4	Panel members complete their review of the documents	9/5/2018
	Battelle provides talking points to panel members for Panel Review Teleconference	9/7/2018
	Battelle convenes Panel Review Teleconference	9/10/2018
	Battelle provides Final Panel Comment templates and instructions to panel members	9/11/2018
	Panel members provide draft Final Panel Comments to Battelle	9/17/2018
	Battelle provides feedback to panel members on draft Final Panel Comments; panel members revise Final Panel Comments	9/18/2018 - 9/24/2018
	Panel finalizes Final Panel Comments	9/25/2018
4	Battelle receives public comments from USACE	9/12/2018
	Battelle sends public comments to Panel	9/13/2018
	Panel members complete their review of the public comments	9/20/2018
	Battelle and Panel review the Panel's responses to the charge question regarding the public comments	9/21/2018
	Panel drafts Final Panel Comment on public comments, if necessary	9/25/2018
	Panel finalizes Final Panel Comment regarding public comments, if necessary	9/27/2018

# Draft Schedule

Task	Action	Due Date Working Days
5	Battelle provides Final IEPR Report to panel members for review	10/1/2018
	Panel members provide comments on Final IEPR Report	10/3/2018
	<b>Battelle submits Final IEPR Report to USACE*</b>	<b>10/5/2018</b>
	USACE Planning Center of Expertise (PCX) provides decision on Final IEPR Report acceptance	10/15/2018
6	Battelle inputs Final Panel Comments to Design Review and Checking System (DrChecks) and provides Final Panel Comment response template to USACE	10/17/2018
	Battelle convenes teleconference with USACE to review Comment Response process	10/17/2018
	Battelle convenes teleconference with Panel to review Comment Response process	10/17/2018
	USACE Project Delivery Team (PDT) provides draft Evaluator Responses to USACE PCX for review	10/31/2018
	USACE PCX reviews draft Evaluator Responses and works with USACE PDT regarding clarifications to responses, if needed	11/6/2018
	USACE PCX provides draft PDT Evaluator Responses to Battelle	11/7/2018
	Battelle provides draft PDT Evaluator Responses to panel members	11/9/2018
	Panel members provide draft BackCheck Responses to Battelle	11/14/2018
	Battelle convenes teleconference with panel members to discuss draft BackCheck Responses	11/15/2018
	Battelle convenes Comment Response Teleconference with panel members and USACE	11/16/2018
	USACE inputs final PDT Evaluator Responses to DrChecks	11/27/2018
	Battelle provides final PDT Evaluator Responses to panel members	11/28/2018
	Panel members provide final BackCheck Responses to Battelle	12/3/2018
	Battelle inputs the panel members' final BackCheck Responses to DrChecks	12/6/2018
	Battelle submits pdf printout of DrChecks project file*	12/7/2018
		Contract End/Delivery Date

# Questions/Comments

1. Please confirm that Mobile Harbor is the abbreviated terminology to be used for this IEPR.
2. The PWS indicates that the Agency Decision Milestone (ADM) Meeting is in November. Has a date in November been confirmed
3. Is there anything about this project that we should be aware of in terms of the nature of the public comments that may be received/groups that may respond, any project controversies or current/expected litigation?
4. USACE will need to give DrChecks access for (b)(6)

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** RE: Mobile Harbor milestone check  
**Date:** Thursday, July 5, 2018 11:22:00 AM

---

(b)(6) Please use 20 November for the Agency Decision Milestone Date.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Tuesday, May 22, 2018 12:35 PM  
**To:** [REDACTED] (b)(6)  
**Subject:** Mobile Harbor milestone check

(b)(6)

Is Mobile Harbor still on track for Public Review start on July 18th and ADM on November 23rd (black Friday)?  
Milestones will relock middle of June.

[REDACTED] (b)(6)

[REDACTED] (b)(6)

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)  
**Date:** Thursday, July 5, 2018 10:44:15 PM

---

Thanks, (b)(6) sorry about messing up your leave. I got your txt, we'll talk soon.

---

**From:** (b)(6)  
**Date:** July 5, 2018 at 2:58:23 PM CDT  
**To:** (b)(6)  
(b)(6)  
**Cc:** (b)(6)  
(b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)

(b)(6) to answer your first question: Yes, I worked w/ Shell too. They Stated WT Offshore (i.e. Shell) has no lines that cross channel. Only lines that run parallel from platforms to shell Yellowhammer plant. Stated Fieldwood has a 6" gas line that Fieldwood owns that feeds their platform but POC had not as-builts to give me.

I totally agree w/ (b)(6) comments that "we need to be specific on the identification of the as-built elevations of known pipelines and utilities and how these compare to required district specified clearances within the engineering appendix to be consistent with guidance and previous district engineering appendices concerning utility crossings on navigation projects."

I've tried to the best of my knowledge to do this. (b)(5)

(b)(5)

I'm good w/ the below changes that (b)(6) recommended below:

#### 4.8 Pipeline Crossings

A search of design files, permit records, and state and federal databases indicate several utilities crossing are located within the project footprint. The locations of these pipelines have been identified; however, uncertainty associated with the locations was accounted for in the abbreviated risk analysis (as generally described in Section 7.1.4) and reflected in the overall cost contingency. Furthermore, surveys will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts. Details of the pipeline crossings coordination is provided in Appendix D – Real Estate.

REMOVE TABLE 4-4 FOR CONSISTENCY WITH RE APPENDIX

#### 7.1.4.1.3 Pipeline Crossings

Mobile Harbor Channel traverses an area where pipelines exist. The locations of all known pipelines have been identified; however, uncertainty associated with the pipeline locations (or unknown pipelines that may exist) was accounted for in the abbreviated risk analysis. The risk of unidentified pipelines will continue to be captured in the CSRA of the Recommended Plan as the study progresses. Furthermore, surveys are included in and will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 04, 2018 10:02 AM

To: (b)(6)

Cc: (b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

Okay. Just let me or (b)(6) know what you need from us when you begin to add the pipeline crossings to the Engineering Appendix. From what I can tell, we only need to add the 4 Chevron Crossings. Will have to ask (b)(6) about the Legacy and the Shell.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 04, 2018 9:56 AM

To: (b)(6)

(b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Thanks. The table (b)(6) provided is what I used to generate the table in the engineering appendix that is now being removed. The GIS data was added to the project geodatabase but overall the dataset is missing critical



metadata for it to be a trusted source.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 4, 2018 9:53 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

Okay, works for me. I did find the attached GIS files that (b)(6) sent that may have the exact locations of the pipelines.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 04, 2018 9:18 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Since I am just now seeing this information I do not have time to digest and incorporate this appropriately within the engineering appendix given the current time frame we have to complete report revisions. We can leave the revisions as suggested at the moment, but I highly encourage the engineering appendix be updated at a later date.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 4, 2018 9:11 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

(b)(6) I am okay with the language.

(b)(6) Attached are e-mails with the minimum cover requirements from (b)(6) and the maps of the EXXON Pipeline crossings from (b)(6) I have also attached images of our Corps Maps with the correlating Exxon utility naming conventions and cross sections of those four pipeline borings (each boring carries several lines) that cross the channel. (b)(6) and I can work with you to answer any questions. (b)(6) with Exxon should be able to provide cadd files of any of the attached images that you need.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, July 03, 2018 5:38 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

My only comment is that we need to be specific on the identification of the as-built elevations of known pipelines and utilities and how these compare to required district specified clearances within the engineering appendix to be consistent with guidance and previous district engineering appendices concerning utility crossings on navigation projects.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, July 3, 2018 4:15 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: Pipeline Language

(b)(6)

Based on our discussion earlier regarding pipelines, I revised the sections below for consistency in how this subject is presented in other portions/appendices of this report. Let me know if you're good with the language.

#### 4.8 Pipeline Crossings

A search of design files, permit records, and state and federal databases indicate several utilities crossing are located within the project footprint. The locations of these pipelines have been identified; however, uncertainty associated with the locations was accounted for in the abbreviated risk analysis (as generally described in Section 7.1.4) and reflected in the overall cost contingency. Furthermore, surveys will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts. Details of the pipeline crossings coordination is provided in Appendix D – Real Estate.

REMOVE TABLE 4-4 FOR CONSISTENCY WITH RE APPENDIX

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(b)(6)

CLASSIFICATION: UNCLASSIFIED  
CLASSIFICATION: UNCLASSIFIED  
CLASSIFICATION: UNCLASSIFIED

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** FW: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS  
**Date:** Friday, July 6, 2018 4:57:00 PM  
**Attachments:** [2018 Mobile-Baykeeper DSEIS Comment Letter Mobile Harbor.pdf](#)

---

FYI

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Friday, July 06, 2018 3:53 PM  
**To:** (b)(6)  
**Cc:** (b)(6)  
**Subject:** FW: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

FYI...

(b)(6)

-----Original Message-----

**From:** Laura Jackson [<mailto:ljackson@mobilebaykeeper.org>]  
**Sent:** Friday, July 06, 2018 3:30 PM  
**To:** DeLapp, James Andrew (Jim) COL USARMY CESAM (US) <James.A.Delapp@usace.army.mil>  
**Cc:** Cade Kistler <ckistler@mobilebaykeeper.org>; Casi (kc) Callaway <callaway@mobilebaykeeper.org>; (b)(6)

(b)(6)

**Subject:** [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

Hi Col. DeLapp,

Attached you will find Mobile Baykeeper's comment letter on the Draft Supplemental Environmental Impact

Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Please let me know that you have received our submission and feel free to reach out with any questions.

Thank you and have a great weekend.

-Laura

--

Laura Stone Jackson

Program & Grants Coordinator  
Mobile Baykeeper  
450-C Government Street  
Mobile, Alabama 36602  
Phone 251-433-4229  
Cell 480-707-3787  
Fax 251-432-8197

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<Blocked[https://www.youtube.com/channel/UCaAAXTy3q\\_8FydkH61bhxRQ](https://www.youtube.com/channel/UCaAAXTy3q_8FydkH61bhxRQ)> Read Our Programs Blog Here!  
<Blocked<http://www.mobilebaykeeper.org/program-blog/>>

"Clean Water, Clean Air, Healthy Communities"

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Providing citizens a means to protect the beauty, health and heritage of the Mobile Bay Watershed, Alabama's waterways and coastal communities.

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July 6, 2018

U.S. Army Corps of Engineers, Mobile District  
Attn: Colonel James A. Delapp  
109 Saint Joseph Street  
Mobile, AL 36602

RE: Draft Supplemental Environmental Impact Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Dear District Commander,

We are Mobile Baykeeper, a twenty-one-year-old nonprofit organization with the mission of providing citizens a means to protect the beauty, health and heritage of the Mobile Bay Watershed and coastal communities. We are submitting comments on behalf of our board, officers, staff and more than 4,500 members regarding a Draft Supplemental Environmental Impact Statement to evaluate improvements to the Mobile Ship Channel. Mobile Bay is a complex and highly sensitive ecosystem considered to be one of the most biodiverse ecosystems in North America<sup>1</sup>. Mobile Bay is Alabama's central estuary serving as a transitional zone where the river's fresh water can mingle with tidally influenced marine waters making it a highly productive and diverse nursery as well as exceedingly environmentally and economically important. Mobile Bay is valuable to several industries including: commercial and recreational fisheries, tourism, coastal development, and recreation (boating, paddling, swimming, etc.). Each of these industries contribute significantly to our economic prosperity and growth making it vitally important to evaluate all potential impacts to our natural resources. To protect our economy, community, and quality of life, we must ensure that we mitigate for any impacts associated with a major development project. Mobile Baykeeper recognizes the economic value of the Port as it contributes \$19.4 billion to our regional economy and know that improvements could make our Port more competitive in the industry<sup>2</sup>. By thoroughly studying and developing a comprehensive plan for the port expansion, we can grow responsibly and minimize negative impacts to the very natural resources that support so many economic sectors and our quality of life.

We applaud the U.S. Army Corps of Engineers (USACE) for its efforts since

<sup>1</sup> Duncan, Scot. *Southern Wonder: Alabama's Surprising Biodiversity*. Tuscaloosa: University of Alabama Press, 2013.

<sup>2</sup> USACE public scoping document



2015 to communicate with and involve the community in the project evaluation. Throughout this time, community members have had the opportunity to attend public scoping meetings and provide feedback on different project components. Since the public has not had all information used in this DSEIS available to them, these involvement opportunities (while helpful) should not be considered comprehensive. We also appreciate that you have a responsibility to meaningfully consider all comments made during this period. Mobile Baykeeper has provided several comment letters during the assessment of the potential impacts associated with deepening and widening the Mobile Bay navigation channel, some of the essential points of which will be restated in this comment letter along with several novel considerations and concerns. We request the Corps fully evaluate the following comments formulated based on the concerns of our members and partners and provide a written response for how each will be addressed and incorporated into the Draft Supplemental Environmental Impact Statement (DSEIS).

## **EXECUTIVE SUMMARY**

### **I. GENERAL CONSIDERATIONS:**

- A. Consider All Impacts From the Proposed Project** – The draft SEIS must include all aspects of the proposed activity from start to finish (dredging activities, impacts from new channel hydrodynamics, and long-term impacts including potential for further development and upgrades at associated port facilities). This includes indirect and cumulative effects.
- B. Coordinate with All Appropriate Audiences** – The Corps should meaningfully coordinate with all the appropriate audiences to develop the DSEIS – including state and federal agencies, commercial and recreational fishermen, and environmental justice communities.
- C. High Quality Accurate Scientific Data** – To ensure the Corps is utilizing the best available science, they must connect with the local scientists and researchers who specialize in subjects that are relevant and pertain directly to the study. These individuals have extensive and critical information. Failure to acquire information from these individuals may reduce the ability to produce “high-quality information and accurate scientific data” necessary to complete a DSEIS (40 C.F.R. § 1500.1(b)).
- D. Utilization of 2010 as Climatic Baseline** – The Corps should use more than one year as a model for the entire project. 2010 did not have any extreme droughts or severe flood events; Basing the entirety of the impacts from the project solely on 2010 will not show the true edge case scenarios including accurate representations of climatic, hydrologic, and other relevant conditions. Because of this it is likely not an accurate characterization of the full range of conditions that would result from the modifications to the ship channel, sea level rise, saltwater intrusion, and other impacts.
- E. Better Define and Understand No Action and Alternative Projections** – We are concerned about the preliminary finding of “no impact” that has been presented. Predicting ship traffic will be greater without the ship channel deepening and widening project than with the project is a tenuous assumption. It is entirely possible that it is in large part due to this assumption that the Corps is able to predict no impact and, therefore, avoid mitigation

for the impacts that will certainly come an enlarged ship channel. We request that the Corps review impacts under multiple growth (negative, neutral, and positive) scenarios to accurately understand what impacts will be under these potential growth scenarios.

- F. Cumulative Impacts** – NEPA requires the Corps to identify the major resources of concern and evaluate those resources through a cumulative impact analysis. According to the CEFQ, a cumulative impact “is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts include those coming from affiliated industries that will need or wish to expand due to the Port’s expansion as well as prospective new growth due to a deeper and wider ship channel. The cumulative analysis needs be sensitive enough to include other important factors such as but not limited to: extreme weather events, pollution, wetland loss, fishery habitat impacts, and sea level rise.
- G. Indirect Impacts** – The Corps must identify all indirect impacts and perform compensatory mitigation for any unavoidable impacts. Indirect impacts are defined as those impacts “caused by the action and are later in time and farther removed in distance, but are still reasonably foreseeable.” These impacts “...may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems.”
- H. Monitoring and Protective Plans** – We suggest the Corps work in cooperation with state agencies to develop a comprehensive plan to use protective BMPs for the proposed activities. We suggest a long-term monitoring plan be implemented that monitors dredging and disposal areas for at least 10 years.
- I. Mitigation** – We encourage the Corps to consider public comments to ensure impacts are not underestimated. If any unavoidable impacts are identified, we suggest the Corps work with the community and environmental groups to ensure projects are supported that will adequately address the impacts identified. Different mitigation measures for A-K below should be considered and studied as separate alternatives. A project of this size and scope will undoubtedly have some unavoidable impacts if implemented. All other similar projects (Jacksonville, Savannah, Houston, Charleston etc.) reviewed by Mobile Baykeeper throughout the region have found unavoidable impacts. If in this case the Corps attempts to ignore or conceal these impacts to improve perception and adoption of this project, it could result in significant liability to the Corps and the project sponsor under environmental statutes in the future.

### **Specific Considerations:**

- A. Wetlands** – The Corps presented minimal to no effects on wetlands in the latest public workshop. This is very concerning given many other large ship channel enlargement projects identified unavoidable impacts from their studies. Evaluations used must be robust enough to predict the impacts from the proposed project. Currently, it appears that these evaluations may not be able to fully predict these impacts. Therefore, we suggest the Corps use multiple

scenarios with varying salinity levels, particularly during longer drought durations and varying sea level rise scenarios (high, medium, low). These models should be run in conjunction with other predicted changes such as increased wave energy from larger vessels, sedimentation and turbidity impacts, and changes in dissolved oxygen. Indirect effects such as development of wetland areas due to industrial growth induced by the ship channel enlargement must be considered as required by NEPA.

- B. SAVs** – We encourage the Corps to evaluate how changes to factors including but not limited to: salinity, turbid conditions produced as a result of dredging, changes in wave energy due to larger vessels, and changes to dissolved oxygen levels will impact the local Sub Aquatic Vegetation (SAV) population. When evaluating these factors, it is important to consider the indirect and cumulative impact of how SAVs will react when enduring all conditions and induced and incremental changes.
- C. Shellfish/Oysters** – We suggest the Corps review impacts to all lifestages of oysters including the use of larvae distribution models created by the Dauphin Island Sea Lab. We also recommend that a cumulative impact analysis be conducted to see how changes in salinity, dissolved oxygen, wake/waves, and sedimentation will impact the species. When looking at the existing oyster reefs, we advise including oyster farms, gardens, and planned oyster production. Aquaculture is expanding dramatically across Mobile Bay. Both the western and eastern shores must be analyzed to determine how enlarging the channel will impact the viability of these operations.
- D. Benthic Communities** – To ensure the full extent of impact is evaluated, we encourage the Corps to characterize the different benthic communities throughout the project and not limit the samples to a portion of the project disturbance. The Corps should also consider the ongoing stress or flux benthic communities will endure from sedimentation and shoaling processes that will continue as maintenance dredging occurs in the navigation channel.
- E. Fish** – We encourage the Corps to consider habitat suitability for all life stages including adult, juvenile, and larvae as well as spawning, nursery, and important migratory and movement areas. The Corps needs to work with the state and federal agencies to understand what areas are considered Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC). Lastly, we strongly encourage the Corps to use cumulative impact analysis to evaluate how multiple factors (salinity, dissolved oxygen, etc.) will impact local species, particularly the Gulf Sturgeon and Red Drum.
- F. Shorebirds, Waterfowl, and Migratory Birds** – We encourage the Corps to evaluate how projected impacts including but not limited to: coastal erosion, beach loss, SAV loss, induced growth, and cumulative impacts will affect birds that rely on these resources.
- G. Threatened and Endangered Species** – We suggest the Corps conduct a biological opinion to evaluate the impacts of the project on each of these threatened or endangered species. We encourage the Corps to coordinate with Dr. Ruth Carmichael at the Dauphin Island Sea Lab to acquire the best available science on the West Indian Manatee. The Corps should carefully evaluate how changes to specific SAV populations (particularly Eurasian watermilfoil, water celery, and coon's tail that were identified as at risk from preliminary

results) will impact the local manatee population. Under ESA, the Corps must also consider any impacts from future state or private activities that are reasonably foreseeable and indirect impacts such as induced growth.

- H. Shorelines** – The Corps should consider the impact from increased ship wake on both sides of Mobile Bay, Dauphin Island, other downdrift MS-AL barrier islands and coordinate with stakeholders to ensure consideration of current, planned, and reasonably foreseeable living shoreline projects. The Corps needs to ensure adequate consideration of all the long-term effects that a deeper and wider ship channel will have from the reduction in littoral sediment deposition on shorelines and develop a protective comprehensive plan to account for unavoidable impacts. The Corps needs to consider how a Vessel Speed Reduction (VSR) program could be implemented to reduce the ship wake energy impacting shorelines and viability for oyster farming.
- I. Air Quality** – We ask the Corps to include air impacts resulting from criteria pollutants, Hazardous Air Pollutants (HAPs), and greenhouse gases from all sources, directly and indirectly caused, as a result of this expansion. This includes induced growth and increases in ship, truck, rail and other traffic. We also want to understand how the Corps will identify baseline conditions for air quality. We request that monitoring is conducted to understand current conditions and compare to expected conditions. The Corps should also consider how implementing a Vessel Speed Reduction program could reduce emissions experienced across our area.
- J. Invasive Species** – We encourage the Corps to evaluate the potential for invasive species introduction into Mobile Bay from increased port activities and adequately develop a plan that mitigates this threat.
- K. Dredged Material and Placement** – The Corps meeting on February 22, 2018 stated that the rate of movement of dredged material out of the Sand Island Beneficial Use Area (SIBUA) was approximately half of the rate that it was being added to the area. The Corps also stated that they would evaluate placement of dredged spoils from the ship channel enlargement and maintenance activities closer to Dauphin Island. Mobile Baykeeper requests that the Corps ensure that dredged materials are placed in appropriate depth and proximity to Dauphin Island. This will enable the dredged spoil to accrete on the island at a sufficient rate to adequately nourish the island and prevent erosion of the island caused by disruption of the littoral drift system. Additionally, given the recreational importance for Tarpon and Red Drum, the placement of dredged material in the Relic Shell Mined Area should be evaluated utilizing all data available to ensure these habitats and other relevant habitats are not destroyed or impaired. To accurately understand the effects of the proposed project, the Corps must investigate sediment for parameters including but not limited to: bacteria, metals, Polychlorinated biphenyl (PCBs), Polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, phenols, pesticides, dioxin congeners, cyanide, organotins, and nutrients and other legacy pollutants.

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## I. GENERAL CONSIDERATIONS FOR THE DSEIS

The following comments relate to the process and implementation of completing the DSEIS. More information on how each of these topics may impact specific species or habitats are described in more detail in the Specific Considerations section below. Careful consideration must be applied to the proposed project's evaluation to ensure all impacts are considered using the most up to date and valid scientific information.

### A. **Consider All Impacts From the Proposed Project**

To our understanding, the Corps announced at the February 22, 2018 public workshop that the draft SEIS will only consider impacts from the specific dredging activities proposed. Although the dredging operations will encompass a portion of the environmental impacts associated with the proposed project, it does not adequately cover the extent of environmental issues that will likely occur from the approval of this project. In addition to direct impacts, the Corps must ensure that all cumulative and indirect effects (addressed in more detail in sections F and G) resulting from the project are evaluated and mitigate for where unavoidable impacts are identified. Below are some of the areas of direct impact that should be considered if the project moves forward. Each of these has been evaluated in similar port expansion EIS evaluations. Environmental impact statements should include all impacts in the evaluation process, including but not limited to: dredging activities (sediment plumes, release of contaminated sediments, etc.); and having a deeper channel (saltwater intrusion, dissolved oxygen changes, etc.), and; the attraction of ships and vessels of all sizes (ship wake, ballast water discharge, noise, air pollution, etc.). Currently the Corps is considering these in separate silos and comprehensively which could underestimate the impacts of the proposed project on our natural resources.

#### i. *Evaluate Impacts from Dredging Activities*

Dredging can cause an increase in suspended sediment concentrations or cloudy water conditions, the potential release of contaminated material, an increase in erosion to nearby shorelines, and the disturbance of habitats particularly within the vicinity of the dredging activities. To our understanding, the Corps plans to utilize a hopper dredge to hydraulically remove sediment from the navigation channel and then store that material in hoppers on the dredge. During this activity, fine sediments (including clays, silt, and fine-sands) generate turbid conditions. Turbidity plumes and sedimentation are a result of overflow and washing practices. The sediment plumes can extend long distances depending upon the type of dredge, operation practices, wind/currents, and the type of sediments located in the excavation area. High turbidity or sediment levels resulting from hopper dredge operations have been documented to redistribute up to 12% of dredged material into the environment with the sediment plume extending more than 5,200 meters from the site of excavation<sup>3,4</sup>. To make the improvements proposed in this project, dredging would span across a

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<sup>3</sup> Nichols, M., Diaz, R. J., & Schaffner, L. C. (1990). Effects of hopper dredging and sediment dispersion, Chesapeake Bay. *Environmental Geology and Water Sciences*, 15(1), 31-43.



large area and potentially make a substantial impact in its path. It will be important to know, plan, and reduce the extent of the sediment plume along with the environments within that vicinity that will be impacted.

ii. *Evaluate Impacts from a Deeper and Wider Channel*

Deepening the channel can increase saltwater intrusion<sup>5</sup>, causing seawater to advance farther upstream. Changing the salinity regime threatens the freshwater and estuarine marshes and ultimately the species that rely on them. There are several examples of hydrological changes determined as unavoidable impacts in the final EIS evaluating similar harbor capital expansion projects (Savannah Harbor, Charleston Harbor, and Jacksonville Harbor); it seems unlikely that the proposed enlargement of the Mobile Bay Ship Channel would not demonstrate similar effects. Changes to salinity should be analyzed both for vertical and horizontal redistribution to predict water quality changes typically associated with redistribution of vertical salinity zones. Redistribution of horizontal salinity zones are important to evaluate the potential for habitat loss and degradation to wetlands, marshes, tidal rivers, and tributaries. This evaluation should identify the extent of altered salinity regimes and other water quality parameters both on a spatial and temporal scale.

In addition to changes in salinity, a deeper channel can also produce significant changes to dissolved oxygen levels<sup>6</sup>. Harbor deepening concerns for dissolved oxygen include: 1) as depth of the channel increases, the ability of oxygen to reach the bay and river bottoms decreases, generating, on average, lower levels of dissolved oxygen (particularly in the bottom portions where several critical species live), and 2) increased saltwater intrusion, bringing additional saltwater to the upper portions of the estuary and making it more difficult for those areas to receive oxygen from the air, and 3) velocity on average can decrease and reduce the capability of oxygen entering through mixing. Low dissolved oxygen concentrations, particularly for extended periods, could have deleterious effects on fish and other aquatic plants and organisms. Dissolved oxygen is also vitally important for giving the estuary the ability to adjust and handle point and non-point source pollution loads. With lower dissolved oxygen concentrations, we may see a decreased resiliency to these existing and continuing issues.

It is vital that the DSEIS consider changes in salinity, dissolved oxygen, and other water quality parameters and evaluate the attendant consequences on 1) wetlands; 2) threatened and endangered

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<sup>4</sup> Blair *et al.* (1990). Environmental Impacts of the Bal Harbor Beach Nourishment Project: Mechanical and Sediment Impact on Hard Bottom Areas Adjacent to the Borrow Area.

<sup>5</sup> Zhu, J., Weisberg, R. H., Zheng, L., & Han, S. (2015). Influences of channel deepening and widening on the tidal and nontidal circulations of Tampa Bay. *Estuaries and Coasts*, 38(1), 132-150.

<sup>6</sup> U.S. Army Corps of Engineers, Savannah District. (2012). Final environmental impact statement: Savannah Harbor Expansion Project (SHEP). 5-42 – 5-55; Chatham County, Ga and Jasper County, SC.

<http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%205%20SHEP%20FINAL%20EIS.pdf> Retrieved July 3, 2018

species; 3) anadromous fish populations; 4) spawning and nursery habitats; 4) other locally significant organisms (Red Drum, Speckled Trout, Southern Flounder, Blue Crab, Brown and White Shrimp, etc.).

iii. *Evaluate Indirect Impacts Post Expansion*

The channel improvements will make the Port of Mobile more competitive among other U.S. ports by allowing for larger or more heavily loaded ships and the potential for increased frequency of ship travel in our harbor. Heavier ships will produce larger waves resulting in the potential for: increased shoreline erosion surrounding the channel, increased sedimentation from wake activity, and disruption of habitat including oyster, submerged aquatic vegetation, and wetlands. Bigger ships may bring further development along the port – an indirect impact that must be considered in full.

In the DSEIS, impacts from the proposed dredging activities, the changed hydrology, and the increased activity and opportunity from a larger port should all be evaluated. Simply analyzing the impacts from the proposed dredged activity, may result in inadequately characterizing the full environmental impacts the project may produce on Mobile Bay and surrounding communities.

## **B. Coordinate with All Appropriate Audiences**

i. *State and Federal Agencies*

Mobile Baykeeper strongly suggests close coordination and communication with state and federal agencies including but not limited to the following: U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), Alabama Department of Environmental Management (ADEM), Alabama Department of Conservation and Natural Resources (ADCNR), and the National Marine Fisheries Service (NMFS). Other port expansion projects across the nation have coordinated with agencies, particularly in generating and receiving Biological Opinions and avoidance strategies that are required.

ii. *Commercial and Recreational Fishermen*

Mobile Bay and surrounding waterways are utilized heavily by both commercial and recreational fishermen. Knowledge from local fishermen is a valuable resource in gathering information about local fishing grounds, productivity of particular areas of interest, and depth and navigation, among others. Failure to communicate with the community of fishermen can limit the understanding of the local ecosystem and result in mistakes in selecting project locations. We applaud the Corps for their efforts to communicate with local fishermen thus far and we encourage them to continue meaningful efforts to collect information from local fishermen to ensure all impacts from proposed activities are considered.

iii. *Environmental Justice Communities*

It is important that the Corps comply with the Executive Order 12898 requiring federal agencies to ensure minority and low-income populations will not experience disproportionately high and adverse impacts from federal projects. These communities often bear the brunt of impacts while

receiving the least consideration when development projects take place. It is critical that they are meaningfully engaged in creation of the SEIS and impacts to these communities are thoroughly considered as mitigation measures are selected. We encourage the Corps to meet with all potentially impacted environmental justice communities to allow for individuals in low-income communities and communities of color to understand the proposed project and have the opportunity to voice any concerns. From our discussions, with some stakeholders in these communities we know air quality, including understanding how baseline conditions will be established, how impacts will be identified, and indirect air quality impacts from induced growth are significant concerns. We also encourage the Corps present the draft SEIS to the community upon release as well as specifically to environmental justice communities.

### **C. High Quality Accurate Scientific Data**

The development of the DSEIS should rely on and utilize the most up to date techniques for data collection and consider alternative studies to improve understanding. A DSEIS must include “high-quality information and accurate scientific data” per 40 C.F.R. § 1500.1(b) to ensure that its own determination is based on the best scientific and current data available. This proposed project is fortunate to have several research institutes containing many scientists and graduate students who study the area. Collectively, the Dauphin Island Sea Lab and Auburn Shellfish Lab have numerous principal investigators who are considered experts in different subjects including marine mammals, oysters, fisheries, benthic organisms, physical oceanography, amongst many others. These individuals and their associated work present a wealth of knowledge that must be utilized during the creation of any serious environmental impact statement. Failure to connect with these individuals and the studies conducted in the area may greatly reduce the accuracy of the Corps study.

Additionally, all existing community plans need to be incorporated in the review to eliminate one plan contradicting another (for example: Map for Mobile, Alabama Coastal Comprehensive Plan, Comprehensive Conservation Management Plan, Plan for Spanish Fort and Mobile Bay Causeway, Watershed Management Plans, etc).

### **D. Utilization of 2010 for Climatic Baseline**

Mobile Baykeeper is concerned with the use of a singular year for basing all environmental impact analyses. We would like to see the justification for this decision and highly encourage the Corps should use more than one year to model outcomes for the entire project. The Corps is currently using the year 2010 for all of the model analyses for wetlands, SAVs, oysters, benthics, fish, birds, and threatened and endangered species. The year of 2010 did not have any severe (D3) or extreme (D4) droughts in consecutive weeks (lasting at least 2 weeks), yet we see examples of these in 2000 and in 2011 (as seen in Figure 1 and Figure 2).<sup>7</sup> Drought is extremely important to include in impact

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<sup>7</sup> United States Drought Monitor (USDM). Retrieved on July 5 2018 at <http://droughtmonitor.unl.edu/Data.aspx>

analyses particularly when considering the extent of saltwater intrusion.

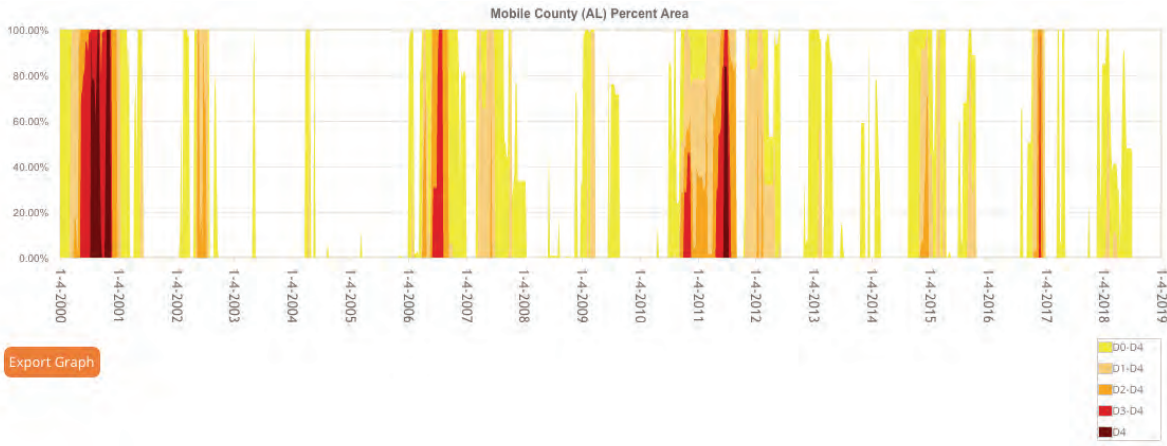


Figure 1. Time series drought data from 2000-2019 extracted from USDM for Mobile County, AL.

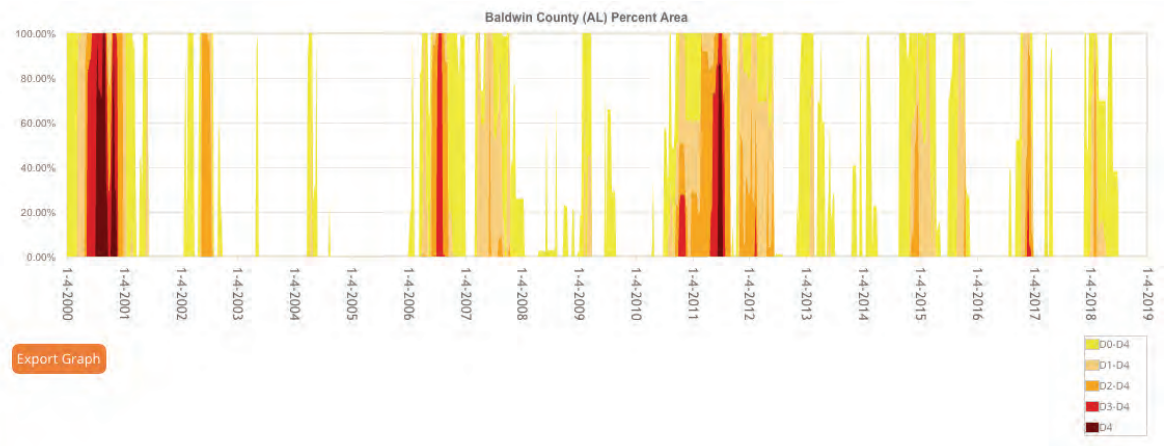


Figure 2. Time series drought data from 2000-2019 extracted from USDM for Baldwin County, AL.

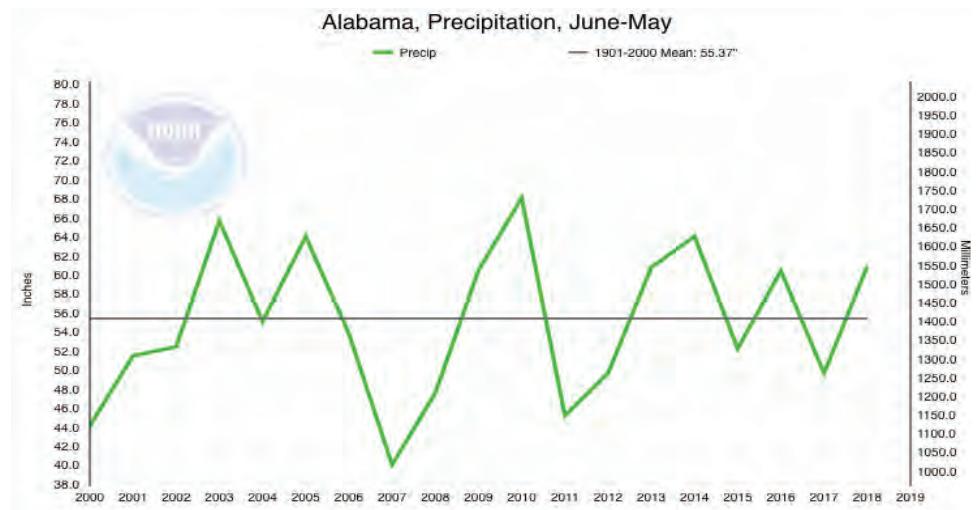


Figure 3. Time series data from NOAA on annual precipitation for Alabama from 2000-2019.

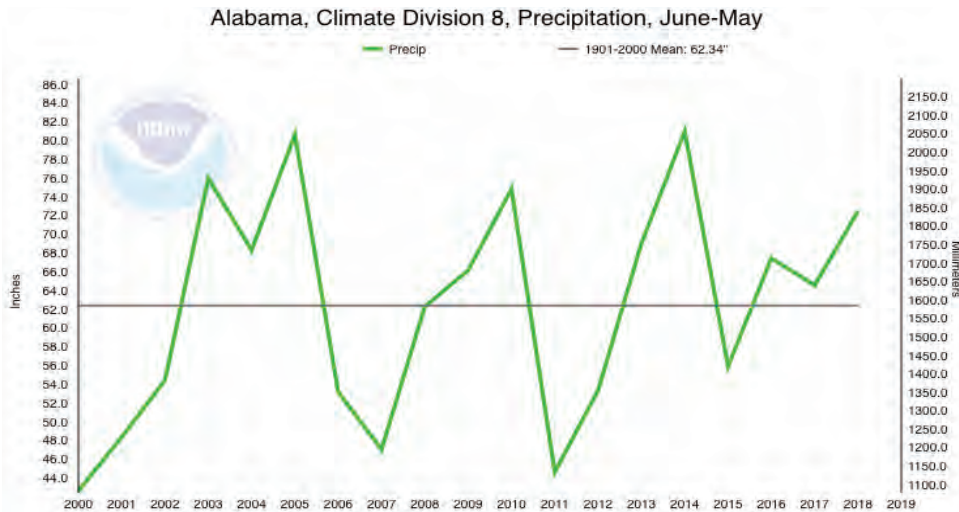


Figure 4. Time series data from NOAA on annual precipitation for District 8, Alabama from 2000-2019.

In fact, the year of 2010 was the highest years of precipitation for the state of Alabama (Figure 3) and one of the highest in the coastal counties (Figure 4) since 2000. Basing the entirety of the impacts from the project solely on 2010 will not show the true edge case scenarios including accurate representations of climatic, hydrologic, and other relevant conditions. Because of this it is likely not an accurate characterization of the full range of conditions that would result from the modifications to the ship channel, sea level rise, saltwater intrusion, and other impacts. The Corps must consider how models may change under severe or extreme droughts lasting two or more weeks.

### E. Better Define and Understand No Action and Alternative Projections

Mobile Baykeeper is concerned with the Corps current evaluations of projected outcomes if the project is not implemented. For instance, the Corps has estimated a significant increase of ship traffic will occur, one that is greater than if the deepening and widening project occurred. This assumption needs to be clearly validated and explained to ensure these projections are not overstating the Port's attraction without necessary improvements to remain competitive. Growth projections should also be built on a baseline of multiple years such as in the Savannah Harbor GRR.<sup>8</sup> We highly encourage the Corps to generate a more realistic No Action Alternative (NAA) that accurately predicts the environmental status without the proposed work. We request the Corps provide detailed information about the alternative analysis conducted and the rationale behind projected growth baselines for the different alternatives. Most importantly, the multiple depth

<sup>8</sup> United States, U.S. Army Corps of Engineers, Savannah District. (2012, January). *General Re-Evaluation Report Appendix A: Economics Savannah Harbor Expansion Project: Chatham County, Georgia and Jasper County, South Carolina*. Retrieved July 3, 2018, from [http://www.sas.usace.army.mil/Portals/61/docs/SHEP/reports/GRR/SHEP\\_FINAL\\_GRR\\_APPEN A Economics\\_Main Body.pdf](http://www.sas.usace.army.mil/Portals/61/docs/SHEP/reports/GRR/SHEP_FINAL_GRR_APPEN_A_Economics_Main_Body.pdf)



impact analysis conducted to evaluate the environmental impact for each depth and width option to make an informed decision on the final project proposal.

## **F. Cumulative Impacts**

As a part of the National Environmental Policy Act (NEPA) process applied by Council on Environmental Quality regulations, (40 CFR §§ 1500 -1508) federal agencies (including the Corps) are required to consider the cumulative impacts when making a decision. A cumulative impact is the “impact on the environment that results from the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions regardless of the agency (federal or non-federal) or person that undertakes such other actions; cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40CFR § 1508.7). Cumulative impact assessments are designed to understand and identify the uncertainties and regulations and indicate the need to include these uncertainties. They should be clearly stated if such information is lacking.

Mobile Baykeeper highly encourages the Corps to identify the major resources of concern and evaluate these concerns through a cumulative impact analysis. For each of the major resources identified, the cumulative impact analysis should include a discussion of geographic scope, a baseline condition or historical status, past, present, and future actions or stresses, present condition, capacity to withstand stress, incremental impacts, and alternatives to avoid, minimize, or mitigate cumulative effects. We also suggest conducting a sensitivity analysis to include scenarios with weather conditions like prolonged droughts and extreme weather, and the presence of sea level rise, overfishing, pollution, and other scenarios. These should be evaluated and considered in all models.

## **G. Indirect Impacts**

Under NEPA, the Corps must identify all indirect impacts resulting from the proposed ship channel enlargement<sup>9</sup> and perform compensatory mitigation for any unavoidable impacts. Indirect impacts are defined by NEPA as those impacts “caused by the action and are later in time and farther removed in distance, but are still reasonably foreseeable.” These impacts “...may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems.”

We request that the Corps fully model and understand the induced growth and encroachment or alteration effects<sup>10</sup> that will occur from the proposed ship channel enlargement and the indirect impacts that will occur from this induced growth. The high likelihood of induced growth is outlined by information provided by the Corps regarding this proposed project. In slides from the Corps’

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<sup>9</sup> 40 CFR 1508.8

<sup>10</sup> 3 NCHRP Report 466, “Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects” (2002), p. 55.



public meeting in September 2017 it is stated that there was a record 19% growth in containerized cargo in 2016. The Corps goes on to state that the Port of Mobile is one of the largest exporters of metallurgical coal and is the 2<sup>nd</sup> largest steel port in the nation and that growth is expected in both sectors. Further noting that the Port of Mobile serves manufacturing markets and agricultural markets both of which are steadily increasing. The Corps explains that there is a need to enlarge the ship channel because vessels would be able to bring in and ship out more cargo per ship (larger vessels) and do so more frequently (wider channel allowing for 24/7 and two-way traffic). Based on this evidence provided by the Corps, the enlargement of the Port of Mobile will induce substantial growth not only around the Port of Mobile but throughout the greater Mobile area as associated business, distributors, and suppliers grow to meet the needs of the expanded Port of Mobile. While this growth is a good thing for the economy of the Mobile area, the Corps must factor the indirect effects of this induced growth into its DSEIS.

For projects that have an explicit economic development purpose (such as the enlargement of the Mobile Ship Channel), it is generally assumed that the project will induce growth. This necessitates an in-depth indirect effect analysis. To perform such an analysis, the Corps must<sup>11</sup>:

- Make estimates based on best available data to show how much travel times will improve and what increases in imports/exports will be a result of the ship channel enlargement.
- Assess potential for induced growth resulting from the increased accessibility of the Port of Mobile.
  - This includes using land use models to generate quantitative projections of growth and changes in land cover/impervious surfaces along with qualitative assessments of projected growth.
- Finally, the Corps should assess the potential impact on sensitive resources (wetlands, air quality, water quality, stormwater runoff, etc.) caused by any induced growth.
  - This includes quantifying sensitive resources in the study area, identifying proximity of sensitive resources to locations where induced growth is most likely, and determining how to minimize and mitigate any reasonably foreseeable impacts.

An important note in identifying indirect impacts is that they do not have to be known but only need be “reasonably foreseeable”<sup>12</sup>. Specific growth induced and encroachment/alteration indirect impacts that Mobile Baykeeper believes are “reasonably foreseeable” and that the Corps should evaluate include but are not limited to:

- Wetland fill resulting from industrial growth

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<sup>11</sup> Center for Environmental Excellence by AASHTO (2016) *Assessing Indirect Effects and Cumulative Impacts Under NEPA (Aashto Practitioner's Handbook)*. Washington, DC: American Association of State Highway and Transportation Officials (AASHTO).

<sup>12</sup> CEQ, “Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations,” 46 Fed. Reg. 18026 (March 23, 1981), Response to Question 18.

- Increased impervious area from industrial (light and heavy) growth causing water quality degradation (increased water temperatures, decreased dissolved oxygen, etc.)
- Impacts to wetlands, SAVs, fisheries, oyster reef, etc. due to degraded water quality
- Decreased air quality resulting from increased traffic to Port of Mobile facilities and other nearby waterfront industry (Port of Chickasaw, Theodore Industrial Canal, etc)
- Damages to wetlands, SAVs, and shoreline caused by increased ship wake
- Damages to communities, wetlands, SAVs, and shoreline caused by increased storm surge etc.

Generally, we stress the need for the Corps to follow the mandates of NEPA and the CEQ by comprehensively assessing and mitigating for indirect impacts caused by the expanded ship channel.

## H. Monitoring & Plans

We strongly recommend taking extra precaution and preparation to ensure ample best management practices (BMPs) are implemented and that a comprehensive plan *is required*. Measures should be taken to ensure BMPs prevent sedimentation from dredging activities to protect the local water quality and avoid key species. We encourage the Corps to work with state agencies to determine the most protective BMPs for the area. The plan should also include a thorough monitoring plan and should be required to be submitted and open for public review. The monitoring plan should extend at least 10 years after construction to ensure all impacts are considered. It should also include areas around dredging operations and beneficial use disposal areas.

Mobile Baykeeper recommends the Corps consider implementing the project in phases that are strategically planned to minimize impacts and ensure proper monitoring of parameters like dissolved oxygen and turbidity can be conducted and adaptive management be possible.

## I. Mitigation

We encourage the Corps to consider our suggestions and others' comments to ensure the project's draft supplemental environmental impact statement accurately estimates the unavoidable impacts to our important natural resources. We are concerned with a project this large being proposed in a sensitive environment like an estuary and resulting in "no effects," which may indicate these studies underestimate the true impact. Once all feasible studies have been performed and avoidance and minimization has been considered, any remaining unavoidable adverse impacts to the environment must be addressed through appropriate and practical compensatory mitigation. We suggest including the community and environmental groups in the process of mitigation to select an existing needed project and/or create a synergistic project that includes buy-in from the community. Any mitigation identified should also directly correlate with the natural resource determined to be adversely impacted from the project's implementation. Several other port expansions have identified unavoidable impacts to wetlands, dissolved oxygen, and fish stocks. We encourage the Corps to carefully and comprehensively look at how this major project will impact our precious natural

resources and mitigate accordingly. These different mitigations should be studied as different alternatives to the project.

## **II. SPECIFIC CONSIDERATIONS FOR THE DSEIS**

The following comments have been gathered by members of Mobile Baykeeper, experts, stakeholders, and our research on similar port expansion projects. We want to emphasize the importance of each of the following specific items being addressed in the DSEIS.

### **A. Impacts to Wetlands**

Wetlands are known to provide several important ecological functions such as water purification, shoreline stabilization, flood protection, groundwater recharge, nutrient recycling, particle retention, surface water and subsurface storage, and habitat for fish and wildlife. They add intrinsic value to the community. Wetlands are known to be impacted by many anthropogenic activities including harbor expansion projects. The final EIS for Charleston's Harbor expansion indicated unavoidable impacts to 324 acres of wetlands from increases in salinity, requiring mitigation plans to preserve 665.6 acres of wetlands.<sup>13</sup> Similarly, the Savannah Harbor Expansion Project (SHEP) determined there would be "minor adverse effects to the fish and wildlife habitat function in 223 acres of tidal freshwater wetlands" and a conversion of 740 acres of saltmarsh to brackish marsh as a result of the project.<sup>14</sup> Both of these impact statements found adverse effects to local wetlands mainly from saltwater intrusion. Likewise, it is imperative that potential impacts are carefully evaluated and alternatives are studied (such as not dredging as deep as 50ft) and different mitigation alternatives are studied (such as wetland restoration in risk areas).

The Corps state there would be minimal or *no effects* on wetlands in the latest public workshop on February 22, 2018. The evaluations, however, may not be robust enough to predict the impacts from the proposed project. It is imperative that the Corps use multiple scenarios with varying salinity levels, sea level rise amounts (high, medium, low), and models are run in conjunction with other predicted changes such as dissolved oxygen, ship wake, and storm surge. To our knowledge, the Corps will use one month's data from 2010 to analyze the impact of saltwater intrusion on wetlands. We are concerned with this decision and would like to receive more information justifying why this dataset was the most representative of the area's different weather patterns, etc. For instance, when running models to predict how far and the extent of saltwater intrusion with a deeper channel hydrology, the high salinities are likely to be discovered during drought periods when freshwater flow is low and saline waters can be pushed farther up the delta.

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<sup>13</sup> Final Report and Environmental Impact Statement for Charleston's Harbor Expansion  
[http://www.sac.usace.army.mil/Portals/43/docs/civilworks/post45/finalreport/1\\_Main%20Report%20and%20EIS.pdf?ver=2015-07-10-131111-623](http://www.sac.usace.army.mil/Portals/43/docs/civilworks/post45/finalreport/1_Main%20Report%20and%20EIS.pdf?ver=2015-07-10-131111-623)

<sup>14</sup> Final Report and Environmental Impact Statement for Savannah Harbor Port Expansion  
<http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%201%20with%20TOC%20SHEP%20FINAL%20EIS.pdf>

To account for this, Mobile Baykeeper suggests the Corps look at additional year's data values that include drought periods, i.e. 2011, 2016. By looking at low freshwater flows from a lack of rainfall in the area, the models will likely better predict the maximum extent of saltwater intrusion. There have been numerous severe droughts over the last 10 years in the Mobile Bay area and the failure to look at how these relatively common droughts (some lasting for several months) will interact with a deeper channel could result in an underestimation of the project's impact on wetlands. In addition, we suggest the Corps model longer durations than one month (i.e. how will the survival or productivity rate change for wetlands enduring high salinity values for 60, 90, 120 days). As an example of a more responsible modeling of impacts to wetlands and marshes, The Savannah Harbor EIS utilizes eight months of average river flows from one year for a basic evaluation. Additional modeling was performed to evaluate different conditions. These included modeling effects of the proposed ship channel enlargement under low river flows (2001 conditions) and sea level rise of 25 cm and 50 cm.<sup>15</sup>

The Corps also indicated they would look at how inundation from a 0.5 m sea level rise scenario would impact the saltwater intrusion on wetlands. The concern again is if a representative drought scenario is not run, the model may not show how far upstream saline intrusion would reach, potentially underestimating the extent of mortality or productivity loss of wetlands in the upper delta. We highly encourage the Corps to be as thorough as possible with these evaluations to accurately characterize the cumulative impacts associated with this project.

## **B. Impacts to Submerged Aquatic Vegetation**

Submerged aquatic vegetation (SAV) is an important source of food for several species including manatees and over-wintering waterfowl. It provides habitat for macroinvertebrates and fishes, and helps prevent erosion through sediment stabilization. Over the past few decades, there have been dramatic declines in the SAV population in Mobile Bay<sup>16</sup>.

Changes to salinity from a deeper channel can modify the vegetative community (or SAVs) which can in turn, alter its use as protection for species and eliminate important food sources. Similar to our concerns detailed above for wetlands, this is also a concern for evaluating SAV population impacts. We encourage the Corps to use multiple duration scenarios when evaluating the impact of

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<sup>15</sup> U.S. Army Corps of Engineers, Savannah District. (2012). Final environmental impact statement: Savannah Harbor Expansion Project (SHEP). 5-9 – 5-10; Chatham County, Ga and Jasper County, SC. <http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%205%20SHEP%20FINAL%20EIS.pdf> Retrieved July 3, 2018

<sup>16</sup> Barry A. Vittor & Associates. (2005). Historical SAV Distribution in the Mobile Bay National Estuary Program Area and Ranking Analysis of Potential SAV Restoration Sites. [http://www.mobilebaynep.com/images/uploads/library/NEP\\_historicSAV.pdf](http://www.mobilebaynep.com/images/uploads/library/NEP_historicSAV.pdf)

saltwater intrusion on SAVs within the selected 2010 data and include additional scenarios for extreme droughts seen in other years.

Deepening the channel will decrease the ability for oxygen to reach waterbottoms. Additionally, dredging activities and wake energy produce low dissolved oxygen and high turbidity levels. These low oxygen conditions can negatively impact SAVs and if these SAVs die off, they can create even lower oxygen levels. In addition to salinity models, dissolved oxygen scenarios must also be considered in conjunction when evaluating the potential for impacts on SAV survival and productivity.

Increases in suspended sediments associated with dredging activities can cause changes in water quality along with a number of negative impacts to flora and fauna. High turbidity resulting from dredging can release nutrients, organic matter, and contaminants depending on the characteristics of the material dredged. These releases can reduce the ability for light to penetrate through the water column, restricting submerged aquatic vegetation ability to photosynthesize. A 2006 case study of dredging effects on seagrass found that, in ~60% of cases detrimental impacts to the seagrass beds were documented. These projects resulted in a cumulative loss of 81 mi<sup>2</sup> - more than 1,100 acres per project.<sup>17</sup> The releases can also create low oxygen conditions from organic-rich sediments that threaten fish and plant die off.<sup>18</sup> Sedimentation can be introduced from dredging activities and from wave energy that can turn up the bottom sediments. Both of these should be evaluated holistically to understand the full impact of suspended sediments resulting from the proposed enlargement of the ship channel on the health and productivity of SAVs.

We encourage the Corps to look at how changes in dissolved oxygen and salinity, turbid conditions resulting from dredging, and hydrodynamic changes resulting from channel enlargement will impact the local SAV population. When evaluating these factors, it is important to consider the cumulative impact of how SAVs will react when enduring all conditions. To our knowledge, the Corps has no intention of running different models that demonstrate the sediment impacts from the project in conjunction with salinity, dissolved oxygen, and hydrodynamic impacts. We encourage the Corps to think about these impacts comprehensively to ensure impacts from the project are not underestimated.

While looking at salinity scenarios only, initial results presented by the Corps during the February 22, 2018 public workshop indicated elevated stress of Eurasian watermilfoil (an invasive species), water celery, and coon's tail. To our knowledge, local manatees have been observed consuming all three of

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<sup>17</sup> Erftemeijer, P. L., & Lewis III, R. R. R. (2006). Environmental impacts of dredging on seagrasses: a review. *Marine pollution bulletin*, 52(12), 1553-1572.

<sup>18</sup> Chislock, M. F., Doster, E., Zitomer, R. A. & Wilson, A. E. (2013). Eutrophication: Causes, Consequences, and Controls in Aquatic Ecosystems. *Nature Education Knowledge* 4(4):10

these species and a depletion of these may have a negative impact on the endangered species. We encourage the Corps and the Fish and Wildlife Service (FWS) to consider this in its evaluation of impacts to the West Indian Manatee from the proposed project.

### C. Impacts to Oysters

Shellfish Harvesting Areas as seen below (Figure 1), are in proximity to the proposed activities (also seen in this [GIS map https://aldcnr.maps.arcgis.com/apps/webappviewer/index.html?id=a32dad8dadcd249ea86bcb80dd951a424](https://aldcnr.maps.arcgis.com/apps/webappviewer/index.html?id=a32dad8dadcd249ea86bcb80dd951a424)). The areas shaded in yellow, green, purple, and red are where shellfish have been harvested. Careful consideration of the proposed projects activities proximity to and impact on these locations must be taken to ensure our natural resources, such as shellfish, are not degraded from the proposed channel expansion.

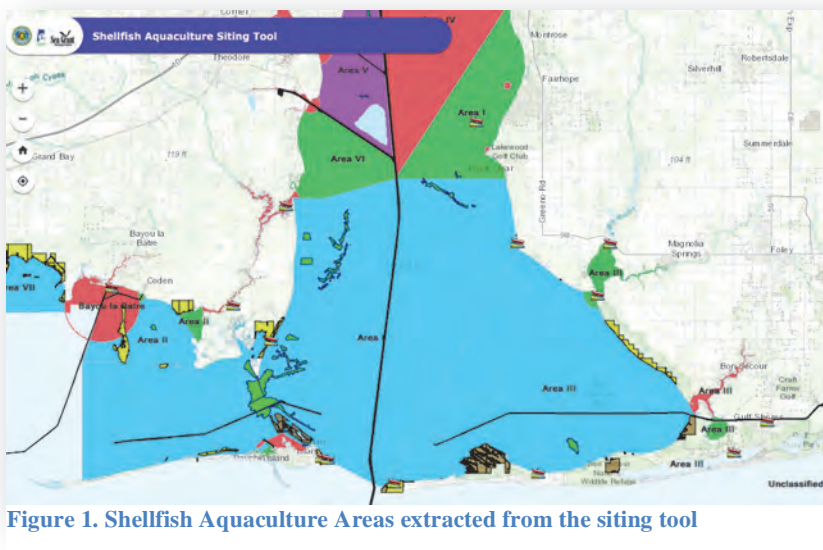


Figure 1. Shellfish Aquaculture Areas extracted from the siting tool

The Eastern oyster (*Crassostrea virginica*), which is important both commercially and ecologically for the area, is a specific concern for the proposed project. There are currently several commercial oyster farms in operation that generate half a million dollars in wholesale value and support local jobs.<sup>19</sup> Furthermore, in 2016, Alabama’s oyster farms generated at least \$1,956,776 in economic activity<sup>20</sup> and employed more than 30 individuals.<sup>21</sup>

Increases in salinity can have significant impacts on oyster productivity and could result in substantial profit loss to local oyster farming operations. The optimal range for oysters is between 14-28 parts per thousand (ppt). Anything greater can introduce stressors such as increased predation,

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<sup>19</sup> <http://alaquaculture.com/state/>

<sup>20</sup>Farm Gate Value - (net value of product once marketing costs are subtracted)

<sup>21</sup> [Grice R and Walton B, “Alabama Shellfish Aquaculture Situation And Outlook Report: Production Year 2016” \(Mississippi-Alabama Sea Grant Consortium\)](#)



which decreases overall spat recruitment<sup>22</sup>. Therefore, we are concerned with the potential for salinity changes from deepening and widening the ship channel, impacting the survival and growth of local oysters. Similar to our recommendations in the wetland and SAV evaluations, we suggest the Corps evaluate the impact of saltwater intrusion on oysters in longer durations and use scenarios for more extreme droughts such as those that occurred in 2007, 2011, and 2016 as well as sea level rise scenarios. Utilizing one year as a baseline for climatic and hydrologic conditions could result in severely erroneous assumptions. Alternatives, such as stopping maintenance dredging when the salinity level reaches a certain point should be analyzed and how different dredging depth alternatives impact SAVs.

At the latest presentation of the DSEIS on February 22, 2018, the Corps indicated 13 adult reefs were used for the assessment to determine how salinity and dissolved oxygen would impact local oysters. Several other locations of oyster reef have been identified by researchers and local fishermen in the area. Therefore it is imperative that the Corps coordinate with these individuals to ensure the models run are considering all locations throughout the project area. We also suggest that potential locations for future oyster farming and harvest locations be evaluated. Given the ecological value of estuarine oysters, oyster gardening has become more prevalent with collaborative efforts between Mobile Bay National Estuary Program, Auburn University Marine Extension and Research Center, and Mississippi-Alabama Sea Grant Consortium. These not for profit farms are currently implemented and will continue to be utilized to improve the water quality of our waterways and therefore must be considered when evaluating the proposed projects impacts.

Oyster aquaculture continues to expand and its success is a major focus for Coastal Alabama. Sedimentation and wave energy generated from the proposed project can have negative impacts on the productivity and survival of such oysters. Dredging activities and ship wake energy can create high turbidity conditions, which can cover or clog oysters. High turbidity can also create low oxygen conditions that could negatively impact oyster survival. Salinity models and dissolved oxygen scenarios should be considered in conjunction to understand survival and productivity. We encourage the Corps to evaluate how sediments, dissolved oxygen, salinity, and wave energy generated by ship wake will impact the local oyster population.

In addition to changes in adult oyster populations on known farms, the Corps must consider impacts to all life stages of oysters. One major concern with the proposed project is the potential disruption of the larvae movement and distribution across the Bay. We suggest the Corps include the existing larvae distribution model from Dr. Carmichael and the associated Principal Investigators work from the Dauphin Island Sea Lab and use multiple scenarios when running these evaluations to ensure larvae are not flushed out of the system from the deepening and widening of the channel.

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<sup>22</sup> Lorio, J.W. and Petrone, C., 1994. The cultivation of American oysters. *Crassostrea virginica*.

There are several community members who are currently or may in the future, raise oysters off of their docks, piers, etc. but may be unable to if the larvae distribution is interrupted or ship wave activity prohibits settling. We strongly encourage the Corps also consider how ship wake waves will disrupt or prohibit oyster spat settling and growth along shorelines of Mobile Bay.

#### D. Impacts to Benthic Communities

Benthic communities are known to play a critical role in the health and functioning of estuarine systems. For instance, organic matter not used in the water column settles on the bottom floor where it can be remineralized by benthic organisms to become nutrients that can then be used in the water column. This remineralization contributes the nutrients necessary to increase primary productivity and is an important link in the food web of an estuary.

Examples of the important benthic species that support our recreational or commercial fishing industries include benthic invertebrate species like Blue crabs (*Callinectes sapidus*), shrimp species, and several species of flounders that occupy areas surrounding the ship channel and other areas of Mobile Bay and coastal communities. There are specific areas determined as important for local shrimp species (Brown Shrimp, White Shrimp, Pink Shrimp, etc) in Mobile Bay and Mobile River. Shrimp nursery areas, shown in blue in Figure 3, are restricted from shrimp fisheries to allow for the population to replenish and continue to grow. These locations are also in close proximity to the proposed project activities which pose a potential threat to the juvenile shrimp species. We suggest the Corps consider the impacts from the project on these important nursery grounds for shrimp, an important source of commercial and recreational income for the area.



Figure 2. Map of selected sample areas extracted from Corps public workshop

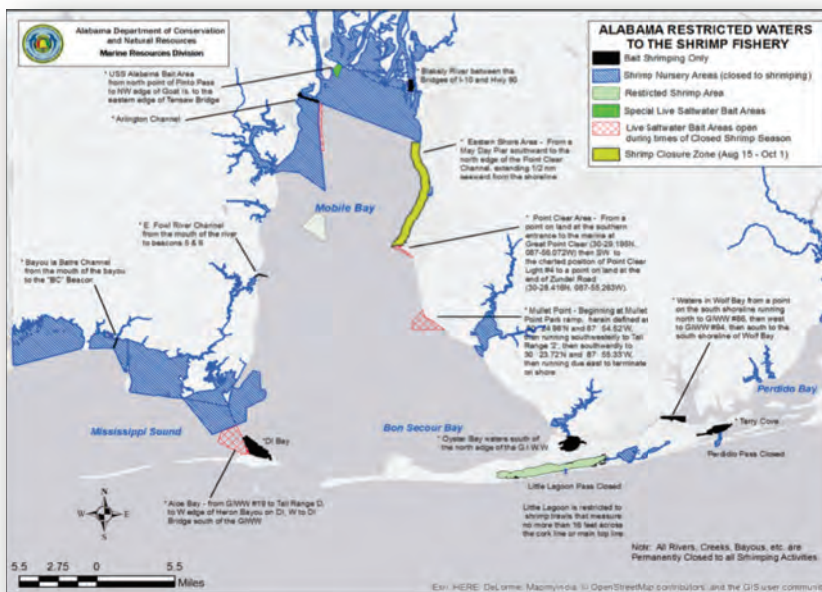
Dredging activities can negatively impact benthic communities either directly or indirectly. The extent of these impacts can vary greatly and depend on many factors including the type of community present, the duration of, and type of dredging. Excavation and smothering by sediment can cause lethal impacts to these communities.<sup>23,24</sup> The specific benthic communities along the

<sup>23</sup> Morton, R. A. (1977). Historical shoreline changes and their causes: Transactions Gulf Coast Association of Geological Societies, v. 27, p. 352-364.

<sup>24</sup> Guillory, V. (1982). Environmental effects of estuarine dredging and spoil disposal, a literature review. Contributions of the Marine Research Laboratory, Technical Bulletin 35, Louisiana Department of

proposed expansion should be characterized to understand what species will be disturbed from dredging and if damage is irreversible or if the area contains recolonizing types that have a more rapid recovery period<sup>25</sup>. For instance, benthic assemblages that are physically buried from sediment deposited may be able to recolonize depending on the species and frequency of dredging and sediment deposited from the project. It is also important to consider the ongoing stress or flux that the benthic species will endure from sedimentation and shoaling processes that will continue as maintenance dredging occurs in the navigation channel.

Additionally, we are concerned with a potential data gap in the Corps sampling for benthics. It is our understanding from the Corps presentations that the benthic collection is only being conducted for the lower channel where the proposed widening activities will take place. This does not adequately cover the benthic assemblages in 1) the upper channel where turn modifications are proposed and 2) the entire channel where deepening activities will occur. We suggest taking additional samples or coordinating with local benthic ecologists like Dr. Kelly Dorgan at the Dauphin Island Sea Lab to ensure full impacts to benthic communities are considered on the complete spatial scale.



**Figure 3. Map of Alabama's restricted areas for shrimp harvesting extracted from Alabama Department of Conservation and Natural Resources - Marine Resources Division**

Wildlife and Fisheries, 37-61.

<sup>25</sup> ICES International Council for the Exploration of the Sea. (1992). Report of the ICES working group on the effects of extraction of marine sediments on fisheries. Copenhagen (Denmark): ICES Cooperative Research Report # 182. <https://www.nefsc.noaa.gov/publications/tm/tm209/pdfs/ch6.pdf>

The Corps should also identify the project effects on dissolved oxygen levels and exacerbated occurrences of hypoxic conditions which will impact or prevent benthic habitat access. Furthermore, we suggest considering the alternative of phasing dredging activities to allow for the rebound of benthic communities.

## **E. Impacts to Fish**

### *i. Dredging Activities*

The proposed dredging has the potential to adversely affect fish in a variety of ways. The sediment removal, dredge plume turbidity, pumping of water, suction functions, noise, and lights can have negative impacts on various life stages of fish species. Dredging activities can cause direct mortality or injury to individual fish (depending on the species, time of year, and location) of all life stages (adults, subadults, juveniles, larvae, and/or eggs). The physical presence of dredging equipment in the channel and the changes in physical and chemical compositions of the water is also a major concern for fish and shellfish movement. These physical factors can 1) interrupt fish movement, (particularly with anadromous fishes that move from nursery grounds to spawning areas within estuaries), 2) block migration routes, and 3) create high turbidity conditions that can impact early life stages (eggs, larvae) transport from sediment material in the water column. High turbidity can also physically impact species through clogging fish gills and damaging filter feeding organisms. Given the multiple venues for how dredging activities can either directly or indirectly impact fish species, we encourage the Corps to consider habitat suitability for all life stages including adult, juvenile, and larvae as well as spawning and nursery locations. It is also critical that the Corps identify migratory paths and temporal movement patterns for local species to have the least impact possible during dredging activities. We suggest working with the Fish and Wildlife Service and National Marine Fisheries Service to identify proper measures of avoidance.

### *ii. Saltwater Intrusion into Estuarine and Freshwater Areas*

Mobile Bay is a sensitive estuary containing marshes, wetlands, and many important estuarine and freshwater species. The potential areas that will be impacted by saltwater intrusion should be identified along with the habitats that exist in those areas to evaluate the extent of degradation. Potential loss of wetlands, marshes, and SAVs from increased salinity should be accounted for and how those changes will then alter fish assemblages from critical habitat loss.

Another species of concern is the Red Drum (*Sciaenops ocellatus*) because the NMFS Gulf of Mexico Fisheries Management Council has identified the entirety of Mobile Bay (and the Mississippi Sound) to be habitat which is “essential to a species’ long-term survival and health” and therefore designated as Essential Fish Habitat. Red Drum are also considered a prized game fish throughout the Gulf of Mexico, and saw major declines after the mid-1980s from commercial harvest. A fishery management plan was developed for Red Drum along with several regulations, including a moratorium on commercial harvest to protect and replenish its population. Negative impacts to the essential habitat areas for Red Drum could counteract improvements made in population levels to date from federal regulations. Several scientists and graduate students from the University of South

Alabama are studying fish movements of Red Drum that may be useful for understanding how they will be impacted from the proposed project (Dr. Sean Powers, Reid Nelson). We encourage the Corps to work closely with relevant scientists and agencies to better understand the potential impacts from the proposed project.

iii. *Changes to Dissolved Oxygen*

Dissolved oxygen is a major concern with the proposed expansion project. Deepening the channel will decrease the ability for oxygen to reach the bottom of the water column and generate lower dissolved oxygen values on average in the waterbottoms. It will also enable saltwater to travel into upper portions of the channel, which can reduce the amount of oxygen entering the system from the air. With these physical changes, there is a possibility that dissolved oxygen may become lowered to levels that have deleterious or damaging effects on fish. It is well known that low dissolved oxygen or hypoxic/anoxic conditions can lead to fish kills. Savannah Harbor Expansion Project identified dissolved oxygen impacts from its project and is installing a dissolved oxygen injection system that will restore oxygen to acceptable levels for fish and plantlife. In addition to salinity models, dissolved oxygen scenarios must also be considered when evaluating the potential for impacts on fish species. Alternative analysis should be conducted to see how a dissolved oxygen injection system may reduce or account for impacts from project implementation.

iv. *Impacts to Fish and Wildlife from More Noise and Light Pollution*

We recommend the Corps evaluate the direct impacts to fish and wildlife from increased noise and light with increased shipping traffic and indirect impacts from port operations as a result of the harbor expansion. Noise has been documented to influence aquatic species behavior and can disrupt behaviors such as feeding, migration, and spawning. Consideration should be given to programs that will reduce the impact of light and noise on organisms.

## **F. Shorebirds and Waterfowl**

The Mobile Bay area is known to have many shorebirds and migratory waterfowl. Harbor, inshore shorelines, and coastal beaches are important for nesting, foraging, and general habitat for birds. We encourage the Corps to consider how bird populations will be impacted from erosion of these areas. Birds may be impacted from dredging and ship activities if noise and light disrupt their flight. Waterfowl may also be negatively impacted if the SAV populations decrease, as they are an essential food source for these bird species. We encourage the Corps to evaluate how projected impacts to coastal erosion, beach loss, and SAV loss will impact birds that need these resources.

## **G. Threatened and Endangered Species**

The state of Alabama is ranked second in the number of extinctions and fourth for species at risk of extinction in the nation. The following species in the Mobile Bay area considered threatened or endangered include: Alabama sturgeon, Gulf sturgeon, West Indian Manatee, Alabama Beach mouse, Perdido Beach mouse, Alabama Red-bellied turtle, Gopher Tortoise, Kemp's Ridley sea turtle, Green Sea turtle, Loggerhead Sea turtle, Piping Plover, Red-Cockaded woodpecker, and



Wood Stork. We suggest the Corps conduct a biological assessment (BATES or similar) to evaluate the impacts of the project on each of these threatened or endangered species.

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, per its amendment (16 U.S.C. § 1531 et seq.), requires each federal agency to “insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species.” We encourage coordination with FWS and the National Marine Fisheries Service (NMFS) to develop Biological Opinions for sea turtles, manatees, Gulf Sturgeon among others to make recommendations on hopper dredging activities.

i. *Habitats*

Currently, the Fish and Wildlife Service has designated the Isle Aux Herbs (a.k.a. Coffee Island), Dauphin Island, Pelican Island, and portions of Bon Secour National Wildlife Refuge (including Little Dauphin Island) as critical habitat areas for Piping Plover. Please consider habitat impacts to these areas from the proposed project, in particular beach erosion on Dauphin Island. Similarly, sea turtles like Loggerheads, Kemp Ridley’s, etc. are known to utilize beach environments as nesting grounds. Therefore this erosion to important nesting locations must be considered along with plans to conduct reasonable and prudent measures for protecting sea turtles during dredging activities to comply with the provisions of Section 9.

ii. *Dredging Activities*

Dredging can also result in direct mortality or injury of aquatic species, including all life stages of fish species (adults, subadults, juveniles, larvae, and/or eggs) through the removal or smothering of benthic organisms. In some cases, these direct takes of species can impact threatened or endangered species populations. Savannah Harbor’s expansion project underestimated the amount of direct take and had to amend its Incidental Take Statement from the National Marine Fisheries Service (NMFS) to increase the amount of Green Sea Turtles and Shortnose Sturgeon that were impacted from dredging. Dredging activities and location of disposal can also result in an indirect mortality or injury of aquatic species, from a loss of dissolved oxygen in the water column.

In Savannah Harbor’s final EIS, Shortnose sturgeon (*Acipenser brevirostrum*) were determined to be negatively impacted from the deepening of the harbor due to saltwater intrusion and marsh degradation, a critical habitat for the species. Cite. A fish species of concern for Mobile Harbor’s expansion is the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), which is considered a **threatened species** by U.S. Fish and Wildlife Service due to habitat destruction and degradation. Gulf Sturgeon are considered anadromous, meaning they live in saltwater and spawn in freshwater. The Corps needs to work with the state and federal agencies to understand what areas are considered Essential Fish Habitat (EFH), “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”, and what are considered Habitat Areas of Particular Concern (HAPC), a component of EFH, includes those waters and substrates “which are rare, particularly susceptible to

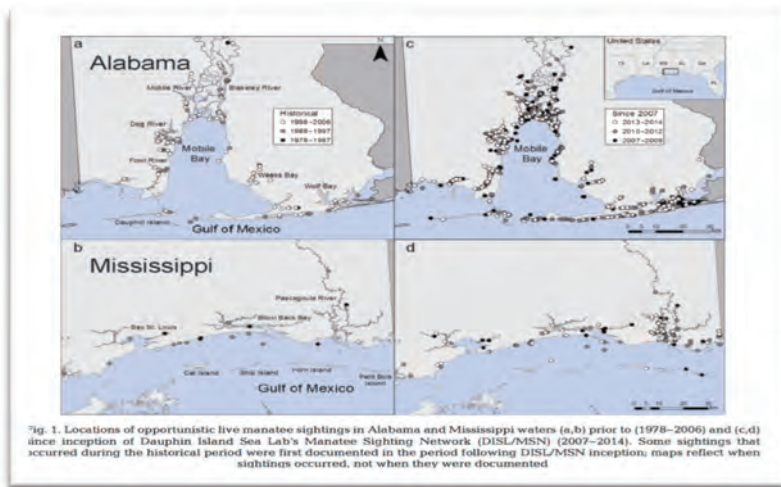


human-induced degradation, especially ecologically important, or located in an environmentally stressed area”. Additionally, we encourage the Corps to carefully evaluate the impacts to benthic organisms known to support juvenile Gulf Sturgeon.

Light has also been documented to impact wildlife and has been associated with impacting migration and spawning behaviors. Threatened and endangered turtles found in the project area are affected by light. Dredge equipment and associated tugs and barges should be verified to ensure they meet Corps, U.S. Coast Guard, and OSHA light standards for safety. Measures should be agreed upon and implemented to reduce potential disorientation of female sea turtles approaching nesting beaches and/or hatchlings heading seaward from beaches due to lighting produced by dredging activities. The Corps could mitigate the negative impacts of ships’ light by 1) restricting the time of year designated for dredging activities to ensure that they do not coincide with spawning periods of impacted species, and 2) complete field observations onboard all dredging activities to document mortality of threatened and endangered species or mammals. Without additional measures, these listed species will be harmed. We encourage the Corps to consider all impact from light and noise on aquatic species and work with state and federal agencies to develop a Biological Opinion to analyze reasonable and prudent measures that minimize the negative impacts to key species.

iii. *Impacts to Mammals*

Mobile Bay is home to several mammals including the West Indian Manatee (*Trichechus manatus*), a species considered one of the most **endangered** marine mammals within the coastal waters of the United States. Sightings of the West Indian Manatee have been well documented by the “Manatee Sighting Network” through Dr. Carmichael’s lab at the Dauphin Island Sea Lab (Figure 4).<sup>26</sup>



**Figure 4. Excerpt from the Dauphin Island Sea Lab’s Manatee Sighting Network study on Manatee sightings throughout Alabama and Mississippi**

<sup>26</sup> Hieb, E.E., R.H. Carmichael, A. Aven, C. Nelson-Seely, N. Taylor. Sighting demographics of the West Indian Manatee (*Trichechus manatus*) in the north central Gulf of Mexico. *Endangered Species Research* 32:321-332

Manatees are known herbivores that consume many types of aquatic plants. Changes to SAVs and local seagrass beds could have a significant impact on the available food source for manatees. The Corps should carefully evaluate how changes to specific SAV populations (particularly Eurasian watermilfoil, water celery, and coon's tail that were identified as at risk from the Corps' preliminary results) will impact local manatees.

Ship-strikes are also a major threat to mammals in the area including manatees and dolphins. Ships are known to injure mammals within harbors and ports. The potential for increased ship-strike occurrences needs to be evaluated from deep draft vessels and dredging equipment that will be frequently travelling in the harbor.

Given the potential for harm to the endangered West Indian Manatee, we encourage the Corps to work with federal and state entities and create a Biological Opinion on dredging and vessel operations. We also strongly encourage the Corps to coordinate with Dr. Carmichael, a professor at the University of South Alabama, to acquire information on the species that has been collected for more than a decade.

## **H. Impacts to Shorelines**

Shorelines are vitally important to the health of the community, ecosystem, and economy. Our shorelines are critical for a number of species like turtles, birds, crabs, and so much more. They are also utilized by many community members who reside on shorelines or use them for recreation. They support our tourism industry and the many businesses and industry that surround our waterways. Shorelines are also important because they are known to be a natural protector against storms and act as filters to our water. The proposed deepening and widening of the Mobile Harbor has the potential to make significant changes to these shorelines and erode our coastal beaches. Therefore it is of the utmost importance that all factors are thoroughly studied and considered in the DSEIS including: sediment transport analysis, ship wake analysis, bank erosion analysis, and coastal erosion analysis.

### *i. Shoreline Erosion from Ship Wake and Dredging Activities*

With larger, heavier, and potentially more frequent ships, the ships' size and the frequency of the ship wake would increase. This increase in wave height and wave energy has the potential to cause erosion to our shorelines and impact the settling and survival of oysters. The Corps has initially indicated that with a deeper and wider channel, the economic study shows fewer ships that are more heavily loaded than if the channel was not modified. It is our understanding that the Corps is looking at the wave energy totals for its comparison. We suggest that in addition to these studies, the Corps look at maximum or peak waves which could potentially be generated from the larger and more heavily loaded ships. We suggest these scenarios are tested to see both how these higher wave heights erode shorelines and how they may disturb the bottom sediment. We strongly suggest the Corps evaluate how a Vessel Speed Reduction (VSR) program would impact the project's impact on

shorelines and air quality. There are several other locations that have successfully implemented VSR programs to reduce the negative impacts from ship wake and air emissions on their surrounding communities including the Port of Los Angeles, Port of Long Beach, Port of San Diego, Port Authority of New York and New Jersey. Several community members along the western shore of Mobile Bay have expressed great concern about the impacts of the project on their shorelines. We encourage the Corps to thoroughly consider this alternative and evaluate how different vessel speeds change the impact analysis.

Dredging activities may also contribute heavily to wake activity and contribute to erosion. The Corps should consider the impact from increased ship wake resulting from both the dredging activities and increased ship traffic and ship load on both sides of Mobile Bay, Dauphin Island, and other downdrift MS-AL barrier islands. Additionally, the Corps should consider current and planned living shoreline project locations in this evaluation and create robust plans to minimize impact to projects during the early stages of implementation when they are the most sensitive to wave energy.

ii. *Sediment Transport Analysis- Loss of Littoral Sediments and Changes to Sediment Budgets*

It is well established that the removal of sediments disrupts the littoral system that transports sand and nourishes barrier islands. With the expansion and alteration of the channel configuration, the potential for increased sedimentation and change to the local sediment budget needs to be carefully evaluated. Furthermore, the potential for increased loss of littoral drift sediments from the deepened channel needs to be identified and how this decrease will consequently impact the existing erosion issues alongside Mobile Bay and Dauphin Island shorelines (as required by River and Harbor Act of 1935 Federal Law: Shoreline Changes). The historical sand deficit caused by dredging and removal of sediment needs to be evaluated and added to the cost of further erosion from additional deepening and widening activities (and overall reduction of sediment supply to the littoral zone). The projected frequency and potential for increased need of maintenance dredged post-construction should be evaluated to determine the sediment budget long-term. The Corps needs to ensure adequate consideration of each potential long-term consequence that a deeper and wider ship channel will have on shorelines of Mobile Bay, Dauphin Island, and other downdrift MS-AL barrier islands affected by this reduction in littoral sediment deposit. Additionally, we urge all parties to develop a comprehensive plan to account for unavoidable impacts to these shorelines.

The Corps has disposed dredged sands in the Sand Island Beneficial Use Area (SIBUA) south of the lighthouse for years with the explanation being that these sands are moved by currents to Dauphin Island to counter erosion. Observations indicate most of the sands are not moved, but accumulate at that location, while Sand Island has almost disappeared and Dauphin Island continues to erode. This leads to the conclusion that the SIBUA is failing to meet its intended purpose. At the last public workshop, the Corps reported initial findings indicating increases in average annual shoaling of 5-20% estimated within the navigation channel. It is our understanding that the Corps intends to propose expanding the existing SIBUA with the intent to improve the rate of shoaling. We applaud the Corps commitment to address this issue and encourage further study to ensure the new disposal

area produces a higher rate of shoaling. With a project this large, we need to ensure the Corps designates proper areas for disposal to counter the erosion from the loss and littoral drift processes.

We feel it is also vital that the Corps fully incorporate the Alabama Barrier Island Restoration Assessment (ABIRA) as a part of the General Reevaluation Report and DSEIS. The results from ABIRA could play an important role in informing decisions about how to use dredged spoils and areas of potential erosion issues. It is our understanding that the Corps intends on using parts of the analyses from the ABIRA in the DSEIS. We encourage the Corps to ensure the study is used to the maximum extent possible when determining potential impacts and disposal options.

iii. *Coastal Resiliency - Changes to Storm Surge and Resiliency*

With a new channel that is deeper and wider, there is a potential for the storm surges to have a greater impact on the surrounding infrastructure and coastline. The Corps should consider severe weather conditions such as drought, storms, and hurricanes when modeling future projections and evaluating long-term impacts. Furthermore, we suggest the Corps consider the effects of sea level rise by incorporating multiple scenarios varying in intensity from low to high influx rates. From the latest public workshop in February 2018, the Corps identified a 0.5 m sea level rise scenario for all models related to environmental impacts. The EIS for Charleston's harbor expansion used a 0.57 ft in low scenario, 1.08 ft in intermediate, and 2.74 ft in high scenarios, significantly higher than the flat rate that the Corps intends on using for the Mobile Harbor. We encourage the Corps to utilize the high, intermediate, and low rates similar to those used in other harbor expansion projects.

## **I. Air Quality**

The EPA created a report in 2009 on the "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report" that provides a framework to help identify all the air emissions that should be studied in the DSEIS. We encourage the Corps to include air impacts resulting from criteria pollutants, hazardous air pollutants (HAPs), and greenhouse gases. We also want to ensure that air impacts are quantified from these deep-draft containerships that are expected to utilize the port. Additionally, we ask the Corps to consider the emissions from the equipment that will be used to service the vessels and the expected emissions from the additional privately-owned terminals in the harbor area that might be constructed as a result of this expansion. We also encourage the Corps to consider air emissions as a result of dredging activities for new work as well as maintenance work. The Corps should also predict the increase in air emissions from the port and surrounding neighborhoods where truckloads will traffic. All of these activities are important to evaluate in accordance with 40 CFR § 1508.8, which requires analysis of direct and indirect impacts on the environment that are associated with the proposed action.

## **J. Introduction of Invasive Species**

Larger and more frequent post-Panamax ships could introduce invasive species into the bay from the ships' hulls or ballast water discharge. Invasive species have the potential to threaten or displace native species, degrade habitats, and spread diseases. The National Invasive Species Act of 1996

begins to address these issues with voluntary guidelines to control the introduction of invasive species in aquatic systems. We recommend the Corps evaluate the potential for invasive species being introduced and what enforcement or control measures will be needed to protect Mobile Bay.

We encourage all feasible and prudent measures be written and formalized in a plan to minimize the risk of detrimental effects on an ecosystem from the introduction of non-native or invasive species. The marine industry has recognized the issues related to ballast water and introduction of non-native species. One of the most stringent ballast water management programs is in the Great Lakes (St. Lawrence Seaway System), successfully eliminating species introduction since it was created in 2006. The Corps has the opportunity to evaluate invasive species introduction into Mobile Bay from port activities and adequately generate a plan for how to combat this risk.

## **K. Dredge Material & Placement**

### *i. Release of Contaminated Sediments into the Water Column*

Dredged material has the potential to be contaminated with harmful substances such as heavy metals, pesticides, PCBs, oil, etc. particularly in ports and harbors. Many of these substances are historical and therefore can be buried within or locked in seabed sediments. Dredging can suspend these into the water column where they can cause contamination of shellfish and/or fish species. Many of these metals typically do not manifest until some time has passed and different chemical, hydrographical, and geological processes have had an opportunity to alter these newly disturbed sediments. Evaluating the long-term impacts and monitoring the material to be dredged is essential for managing the potential for contamination.

It is well established that ports and harbors can act as sinks for effluent from surrounding and upstream industry inheriting a legacy of contamination and numerous studies have shown issues caused by dredging sediments that have high levels of contaminants. It is well documented that dredging can cause increases in heavy metals. Further, many of these metals typically do not manifest until some time has passed and different chemical, hydrographical, and geological processes have had an opportunity to alter these newly disturbed sediments. To demonstrate this, some studies have shown substantial increase in several metals with commencement of dredging activities. This clearly indicates that resuspension of contaminated sediments can expose aquatic organisms to substantial amounts of metal contaminants.

In addition to harmful metals and chemicals, it has also been well documented that dredging operations can cause significant increases in fecal coliform.<sup>27</sup> In 2017 alone, there were more than 26 million gallons of sewage overflows reported in Mobile and Baldwin Counties. Resuspension of

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<sup>27</sup> Grimes, D.J. (1975). Release of Sediment-Bound Fecal Coliforms by Dredging. *Applied Microbiology*, 29(1), p.109.



contaminated sediments containing such materials can pose a threat to human health and the ability to fish, swim, and play in the Bay. We highly encourage the Corps to evaluate fecal coliform in the sediment sample studies and the likelihood for resuspension. The areas surrounding dredging activities will have the highest risk for exposure to bacteria. As a result, we suggest the Corps consider the proximity of designated use areas for shellfish and recreation (swimming, etc.) in association with dredging activities and plume impact distance.

Resuspension of contaminated sediments into the water column has been shown to cause major ecological impacts over large spatial scales. Studies have also shown that dredging can cause severe impacts on estuaries through releases of high concentrations of ammonia leading to algal blooms in turn followed by increases in pH, and BOD. Nutrients can also be disturbed from dredging and cause a number of problems. We recommend the Corps evaluate whether this project would impact nutrient concentrations, nutrient loading, and nutrient cycling in Mobile Bay.

The Corps has stated that, “sediment testing has not been performed on the entirety of the project area. and Limited data is available.” The Corps must explain what they have done since that statement was made and what do they plan to do to ensure that they thoroughly understand what contaminants are present in sediments, and the potential magnitude of impacts that may result from the disturbance and release of these sediments.

ii. *New Work*

As discussed earlier, new work sediment should be investigated (core samples) for the following parameters: bacteria, metals, PCBs, Polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, phenols, pesticides, dioxin congeners, cyanide, organotins, and nutrients. There are also concerns with where the new work will be placed. To our understanding, the Corps has identified three potential locations: Relic Shell Mined Area, Ocean Dredged Material Disposal Site (ODMDS), and the Sand Island/Pelican Island Beneficial Use Area (SIBUA).

There have been several concerns about the placement of dredged material in the Relic Shell Mined Area due to its proximity to recreationally important fish species including Tarpon and Red Drum. Observations from local fishermen and tracking studies conducted by the Dauphin Island Sea Lab confirm Tarpon utilize the designated area. We highly encourage the Corps to communicate with local scientists and ensure they have the most accurate data when considering placement of new work material. By not considering all available data, the Corps risks making decisions that may negatively impact local recreational fisheries.



Figure 5. Map of new work material placement extracted from Corps presentation.



iii. *Maintenance Work*

Mobile Baykeeper understands the necessity to consider potential beneficial use options for maintenance dredging per the regulations of the 1966 Water Resources Development Act. It is necessary that these options are chosen wisely so as to not negatively contribute to the negative impacts of the project.

iv. *Upper Mobile Bay - Beneficial Use Site*

To our knowledge, the design and environmental coordination of this proposed project has been funded by RESTORE (although waiting on the receipt of those funds) and the construction and implementation phases have not yet been approved for funding. The current proposal involves constructing 1,200 acres of semi-contained, open water dredged material to generate tidal marsh in the upper Mobile Bay. After distribution of this potential project at various public scoping meetings, there have been several local fisherman who have identified the proposed location as important recreational fishing habitat and known productive commercial crabbing area. Mobile Baykeeper opposes the selection of this project as a Beneficial Use Site given its existing high quality and purpose. Other Beneficial Use Site alternatives should be considered. Additionally, we feel this project may be counterintuitive to the efforts by the ADCNR to protect shrimp nursery areas by creating restricted areas (including the area of the proposed fill). We highly suggest considering other potential areas for disposal and not utilizing RESTORE funds for the completion of this project.

v. *In Bay Disposal*

Several citizens have raised concerns regarding the disposal of maintenance material in a thin layer fashion (Figure 7). One of the main concerns was with the possibility for disposal to result in boat navigation issues when adding more material to an already shallow area. It is our understanding from the Corps that the placement of maintenance material will only occur in areas with a depth of at least 12-15ft. We encourage the Corps to carefully consider how this placement may impact local boating. Another concern is with the placement of



Figure 6. Map of the proposed beneficial use site in the Upper Mobile Bay as presented by the Corps at the public workshop

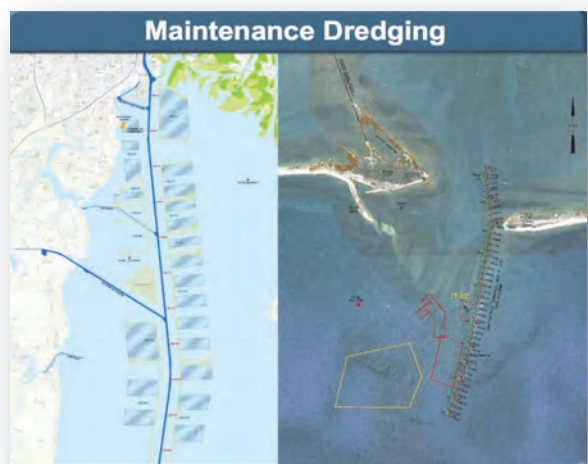


Figure 7. Map of the maintenance dredging disposal plans as presented by the Corps at a public workshop.

the material over existing habitats important to the area, which could potentially impact benthic communities and existing fishing grounds. There are also concerns with how this disposal over a large area will affect local water quality, changes in pH, Dissolved Oxygen, turbidity, TSS, ammonia, and nitrates. We encourage the Corps study the impacts of thin layer disposal in Mobile Bay to ensure this long-term solution is not detrimental for the productivity and quality of these areas.

Mobile Baykeeper appreciates the opportunity to provide input on the Mobile Harbor General Reevaluation Report and the DSEIS. We understand this is a long and tenuous process and appreciate the Corps taking the time to address the public's concerns and take comments into consideration to ensure all impacts are properly evaluated.

Ultimately, we encourage the Corps to select a plan that addresses the triple bottom line - the economy, environment, and community. Supporting all three of these values will continue to allow Mobile Bay thrive and continue to support its many uses.

Thank you in advance for your consideration and response to each of these comments. We request a written response to each of the provided comments. Please feel free to contact us with any questions at (251)-433-4229.

Sincerely,



Casi (kc) Callaway  
Executive Director



Cade Kistler  
Program Director



Laura Stone Jackson  
Program and Grants Coordinator

Cc: Fish and Wildlife Service, Alabama Department of Environmental Management, Environmental Protection Agency Region Four

**From:** (b)(6)  
**To:** [Laura Jackson](#)  
**Subject:** RE: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS  
**Date:** Friday, July 6, 2018 3:51:00 PM

---

Hey Laura,  
Colonel DeLapp has retired. I'll make sure that Colonel Joli receives your letter. I do not have his e-mail and contact information because he is not in our global contacts just yet and his secretary is out for the afternoon. I will get that information to you on Monday.

(b)(6)

-----Original Message-----

From: Laura Jackson [<mailto:ljackson@mobilebaykeeper.org>]  
Sent: Friday, July 06, 2018 3:30 PM  
To: DeLapp, James Andrew (Jim) COL USARMY CESAM (US) <James.A.Delapp@usace.army.mil>  
Cc: Cade Kistler <[ckistler@mobilebaykeeper.org](mailto:ckistler@mobilebaykeeper.org)>; Casi (kc) Callaway <[callaway@mobilebaykeeper.org](mailto:callaway@mobilebaykeeper.org)> (b)(6)

(b)(6)

Subject: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

Hi Col. DeLapp,

Attached you will find Mobile Baykeeper's comment letter on the Draft Supplemental Environmental Impact Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Please let me know that you have received our submission and feel free to reach out with any questions.

Thank you and have a great weekend.  
-Laura

--

Laura Stone Jackson

Program & Grants Coordinator  
Mobile Baykeeper  
450-C Government Street  
Mobile, Alabama 36602  
Phone 251-433-4229  
Cell 480-707-3787  
Fax 251-432-8197

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<Blocked[https://www.youtube.com/channel/UCAaAXTy3q\\_8FydkH61bhxRQ](https://www.youtube.com/channel/UCAaAXTy3q_8FydkH61bhxRQ)> Read Our Programs Blog Here!  
<Blocked<http://www.mobilebaykeeper.org/program-blog/>>

"Clean Water, Clean Air, Healthy Communities"

Please consider the environment before printing this email

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)  
**Date:** Friday, July 6, 2018 1:40:00 PM

---

Hey (b)(6) Just a heads up...I noticed when I was uploading the Real Estate Appendix that it did not capture the updated maps and the language for the TSP. You can pull the revised language and maps from the main report.

We have to have it ready to upload to the EPA site by COB next Thursday, 12 July for the public release.

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Thursday, July 05, 2018 2:58 PM  
**To:** (b)(6)  
(b)(6)  
**Cc:** (b)(6)  
(b)(6)  
**Subject:** RE: Pipeline Language (UNCLASSIFIED)

(b)(6) to answer your first question: Yes, I worked w/ Shell too. They Stated WT Offshore (i.e. Shell) has no lines that cross channel. Only lines that run parallel from platforms to shell Yellowhammer plant. Stated Fieldwood has a 6" gas line that Fieldwood owns that feeds their platform but POC had not as-builts to give me.

I totally agree w (b)(6) omments that "we need to be specific on the identification of the as-built elevations of known pipelines and utilities and how these compare to required district specified clearances within the engineering appendix to be consistent with guidance and previous district engineering appendices concerning utility crossings on navigation projects."

I've tried to the best of my knowledge to do this. (b)(5)  
(b)(5)

I'm good w/ the below changes tha (b)(6) recommended below:

#### 4.8 Pipeline Crossings

A search of design files, permit records, and state and federal databases indicate several utilities crossing are located within the project footprint. The locations of these pipelines have been identified; however, uncertainty associated with the locations was accounted for in the abbreviated risk analysis (as generally described in Section 7.1.4) and reflected in the overall cost contingency. Furthermore, surveys will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts. Details of the pipeline crossings coordination is provided in Appendix D – Real Estate.

REMOVE TABLE 4-4 FOR CONSISTENCY WITH RE APPENDIX

#### 7.1.4.1.3 Pipeline Crossings

Mobile Harbor Channel traverses an area where pipelines exist. The locations of all known pipelines have been identified; however, uncertainty associated with the pipeline locations (or unknown pipelines that may exist) was accounted for in the abbreviated risk analysis. The risk of unidentified pipelines will continue to be captured in the CSRA of the Recommended Plan as the study progresses. Furthermore, surveys are included in and will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts.



-----Original Message-----

From: [REDACTED] (b)(6)

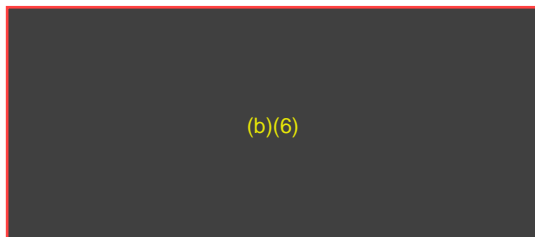
Sent: Wednesday, July 04, 2018 10:02 AM

To: [REDACTED] (b)(6)

Cc: [REDACTED] (b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

Okay. Just let me or [REDACTED] (b)(6) know what you need from us when you begin to add the pipeline crossings to the Engineering Appendix. From what I can tell, we only need to add the 4 Chevron Crossings. Will have to ask [REDACTED] (b)(6) about the Legacy and the Shell.



-----Original Message-----

From: [REDACTED] (b)(6)

Sent: Wednesday, July 04, 2018 9:56 AM

To: [REDACTED] (b)(6)



(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Thanks. The table (b)(6) provided is what I used to generate the table in the engineering appendix that is now being removed. The GIS data was added to the project geodatabase but overall the dataset is missing critical metadata for it to be a trusted source.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 4, 2018 9:53 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

Okay, works for me. I did find the attached GIS files that (b)(6) sent that may have the exact locations of the pipelines.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 04, 2018 9:18 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Since I am just now seeing this information I do not have time to digest and incorporate this appropriately within the engineering appendix given the current time frame we have to complete report revisions. We can leave the revisions as suggested at the moment, but I highly encourage the engineering appendix be updated at a later date.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 4, 2018 9:11 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

(b)(6) I am okay with the language.

(b)(6) Attached are e-mails with the minimum cover requirements from (b)(6) and the maps of the EXXON Pipeline crossings from (b)(6). I have also attached images of our Corps Maps with the correlating Exxon utility naming conventions and cross sections of those four pipeline borings (each boring carries several lines) that cross the channel. (b)(6) and I can work with you to answer any questions. (b)(6) with Exxon should be able to provide cadd files of any of the attached images that you need.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, July 03, 2018 5:38 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

Subject: RE: Pipeline Language (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

My only comment is that we need to be specific on the identification of the as-built elevations of known pipelines and utilities and how these compare to required district specified clearances within the engineering appendix to be consistent with guidance and previous district engineering appendices concerning utility crossings on navigation projects.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, July 3, 2018 4:15 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: Pipeline Language

(b)(6)

Based on our discussion earlier regarding pipelines, I revised the sections below for consistency in how this subject is presented in other portions/appendices of this report. Let me know if you're good with the language.

#### 4.8 Pipeline Crossings

A search of design files, permit records, and state and federal databases indicate several utilities crossing are located within the project footprint. The locations of these pipelines have been identified; however, uncertainty associated with the locations was accounted for in the abbreviated risk analysis (as generally described in Section 7.1.4) and reflected in the overall cost contingency. Furthermore, surveys will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts. Details of the pipeline crossings coordination is provided in Appendix D – Real Estate.

REMOVE TABLE 4-4 FOR CONSISTENCY WITH RE APPENDIX

#### 7.1.4.1.3 Pipeline Crossings

Mobile Harbor Channel traverses an area where pipelines exist. The locations of all known pipelines have been identified; however, uncertainty associated with the pipeline locations (or unknown pipelines that may exist) was accounted for in the abbreviated risk analysis. The risk of unidentified pipelines will continue to be captured in the CSRA of the Recommended Plan as the study progresses. Furthermore, surveys are included in and will be conducted during PED to validate the locations and depths prior to commencement of any construction efforts.

(b)(6)

CLASSIFICATION: UNCLASSIFIED  
CLASSIFICATION: UNCLASSIFIED  
CLASSIFICATION: UNCLASSIFIED

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Subject:** RE: Updated GRR Info Paper  
**Date:** Friday, July 6, 2018 10:23:00 AM

---

I would say " impacts to aquatic resources and fisheries" rather than just fisheries in the local interest or opposition.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Friday, July 06, 2018 9:36 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)

**Subject:** RE: Updated GRR Info Paper

Looks good to me.

[REDACTED] (b)(6)

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Friday, July 6, 2018 9:31 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)

**Subject:** RE: Updated GRR Info Paper

I revised slightly...made date formatting consistent and wording for the local opposition, etc. Does this look/sound OK?

[REDACTED] (b)(6)

(b)(6)

-----Original Message-----

From: (b)(6)  
Sent: Friday, July 06, 2018 8:54 AM  
To:  
Cc: (b)(6)  
Subject: Updated GRR Info Paper

(b)(6)

Made change concerning GRR approval.

Talked to (b)(6) and he verified with (b)(6) Still a Director's Report.

Thanks,

(b)(6)

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** Emailing: Mobile Harbor GRR Schedule - 17 Nov 2015.pdf, Mobile Harbor GRR Schedule - 17 Nov 2015.xlsm  
**Date:** Monday, July 9, 2018 12:18:00 PM  
**Attachments:** [Mobile Harbor GRR Schedule - 17 Nov 2015.pdf](#)  
[Mobile Harbor GRR Schedule - 17 Nov 2015.xlsm](#)

---

I know the dates were updated but just in case the resource loaded funding got fouled up in an update, use the attached November 2015 spreadsheet. Let me know if you need any help figuring it out.

(b)(6)

Your message is ready to be sent with the following file or link attachments:

Mobile Harbor GRR Schedule - 17 Nov 2015.pdf  
Mobile Harbor GRR Schedule - 17 Nov 2015.xlsm

Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.







**From:** [REDACTED]  
**To:** (b)(6)  
**Subject:** focus group Jun 25 2018.pptx  
**Date:** Monday, July 9, 2018 11:06:00 AM  
**Attachments:** [focus group Jun 25 2018.pptx](#)

---



# MOBILE HARBOR PROJECT



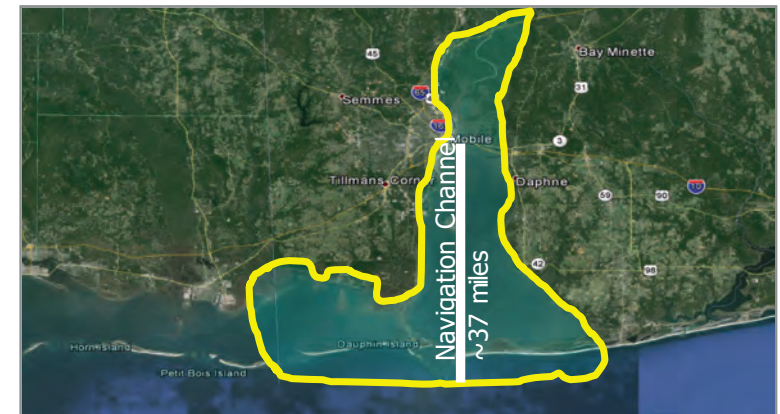
- **Project authorized in the Water Resources Development Act of 1986 in accordance with the 1981 Chief's Report.**
- **Full-Service Seaport -- 10th Largest in the United States - Balanced Trade (Strong Export Market)**
  - ✓ 58M tons handled port-wide. ASPA terminals represent 25 - 29M tons annually
- **Port of Mobile has sustained growth in steel, petroleum and containerized cargoes**
  - ✓ Record 2017 20% growth in containerized cargo – automotive, aviation, forest products, chemicals, poultry
  - ✓ Now ranked No. 2 steel port in the United States
  - ✓ 10 New Ocean Carriers Added Service into Mobile in 2016-2017
- **The Port of Mobile Drives the Regional Economy**
  - ✓ Alabama State Port Authority terminals alone generate 153,000 jobs and \$25.1B in total economic value
  - ✓ Private Petroleum / Petroleum Products terminals alone generate 5,220 jobs and \$687M in economic value
- **Modernizing Mobile Harbor is Necessary Because**
  - ✓ 2/3's of the Port of Mobile's vessel traffic is restricted or delayed.
  - ✓ Larger Ships Now Transit North American Trade Lanes
  - ✓ Channel Deficiencies and Vessel Transit Inefficiencies Directly Impact Shipper Costs and Competitiveness
  - ✓ Mobile's Port-side Infrastructure Investments have met Shipper Needs (\$500+ Million Invested) - Channel Investment Necessary to Leverage Non-federal Sponsor investment and Regional Growth





## Mobile Bay and Watershed

- *The Mobile Bay Watershed is the 6th largest river basin in the United States with five rivers forming the 2nd largest delta in the US, and the 4th largest watershed based on drainage area* (Mobile, Tensaw, Blakeley, Spanish, and Apalachee). Environmentally and economically important because of the exceptional biological diversity and productivity which provides habitat for various invertebrates, fishes, waterfowl, migrant birds, as well as, other game and non-game species.
- *Mobile Delta is one of the most diverse ecosystems in the US* with 3 types of wetland habitats, extensive seagrasses, 200+ species of fish, major shellfish communities, and 300+ species of birds and reptiles. The Delta is one of the most important and valuable natural resources in the US.
- *Alabama Seafood Industry Economic Impact.* Commercial species harvests provide a valuable source of revenue for the state contributing approximately \$461M in revenue annually and 10,000 jobs. The most common commercial species obtained from Alabama waters are shrimp, blue crabs, oysters, and numerous species of fish.
- *Coastal tourism and recreation provide local economic benefits including* boating, fishing, swimming, and sight seeing. Saltwater species provide the vast majority of fish caught recreationally in the Mobile Bay system.
- *Cultural Resources.* The Mobile area is rich in both pre-historic and historic cultural resources.







# MOBILE HARBOR PROJECT ALTERNATIVES



## Initial

- Deepening: 47 to 55 feet Including Turning Basin
- Bend Easing
- Widener: 100 and 150 feet 5, 10,15 miles in length

## Tentatively Selected Plan

- Deepening: 50 feet Including Turning Basin
- Bend Easing
- Widener: 100 feet 3 miles in length

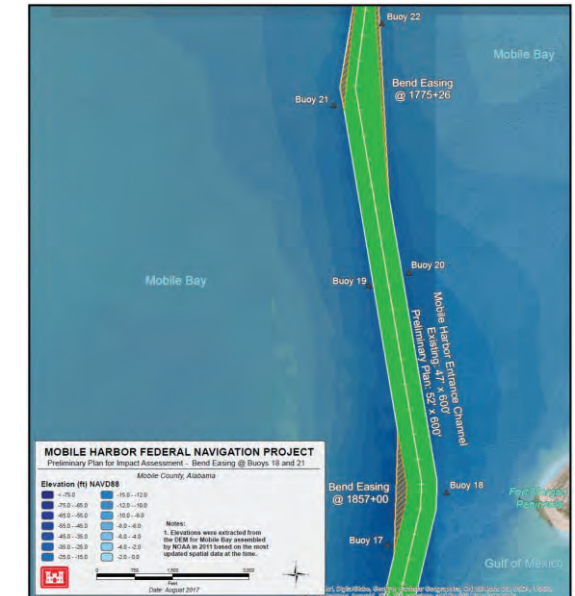
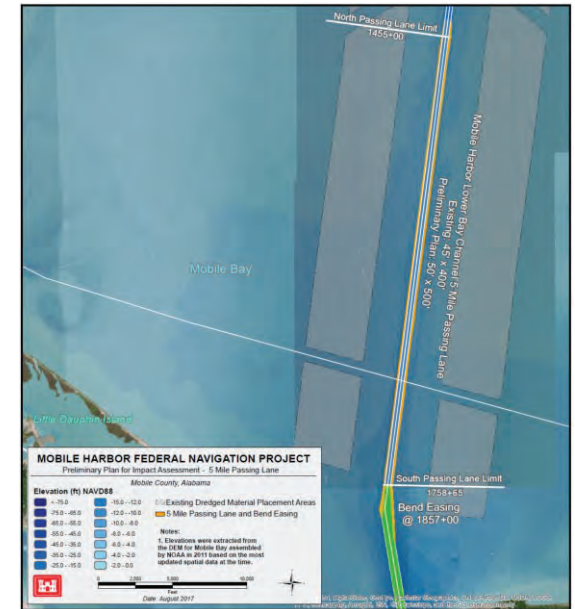
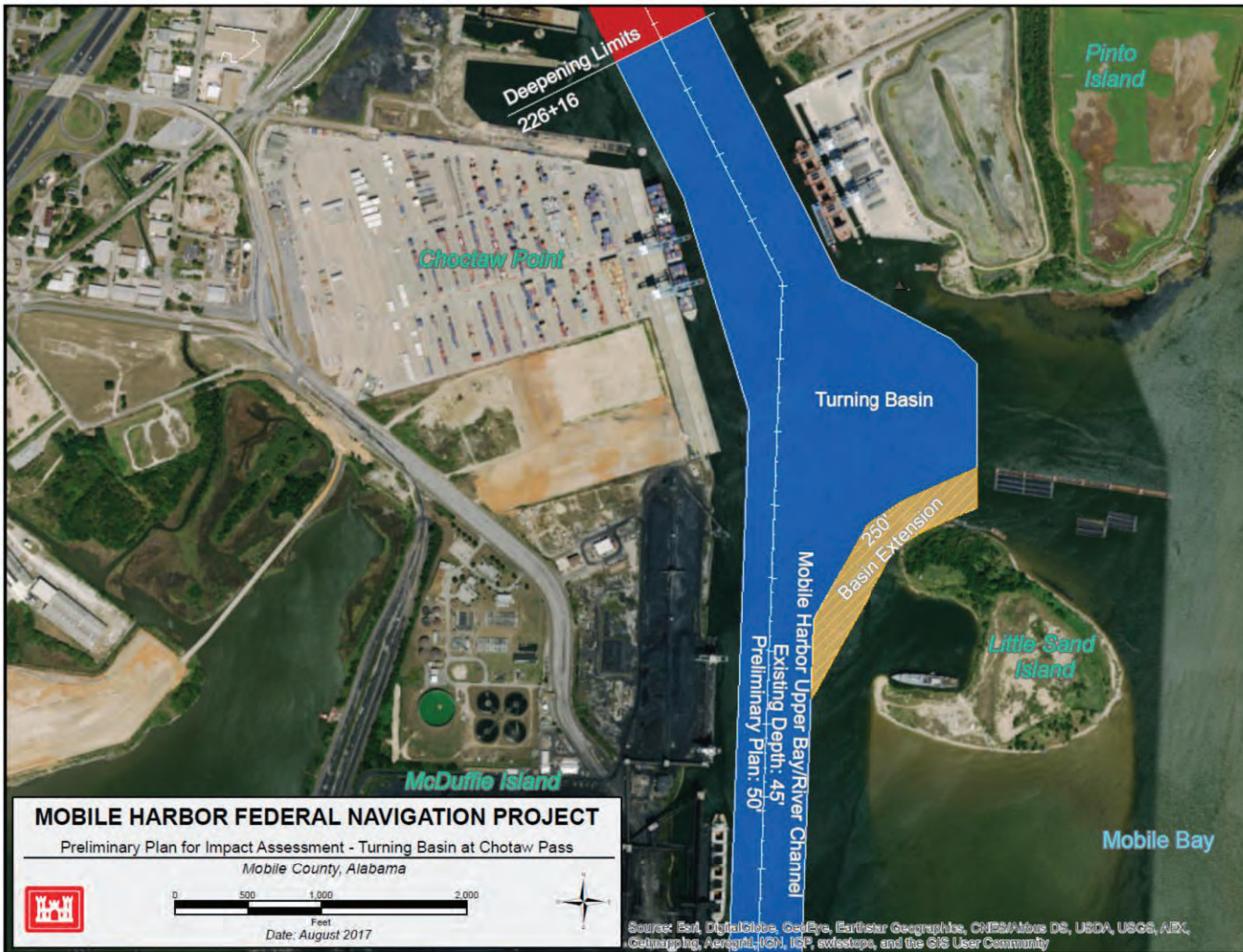






US Army Corps  
of Engineers

# MOBILE HARBOR PROJECT



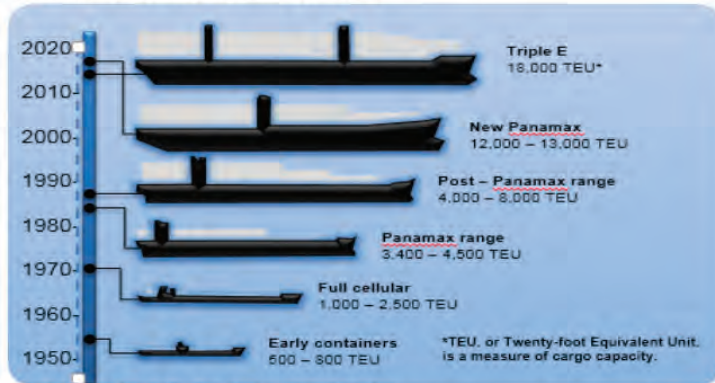




## ECONOMIC CONSIDERATIONS



Mobile Harbor Trade Routes



Evolution of container ships

Post-Panamax ships make up 16% of the world's container fleet today, but carry 45% of the cargo. New Panamax ships are the largest that can pass through the new locks in 2016.

### Concepts Behind Mobile Harbor Economic Analysis

- Growth is assumed only to the capacity of the facilities
- Deeper channels allow vessels to load more efficiently
- Channel widening reduces transit delays/wait times to gain efficiencies
- The project benefits are reduction in transportation costs

Commodity Forecast

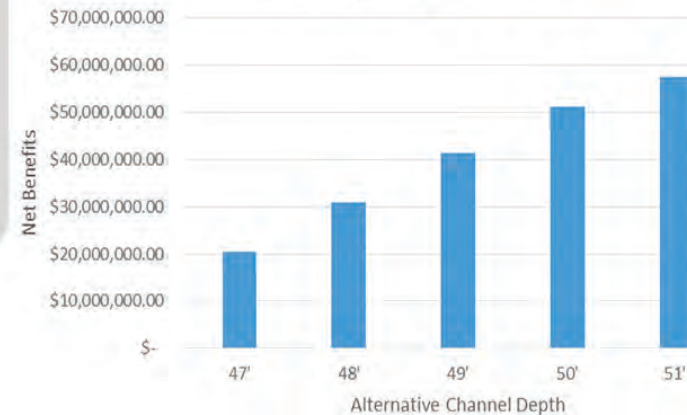
World Fleet Forecast

Major Components of Mobile Harbor Economic Analysis

Mobile Fleet Forecast

Historic Vessel Calls

Preliminary Deepening Net Benefits



**National Economic Development (NED) Plan maximizes net benefits at 51 foot depth**



## ENVIRONMENTAL CONSIDERATIONS

### FISHERIES ASSESSMENT

Understand relationships between salinity and fish populations to predict potential impacts. Conducted spring/summer fish sampling.

### OYSTER MODELING

Map existing oyster reefs and determine larvae distribution patterns throughout the Bay. Evaluate potential impacts to oysters based on the predictive water quality and hydrodynamic models.

### SUBMERGED AQUATIC-VEGETATION (SAV) ASSESSMENT AND MAPPING

Identify and map distribution of existing sea grasses to establish baseline used in determining potential impacts based on water quality model results.

### WETLAND ASSESSMENT AND MAPPING

Identify and map the distribution of existing wetland communities to understand potential impacts based on water quality model results

### BENTHIC COMMUNITY ASSESSMENT

Establish baseline conditions to analyze impacts to benthos from water-quality and saltwater intrusion based on information obtained through water-quality modeling







## ENVIRONMENTAL CONSIDERATIONS

### CLASSIFY SUBSURFACE CONDITIONS

Compile and evaluate all existing subsurface data for the navigation channel sediments. Collect additional subsurface samples/borings to determine sediment composition and potential contamination.

### SHIP WAKE ANALYSIS

Estimate increases in waves and associated effects due to future ship traffic.

### SEDIMENT TRANSPORT MODELING

Collect baseline data and develop hydrodynamic and sediment transport models to characterize the physical conditions and sediment transport processes of the study area.

### ENVIRONMENTAL JUSTICE ISSUES

Evaluate the impacts to human and social environments. This will also include impacts from air quality and noise pollution.

### CULTURAL RESOURCES

Evaluate potential impacts to Historic Properties in compliance with the National Historic Preservation Act.



**Data Collection Parameters**

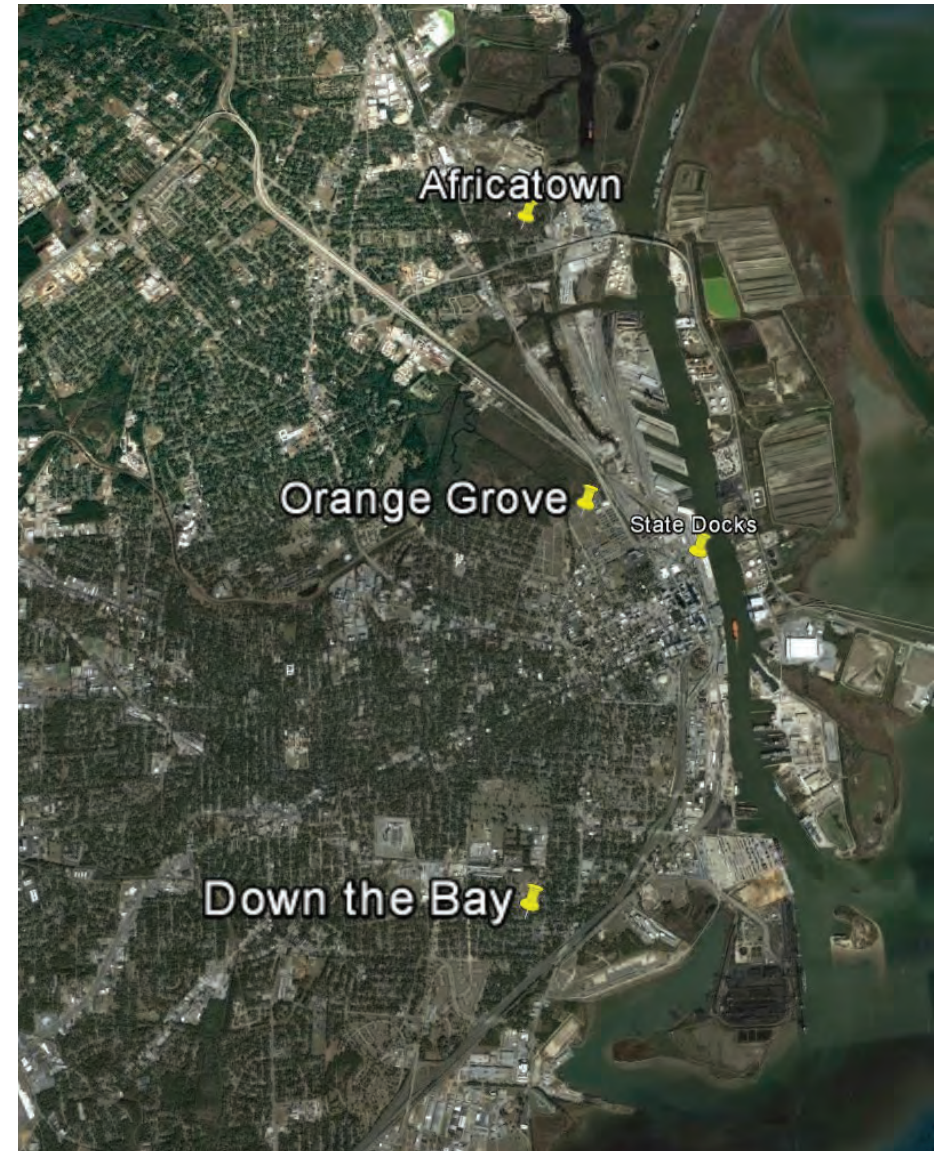
- Average along stream velocity
- Water level (NAVD88)
- Turbidity
- Salinity
- Temperature
- Automatic sampling for Total Suspended Solids
- Wave height (ship wake)

Image © 2016 TerraMetrics



## ENVIRONMENTAL JUSTICE EXECUTIVE ORDER 12898

- Identify and address disproportionately high and adverse health or environmental project effects on minority and low-income populations by considering natural or physical effects on human health, economics, and social environment.
- Mobile Harbor GRR is analyzing effects to communities and human health due to changes in:
  - Air quality from increased ship traffic
  - Water quality related to channel modifications
  - Noise from increased Port activities
  - Impacts from coal transportation
  - Traffic, transportation, development, and infrastructure
  - Foreseeable future Port Activities

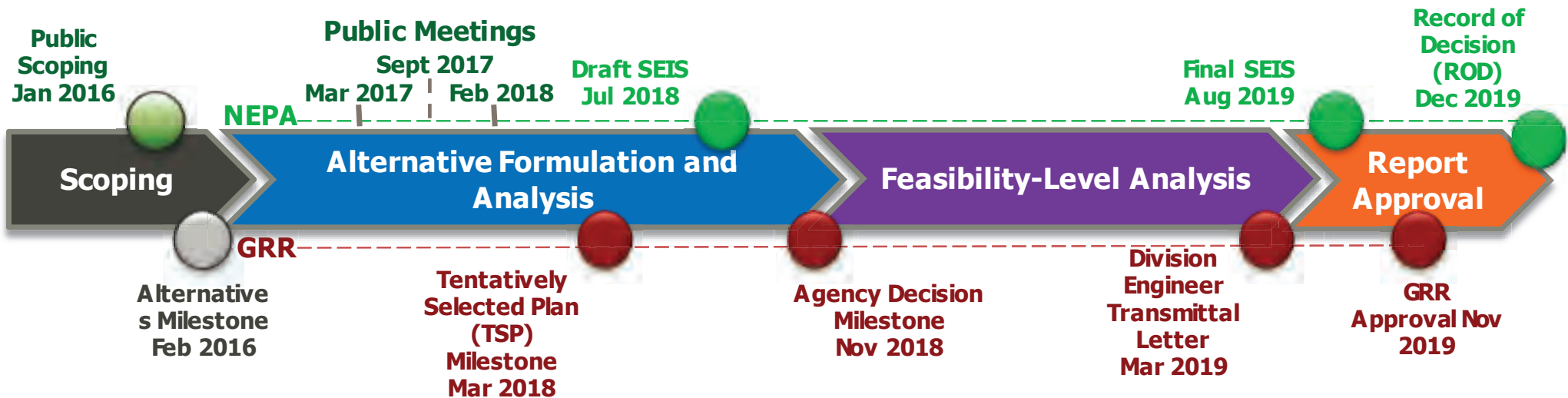




# MOBILE HARBOR PROJECT



## PROJECT SCHEDULE (48 MONTHS)







US Army Corps  
of Engineers

# MOBILE HARBOR PROJECT



## Submit Your Comments

Your input will assure that all concerns have been considered during the study. Submit your comments in any of the following ways:



Email: [MobileHarborGRR@usace.army.mil](mailto:MobileHarborGRR@usace.army.mil)



Postal Mail:

U.S. Army Corps of Engineers

ATTN: PD-F

P.O. Box 2288

Mobile, AL 36628

## Stay Informed



Biweekly updates and project documents on the project website :  
[www.sam.usace.army.mil/Missions/Program-and-Project-Management/Civil-Projects/Mobile-Harbor-GRR/](http://www.sam.usace.army.mil/Missions/Program-and-Project-Management/Civil-Projects/Mobile-Harbor-GRR/)



Sign up for the Listserve on the project website to receive a copy of the quarterly bulletin.

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[Instagram.com/USACEMobile](https://www.instagram.com/USACEMobile)

**From:** [REDACTED]  
**To:** (b)(6)  
**Cc:**  
**Subject:** Mobile Harbor GRR page counts  
**Date:** Monday, July 9, 2018 9:02:00 AM

---

(b)(6)

The attached image provides the updated page counts for the Mobile Harbor GRR.



-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 09, 2018 9:00 AM  
**To:** [REDACTED] (b)(6)  
**Subject:**

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** RE: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS  
**Date:** Monday, July 9, 2018 7:02:08 AM

---

...yet.

---

**From:** (b)(6)  
**Date:** July 9, 2018 at 6:48:26 AM CDT  
**To:** (b)(6)  
**Subject:** RE: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

Well, at least they didn't call us liars, cheats, thieves, etc.

-----Original Message-----

**From:** (b)(6)  
**Sent:** Friday, July 6, 2018 3:54 PM  
**To:** (b)(6)  
**Cc:** (b)(6)  
**Subject:** FW: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

FYI...

(b)(6)

-----Original Message-----

**From:** Laura Jackson [<mailto:ljackson@mobilebaykeeper.org>]  
**Sent:** Friday, July 06, 2018 3:30 PM  
**To:** DeLapp, James Andrew (Jim) COL USARMY CESAM (US) <James.A.Delapp@usace.army.mil>  
**Cc:** Cade Kistler <ckistler@mobilebaykeeper.org>; Casi (kc) Callaway <callaway@mobilebaykeeper.org> (b)(6)

(b)(6)

**Subject:** [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

Hi Col. DeLapp,

Attached you will find Mobile Baykeeper's comment letter on the Draft Supplemental Environmental Impact Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Please let me know that you have received our submission and feel free to reach out with any questions.

Thank you and have a great weekend.

-Laura

--

Laura Stone Jackson

Program & Grants Coordinator  
Mobile Baykeeper  
450-C Government Street  
Mobile, Alabama 36602  
Phone 251-433-4229  
Cell 480-707-3787  
Fax 251-432-8197

You can make a difference - become a Member <Blocked<http://www.mobilebaykeeper.org/contribute/>> or Volunteer <Blocked<http://www.mobilebaykeeper.org/volunteer-home/>> today!

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<Blocked[https://www.youtube.com/channel/UCaAaXTy3q\\_8FydkH61bhxRQ](https://www.youtube.com/channel/UCaAaXTy3q_8FydkH61bhxRQ)> Read Our Programs Blog Here!  
<Blocked<http://www.mobilebaykeeper.org/program-blog/>>

"Clean Water, Clean Air, Healthy Communities"

Please consider the environment before printing this email

**From:** [REDACTED] (b)(6)  
**To:** [REDACTED] (b)(6)  
**Subject:** RE: DQC Review Backcheck - Mobile Harbor GRR  
**Date:** Monday, July 9, 2018 9:05:00 AM

---

Okay, thanks (b)(6). Most important thing is if there are any showstoppers we want to know prior to the public release (possibly this Friday).

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 09, 2018 9:03 AM  
**To:** [REDACTED] (b)(6)  
**Subject:** RE: DQC Review Backcheck - Mobile Harbor GRR

(b)(6)  
I will be TDY [REDACTED] not relevant can't  
guarantee that I'll be finished by Thursday. [REDACTED] not relevant  
Thursday. Thanks.

(b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Friday, July 06, 2018 16:49  
**To:** [REDACTED] (b)(6)

[REDACTED] (b)(6)

**Cc:** [REDACTED] (b)(6)  
**Subject:** DQC Review Backcheck - Mobile Harbor GRR

(b)(6)

The Backcheck documents incorporating the DQC comments have been uploaded to Dr. Checks. Please review the evaluations of your comments, ensure that the changes have been properly made in the Backcheck documents, and close or respond to your comments by COB Thursday, 12 July, 2018.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Thursday, May 31, 2018 6:53 PM

To (b)(6)

(b)(6)

Cc (b)(6)

(b)(6)

Subject: DQC Review - Mobile Harbor GRR

(b)(6)

The Mobile Harbor GRR Report has been uploaded to Dr. Checks for the DQC Review. Please have your review complete and all comments submitted in Dr. Checks NLT 14 June, 2018. If possible, please complete your review sooner than the deadline because the PDT has very little time to turnaround the report prior to release of the DRAFT Report.

Attached is the new Review Policy guidance for Civil Works (Refer to Section 8 District Quality Control and MSC Quality Assurance). (b)(6) is the DQC Review Lead.

Let me know if you have any questions.



(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Tuesday, May 29, 2018 7:08 AM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: RE: DQC Review - Mobile Harbor GRR

All: We are still completing the report. Will let everyone know when it has been uploaded to Dr. Checks.

(b)(6)

-----Original Appointment-----

From: (b)(6)

Sent: Thursday, May 03, 2018 10:41 AM

To: (b)(6)

(b)(6)

(b)(6)

Subject: DQC Review - Mobile Harbor GRR

When: Friday, May 25, 2018 9:00 AM-10:00 AM (UTC-06:00) Central Time (US & Canada).

Where: Main 3rd floor PM Conference Room (in hall across from restrooms)

For those not in the district office, call-in Information is as follows:

USA Toll-Free: [REDACTED]

Access Code [REDACTED]

Security Code: [REDACTED]

All: You have been selected as part of the DQC Review Team for the Mobile Harbor General Reevaluation Report. Please make plans to attend a DQC kick-off discussion on Friday, 25 May at 0900hrs in the main PM-Conference Room. The Report will be provided electronically to you that morning. Your labor numbers for this effort are as follows:

[REDACTED]  
(b)(6)

[REDACTED]  
(b)(6)

**From:** [REDACTED] (b)(6)  
**To:** [REDACTED]  
**Subject:** RE: Emailing: Mobile Harbor GRR Schedule - 17 Nov 2015.pdf, Mobile Harbor GRR Schedule - 17 Nov 2015.xlsm  
**Date:** Monday, July 9, 2018 12:32:00 PM

---

Can you print your Engineering Appendix for tomorrow's meeting? I don't think we'll need the attachments printed but that would be up to you. I just want one hardcopy of everything for the meeting tomorrow.

-----Original Message-----

From: [REDACTED] (b)(6)  
Sent: Monday, July 09, 2018 12:31 PM  
To: [REDACTED] (b)(6)  
Subject: RE: Emailing: Mobile Harbor GRR Schedule - 17 Nov 2015.pdf, Mobile Harbor GRR Schedule - 17 Nov 2015.xlsm

Thanks! I'll let you know.

[REDACTED] (b)(6)

-----Original Message-----

From: [REDACTED] (b)(6)  
Sent: Monday, July 09, 2018 12:19 PM  
To: [REDACTED] (b)(6)  
Subject: Emailing: Mobile Harbor GRR Schedule - 17 Nov 2015.pdf, Mobile Harbor GRR Schedule - 17 Nov 2015.xlsm

I know the dates were updated but just in case the resource loaded funding got fouled up in an update, use the attached November 2015 spreadsheet. Let me know if you need any help figuring it out.

[REDACTED] (b)(6)

Your message is ready to be sent with the following file or link attachments:

Mobile Harbor GRR Schedule - 17 Nov 2015.pdf  
Mobile Harbor GRR Schedule - 17 Nov 2015.xlsm

Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.

**From:** (b)(6)  
**To:**  
**Subject:** RE: Mobile SDEIS Update  
**Date:** Monday, July 9, 2018 9:34:00 AM

---

Good morning (b)(6)  
No, it has not gone out for review. I wonder what you are seeing?

(b)(6)

-----Original Message-----

**From:** (b)(6) [epa.gov]  
**Sent:** Monday, July 09, 2018 9:16 AM  
**To:** (b)(6)  
**Subject:** [Non-DoD Source] Mobile SDEIS Update

(b)(6)

We are seeing emails from other entities on the Mobile Harbor project. Is the EIS out for review. If so, it has not go our cdx system yet.

(b)(6)

Sent from my iPhone

**From:** [REDACTED] (b)(6)  
**To:** [REDACTED]  
**Subject:** RE: Mobile SDEIS Update  
**Date:** Monday, July 9, 2018 1:22:00 PM  
**Attachments:** [Non-DoD Source Mobile Baykeeper"s Comments on Mobile Ship Channel DSEIS.msg](#)

---

Okay. We received a pretty large set of comments from the Baykeeper (attached). We are trying to get the document uploaded to the EPA site by this Friday.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 09, 2018 1:09 PM  
**To:** [REDACTED] (b)(6)  
**Subject:** [Non-DoD Source] RE: Mobile SDEIS Update

The River Keepers sent us an email with comments.

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 9, 2018 10:34 AM  
**To:** [REDACTED] (b)(6)  
**Subject:** RE: Mobile SDEIS Update

Good morning [REDACTED] (b)(6)  
No, it has not gone out for review. I wonder what you are seeing?

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 09, 2018 9:16 AM  
**To:** [REDACTED] (b)(6)  
**Subject:** [Non-DoD Source] Mobile SDEIS Update

[REDACTED] (b)(6)

We are seeing emails from other entities on the Mobile Harbor project. Is the EIS out for review. If so, it has not go our cdx system yet.

(b)(6)

Sent from my iPhone



**From:** [Laura Jackson](#)  
**To:** [DeLapp, James Andrew \(Jim\) COL USARMY CESAM \(US\)](#)  
**Cc:** [Cade Kistler; Casi \(kc\) Callaway;](#) (b)(6)  
(b)(6)  
**Subject:** [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS  
**Date:** Friday, July 6, 2018 3:33:28 PM  
**Attachments:** [2018 Mobile-Baykeeper DSEIS Comment Letter Mobile Harbor.pdf](#)

---

Hi Col. DeLapp,

Attached you will find Mobile Baykeeper's comment letter on the Draft Supplemental Environmental Impact Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Please let me know that you have received our submission and feel free to reach out with any questions.

Thank you and have a great weekend.

-Laura

--

Laura Stone Jackson

Program & Grants Coordinator  
Mobile Baykeeper  
450-C Government Street  
Mobile, Alabama 36602  
Phone 251-433-4229  
Cell 480-707-3787  
Fax 251-432-8197

You can make a difference - become a Member <Blocked<http://www.mobilebaykeeper.org/contribute/>> or Volunteer <Blocked<http://www.mobilebaykeeper.org/volunteer-home/>> today!

<Blocked<https://www.facebook.com/mobilebaykeeper>> <Blocked<https://twitter.com/MobileBaykeeper>>  
<Blocked[https://www.youtube.com/channel/UCAaAXTy3q\\_8FydkH61bhxRQ](https://www.youtube.com/channel/UCAaAXTy3q_8FydkH61bhxRQ)> Read Our Programs Blog Here!  
<Blocked<http://www.mobilebaykeeper.org/program-blog/>>

"Clean Water, Clean Air, Healthy Communities"

Please consider the environment before printing this email



Providing citizens a means to protect the beauty, health and heritage of the Mobile Bay Watershed, Alabama's waterways and coastal communities.

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July 6, 2018

U.S. Army Corps of Engineers, Mobile District  
Attn: Colonel James A. Delapp  
109 Saint Joseph Street  
Mobile, AL 36602

RE: Draft Supplemental Environmental Impact Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Dear District Commander,

We are Mobile Baykeeper, a twenty-one-year-old nonprofit organization with the mission of providing citizens a means to protect the beauty, health and heritage of the Mobile Bay Watershed and coastal communities. We are submitting comments on behalf of our board, officers, staff and more than 4,500 members regarding a Draft Supplemental Environmental Impact Statement to evaluate improvements to the Mobile Ship Channel. Mobile Bay is a complex and highly sensitive ecosystem considered to be one of the most biodiverse ecosystems in North America<sup>1</sup>. Mobile Bay is Alabama's central estuary serving as a transitional zone where the river's fresh water can mingle with tidally influenced marine waters making it a highly productive and diverse nursery as well as exceedingly environmentally and economically important. Mobile Bay is valuable to several industries including: commercial and recreational fisheries, tourism, coastal development, and recreation (boating, paddling, swimming, etc.). Each of these industries contribute significantly to our economic prosperity and growth making it vitally important to evaluate all potential impacts to our natural resources. To protect our economy, community, and quality of life, we must ensure that we mitigate for any impacts associated with a major development project. Mobile Baykeeper recognizes the economic value of the Port as it contributes \$19.4 billion to our regional economy and know that improvements could make our Port more competitive in the industry<sup>2</sup>. By thoroughly studying and developing a comprehensive plan for the port expansion, we can grow responsibly and minimize negative impacts to the very natural resources that support so many economic sectors and our quality of life.

We applaud the U.S. Army Corps of Engineers (USACE) for its efforts since

<sup>1</sup> Duncan, Scot. *Southern Wonder: Alabama's Surprising Biodiversity*. Tuscaloosa: University of Alabama Press, 2013.

<sup>2</sup> USACE public scoping document

2015 to communicate with and involve the community in the project evaluation. Throughout this time, community members have had the opportunity to attend public scoping meetings and provide feedback on different project components. Since the public has not had all information used in this DSEIS available to them, these involvement opportunities (while helpful) should not be considered comprehensive. We also appreciate that you have a responsibility to meaningfully consider all comments made during this period. Mobile Baykeeper has provided several comment letters during the assessment of the potential impacts associated with deepening and widening the Mobile Bay navigation channel, some of the essential points of which will be restated in this comment letter along with several novel considerations and concerns. We request the Corps fully evaluate the following comments formulated based on the concerns of our members and partners and provide a written response for how each will be addressed and incorporated into the Draft Supplemental Environmental Impact Statement (DSEIS).

## **EXECUTIVE SUMMARY**

### **I. GENERAL CONSIDERATIONS:**

- A. Consider All Impacts From the Proposed Project** – The draft SEIS must include all aspects of the proposed activity from start to finish (dredging activities, impacts from new channel hydrodynamics, and long-term impacts including potential for further development and upgrades at associated port facilities). This includes indirect and cumulative effects.
- B. Coordinate with All Appropriate Audiences** – The Corps should meaningfully coordinate with all the appropriate audiences to develop the DSEIS – including state and federal agencies, commercial and recreational fishermen, and environmental justice communities.
- C. High Quality Accurate Scientific Data** – To ensure the Corps is utilizing the best available science, they must connect with the local scientists and researchers who specialize in subjects that are relevant and pertain directly to the study. These individuals have extensive and critical information. Failure to acquire information from these individuals may reduce the ability to produce “high-quality information and accurate scientific data” necessary to complete a DSEIS (40 C.F.R. § 1500.1(b)).
- D. Utilization of 2010 as Climatic Baseline** – The Corps should use more than one year as a model for the entire project. 2010 did not have any extreme droughts or severe flood events; Basing the entirety of the impacts from the project solely on 2010 will not show the true edge case scenarios including accurate representations of climatic, hydrologic, and other relevant conditions. Because of this it is likely not an accurate characterization of the full range of conditions that would result from the modifications to the ship channel, sea level rise, saltwater intrusion, and other impacts.
- E. Better Define and Understand No Action and Alternative Projections** – We are concerned about the preliminary finding of “no impact” that has been presented. Predicting ship traffic will be greater without the ship channel deepening and widening project than with the project is a tenuous assumption. It is entirely possible that it is in large part due to this assumption that the Corps is able to predict no impact and, therefore, avoid mitigation

for the impacts that will certainly come an enlarged ship channel. We request that the Corps review impacts under multiple growth (negative, neutral, and positive) scenarios to accurately understand what impacts will be under these potential growth scenarios.

- F. Cumulative Impacts** – NEPA requires the Corps to identify the major resources of concern and evaluate those resources through a cumulative impact analysis. According to the CEFQ, a cumulative impact “is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts include those coming from affiliated industries that will need or wish to expand due to the Port’s expansion as well as prospective new growth due to a deeper and wider ship channel. The cumulative analysis needs be sensitive enough to include other important factors such as but not limited to: extreme weather events, pollution, wetland loss, fishery habitat impacts, and sea level rise.
- G. Indirect Impacts** – The Corps must identify all indirect impacts and perform compensatory mitigation for any unavoidable impacts. Indirect impacts are defined as those impacts “caused by the action and are later in time and farther removed in distance, but are still reasonably foreseeable.” These impacts “...may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems.”
- H. Monitoring and Protective Plans** – We suggest the Corps work in cooperation with state agencies to develop a comprehensive plan to use protective BMPs for the proposed activities. We suggest a long-term monitoring plan be implemented that monitors dredging and disposal areas for at least 10 years.
- I. Mitigation** – We encourage the Corps to consider public comments to ensure impacts are not underestimated. If any unavoidable impacts are identified, we suggest the Corps work with the community and environmental groups to ensure projects are supported that will adequately address the impacts identified. Different mitigation measures for A-K below should be considered and studied as separate alternatives. A project of this size and scope will undoubtedly have some unavoidable impacts if implemented. All other similar projects (Jacksonville, Savannah, Houston, Charleston etc.) reviewed by Mobile Baykeeper throughout the region have found unavoidable impacts. If in this case the Corps attempts to ignore or conceal these impacts to improve perception and adoption of this project, it could result in significant liability to the Corps and the project sponsor under environmental statutes in the future.

### **Specific Considerations:**

- A. Wetlands** – The Corps presented minimal to no effects on wetlands in the latest public workshop. This is very concerning given many other large ship channel enlargement projects identified unavoidable impacts from their studies. Evaluations used must be robust enough to predict the impacts from the proposed project. Currently, it appears that these evaluations may not be able to fully predict these impacts. Therefore, we suggest the Corps use multiple

scenarios with varying salinity levels, particularly during longer drought durations and varying sea level rise scenarios (high, medium, low). These models should be run in conjunction with other predicted changes such as increased wave energy from larger vessels, sedimentation and turbidity impacts, and changes in dissolved oxygen. Indirect effects such as development of wetland areas due to industrial growth induced by the ship channel enlargement must be considered as required by NEPA.

- B. SAVs** – We encourage the Corps to evaluate how changes to factors including but not limited to: salinity, turbid conditions produced as a result of dredging, changes in wave energy due to larger vessels, and changes to dissolved oxygen levels will impact the local Sub Aquatic Vegetation (SAV) population. When evaluating these factors, it is important to consider the indirect and cumulative impact of how SAVs will react when enduring all conditions and induced and incremental changes.
- C. Shellfish/Oysters** – We suggest the Corps review impacts to all lifestages of oysters including the use of larvae distribution models created by the Dauphin Island Sea Lab. We also recommend that a cumulative impact analysis be conducted to see how changes in salinity, dissolved oxygen, wake/waves, and sedimentation will impact the species. When looking at the existing oyster reefs, we advise including oyster farms, gardens, and planned oyster production. Aquaculture is expanding dramatically across Mobile Bay. Both the western and eastern shores must be analyzed to determine how enlarging the channel will impact the viability of these operations.
- D. Benthic Communities** – To ensure the full extent of impact is evaluated, we encourage the Corps to characterize the different benthic communities throughout the project and not limit the samples to a portion of the project disturbance. The Corps should also consider the ongoing stress or flux benthic communities will endure from sedimentation and shoaling processes that will continue as maintenance dredging occurs in the navigation channel.
- E. Fish** – We encourage the Corps to consider habitat suitability for all life stages including adult, juvenile, and larvae as well as spawning, nursery, and important migratory and movement areas. The Corps needs to work with the state and federal agencies to understand what areas are considered Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC). Lastly, we strongly encourage the Corps to use cumulative impact analysis to evaluate how multiple factors (salinity, dissolved oxygen, etc.) will impact local species, particularly the Gulf Sturgeon and Red Drum.
- F. Shorebirds, Waterfowl, and Migratory Birds** – We encourage the Corps to evaluate how projected impacts including but not limited to: coastal erosion, beach loss, SAV loss, induced growth, and cumulative impacts will affect birds that rely on these resources.
- G. Threatened and Endangered Species** – We suggest the Corps conduct a biological opinion to evaluate the impacts of the project on each of these threatened or endangered species. We encourage the Corps to coordinate with Dr. Ruth Carmichael at the Dauphin Island Sea Lab to acquire the best available science on the West Indian Manatee. The Corps should carefully evaluate how changes to specific SAV populations (particularly Eurasian watermilfoil, water celery, and coon's tail that were identified as at risk from preliminary

results) will impact the local manatee population. Under ESA, the Corps must also consider any impacts from future state or private activities that are reasonably foreseeable and indirect impacts such as induced growth.

- H. Shorelines** – The Corps should consider the impact from increased ship wake on both sides of Mobile Bay, Dauphin Island, other downdrift MS-AL barrier islands and coordinate with stakeholders to ensure consideration of current, planned, and reasonably foreseeable living shoreline projects. The Corps needs to ensure adequate consideration of all the long-term effects that a deeper and wider ship channel will have from the reduction in littoral sediment deposition on shorelines and develop a protective comprehensive plan to account for unavoidable impacts. The Corps needs to consider how a Vessel Speed Reduction (VSR) program could be implemented to reduce the ship wake energy impacting shorelines and viability for oyster farming.
- I. Air Quality** – We ask the Corps to include air impacts resulting from criteria pollutants, Hazardous Air Pollutants (HAPs), and greenhouse gases from all sources, directly and indirectly caused, as a result of this expansion. This includes induced growth and increases in ship, truck, rail and other traffic. We also want to understand how the Corps will identify baseline conditions for air quality. We request that monitoring is conducted to understand current conditions and compare to expected conditions. The Corps should also consider how implementing a Vessel Speed Reduction program could reduce emissions experienced across our area.
- J. Invasive Species** – We encourage the Corps to evaluate the potential for invasive species introduction into Mobile Bay from increased port activities and adequately develop a plan that mitigates this threat.
- K. Dredged Material and Placement** – The Corps meeting on February 22, 2018 stated that the rate of movement of dredged material out of the Sand Island Beneficial Use Area (SIBUA) was approximately half of the rate that it was being added to the area. The Corps also stated that they would evaluate placement of dredged spoils from the ship channel enlargement and maintenance activities closer to Dauphin Island. Mobile Baykeeper requests that the Corps ensure that dredged materials are placed in appropriate depth and proximity to Dauphin Island. This will enable the dredged spoil to accrete on the island at a sufficient rate to adequately nourish the island and prevent erosion of the island caused by disruption of the littoral drift system. Additionally, given the recreational importance for Tarpon and Red Drum, the placement of dredged material in the Relic Shell Mined Area should be evaluated utilizing all data available to ensure these habitats and other relevant habitats are not destroyed or impaired. To accurately understand the effects of the proposed project, the Corps must investigate sediment for parameters including but not limited to: bacteria, metals, Polychlorinated biphenyl (PCBs), Polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, phenols, pesticides, dioxin congeners, cyanide, organotins, and nutrients and other legacy pollutants.



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## I. GENERAL CONSIDERATIONS FOR THE DSEIS

The following comments relate to the process and implementation of completing the DSEIS. More information on how each of these topics may impact specific species or habitats are described in more detail in the Specific Considerations section below. Careful consideration must be applied to the proposed project's evaluation to ensure all impacts are considered using the most up to date and valid scientific information.

### A. **Consider All Impacts From the Proposed Project**

To our understanding, the Corps announced at the February 22, 2018 public workshop that the draft SEIS will only consider impacts from the specific dredging activities proposed. Although the dredging operations will encompass a portion of the environmental impacts associated with the proposed project, it does not adequately cover the extent of environmental issues that will likely occur from the approval of this project. In addition to direct impacts, the Corps must ensure that all cumulative and indirect effects (addressed in more detail in sections F and G) resulting from the project are evaluated and mitigate for where unavoidable impacts are identified. Below are some of the areas of direct impact that should be considered if the project moves forward. Each of these has been evaluated in similar port expansion EIS evaluations. Environmental impact statements should include all impacts in the evaluation process, including but not limited to: dredging activities (sediment plumes, release of contaminated sediments, etc.); and having a deeper channel (saltwater intrusion, dissolved oxygen changes, etc.), and; the attraction of ships and vessels of all sizes (ship wake, ballast water discharge, noise, air pollution, etc.). Currently the Corps is considering these in separate silos and comprehensively which could underestimate the impacts of the proposed project on our natural resources.

#### i. *Evaluate Impacts from Dredging Activities*

Dredging can cause an increase in suspended sediment concentrations or cloudy water conditions, the potential release of contaminated material, an increase in erosion to nearby shorelines, and the disturbance of habitats particularly within the vicinity of the dredging activities. To our understanding, the Corps plans to utilize a hopper dredge to hydraulically remove sediment from the navigation channel and then store that material in hoppers on the dredge. During this activity, fine sediments (including clays, silt, and fine-sands) generate turbid conditions. Turbidity plumes and sedimentation are a result of overflow and washing practices. The sediment plumes can extend long distances depending upon the type of dredge, operation practices, wind/currents, and the type of sediments located in the excavation area. High turbidity or sediment levels resulting from hopper dredge operations have been documented to redistribute up to 12% of dredged material into the environment with the sediment plume extending more than 5,200 meters from the site of excavation<sup>3,4</sup>. To make the improvements proposed in this project, dredging would span across a

---

<sup>3</sup> Nichols, M., Diaz, R. J., & Schaffner, L. C. (1990). Effects of hopper dredging and sediment dispersion, Chesapeake Bay. *Environmental Geology and Water Sciences*, 15(1), 31-43.

large area and potentially make a substantial impact in its path. It will be important to know, plan, and reduce the extent of the sediment plume along with the environments within that vicinity that will be impacted.

ii. *Evaluate Impacts from a Deeper and Wider Channel*

Deepening the channel can increase saltwater intrusion<sup>5</sup>, causing seawater to advance farther upstream. Changing the salinity regime threatens the freshwater and estuarine marshes and ultimately the species that rely on them. There are several examples of hydrological changes determined as unavoidable impacts in the final EIS evaluating similar harbor capital expansion projects (Savannah Harbor, Charleston Harbor, and Jacksonville Harbor); it seems unlikely that the proposed enlargement of the Mobile Bay Ship Channel would not demonstrate similar effects. Changes to salinity should be analyzed both for vertical and horizontal redistribution to predict water quality changes typically associated with redistribution of vertical salinity zones. Redistribution of horizontal salinity zones are important to evaluate the potential for habitat loss and degradation to wetlands, marshes, tidal rivers, and tributaries. This evaluation should identify the extent of altered salinity regimes and other water quality parameters both on a spatial and temporal scale.

In addition to changes in salinity, a deeper channel can also produce significant changes to dissolved oxygen levels<sup>6</sup>. Harbor deepening concerns for dissolved oxygen include: 1) as depth of the channel increases, the ability of oxygen to reach the bay and river bottoms decreases, generating, on average, lower levels of dissolved oxygen (particularly in the bottom portions where several critical species live), and 2) increased saltwater intrusion, bringing additional saltwater to the upper portions of the estuary and making it more difficult for those areas to receive oxygen from the air, and 3) velocity on average can decrease and reduce the capability of oxygen entering through mixing. Low dissolved oxygen concentrations, particularly for extended periods, could have deleterious effects on fish and other aquatic plants and organisms. Dissolved oxygen is also vitally important for giving the estuary the ability to adjust and handle point and non-point source pollution loads. With lower dissolved oxygen concentrations, we may see a decreased resiliency to these existing and continuing issues.

It is vital that the DSEIS consider changes in salinity, dissolved oxygen, and other water quality parameters and evaluate the attendant consequences on 1) wetlands; 2) threatened and endangered

---

<sup>4</sup> Blair *et al.* (1990). Environmental Impacts of the Bal Harbor Beach Nourishment Project: Mechanical and Sediment Impact on Hard Bottom Areas Adjacent to the Borrow Area.

<sup>5</sup> Zhu, J., Weisberg, R. H., Zheng, L., & Han, S. (2015). Influences of channel deepening and widening on the tidal and nontidal circulations of Tampa Bay. *Estuaries and Coasts*, 38(1), 132-150.

<sup>6</sup> U.S. Army Corps of Engineers, Savannah District. (2012). Final environmental impact statement: Savannah Harbor Expansion Project (SHEP). 5-42 – 5-55; Chatham County, Ga and Jasper County, SC.

<http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%205%20SHEP%20FINAL%20EIS.pdf> Retrieved July 3, 2018

species; 3) anadromous fish populations; 4) spawning and nursery habitats; 4) other locally significant organisms (Red Drum, Speckled Trout, Southern Flounder, Blue Crab, Brown and White Shrimp, etc.).

iii. *Evaluate Indirect Impacts Post Expansion*

The channel improvements will make the Port of Mobile more competitive among other U.S. ports by allowing for larger or more heavily loaded ships and the potential for increased frequency of ship travel in our harbor. Heavier ships will produce larger waves resulting in the potential for: increased shoreline erosion surrounding the channel, increased sedimentation from wake activity, and disruption of habitat including oyster, submerged aquatic vegetation, and wetlands. Bigger ships may bring further development along the port – an indirect impact that must be considered in full.

In the DSEIS, impacts from the proposed dredging activities, the changed hydrology, and the increased activity and opportunity from a larger port should all be evaluated. Simply analyzing the impacts from the proposed dredged activity, may result in inadequately characterizing the full environmental impacts the project may produce on Mobile Bay and surrounding communities.

## **B. Coordinate with All Appropriate Audiences**

i. *State and Federal Agencies*

Mobile Baykeeper strongly suggests close coordination and communication with state and federal agencies including but not limited to the following: U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), Alabama Department of Environmental Management (ADEM), Alabama Department of Conservation and Natural Resources (ADCNR), and the National Marine Fisheries Service (NMFS). Other port expansion projects across the nation have coordinated with agencies, particularly in generating and receiving Biological Opinions and avoidance strategies that are required.

ii. *Commercial and Recreational Fishermen*

Mobile Bay and surrounding waterways are utilized heavily by both commercial and recreational fishermen. Knowledge from local fishermen is a valuable resource in gathering information about local fishing grounds, productivity of particular areas of interest, and depth and navigation, among others. Failure to communicate with the community of fishermen can limit the understanding of the local ecosystem and result in mistakes in selecting project locations. We applaud the Corps for their efforts to communicate with local fishermen thus far and we encourage them to continue meaningful efforts to collect information from local fishermen to ensure all impacts from proposed activities are considered.

iii. *Environmental Justice Communities*

It is important that the Corps comply with the Executive Order 12898 requiring federal agencies to ensure minority and low-income populations will not experience disproportionately high and adverse impacts from federal projects. These communities often bear the brunt of impacts while

receiving the least consideration when development projects take place. It is critical that they are meaningfully engaged in creation of the SEIS and impacts to these communities are thoroughly considered as mitigation measures are selected. We encourage the Corps to meet with all potentially impacted environmental justice communities to allow for individuals in low-income communities and communities of color to understand the proposed project and have the opportunity to voice any concerns. From our discussions, with some stakeholders in these communities we know air quality, including understanding how baseline conditions will be established, how impacts will be identified, and indirect air quality impacts from induced growth are significant concerns. We also encourage the Corps present the draft SEIS to the community upon release as well as specifically to environmental justice communities.

### **C. High Quality Accurate Scientific Data**

The development of the DSEIS should rely on and utilize the most up to date techniques for data collection and consider alternative studies to improve understanding. A DSEIS must include “high-quality information and accurate scientific data” per 40 C.F.R. § 1500.1(b) to ensure that its own determination is based on the best scientific and current data available. This proposed project is fortunate to have several research institutes containing many scientists and graduate students who study the area. Collectively, the Dauphin Island Sea Lab and Auburn Shellfish Lab have numerous principal investigators who are considered experts in different subjects including marine mammals, oysters, fisheries, benthic organisms, physical oceanography, amongst many others. These individuals and their associated work present a wealth of knowledge that must be utilized during the creation of any serious environmental impact statement. Failure to connect with these individuals and the studies conducted in the area may greatly reduce the accuracy of the Corps study.

Additionally, all existing community plans need to be incorporated in the review to eliminate one plan contradicting another (for example: Map for Mobile, Alabama Coastal Comprehensive Plan, Comprehensive Conservation Management Plan, Plan for Spanish Fort and Mobile Bay Causeway, Watershed Management Plans, etc).

### **D. Utilization of 2010 for Climatic Baseline**

Mobile Baykeeper is concerned with the use of a singular year for basing all environmental impact analyses. We would like to see the justification for this decision and highly encourage the Corps should use more than one year to model outcomes for the entire project. The Corps is currently using the year 2010 for all of the model analyses for wetlands, SAVs, oysters, benthics, fish, birds, and threatened and endangered species. The year of 2010 did not have any severe (D3) or extreme (D4) droughts in consecutive weeks (lasting at least 2 weeks), yet we see examples of these in 2000 and in 2011 (as seen in Figure 1 and Figure 2).<sup>7</sup> Drought is extremely important to include in impact

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<sup>7</sup> United States Drought Monitor (USDMD). Retrieved on July 5 2018 at <http://droughtmonitor.unl.edu/Data.aspx>



analyses particularly when considering the extent of saltwater intrusion.

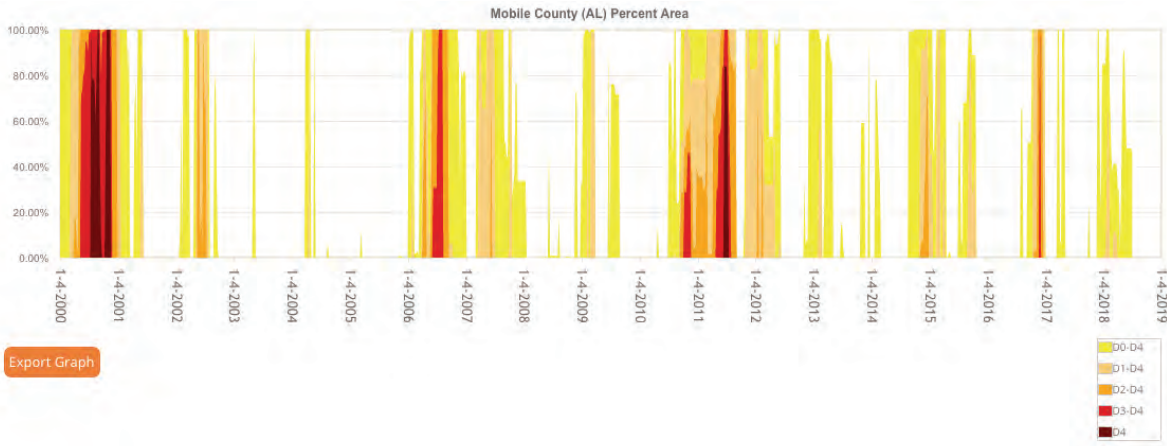


Figure 1. Time series drought data from 2000-2019 extracted from USDM for Mobile County, AL.

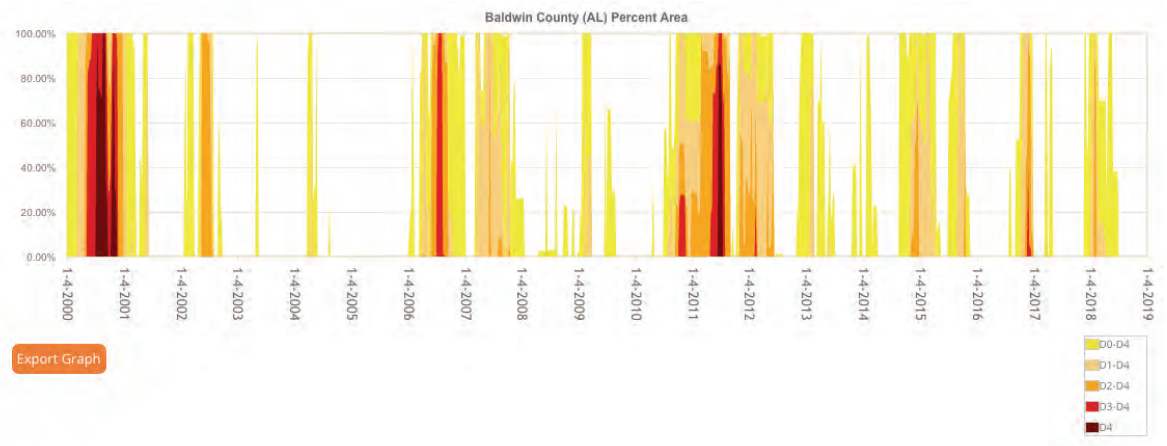


Figure 2. Time series drought data from 2000-2019 extracted from USDM for Baldwin County, AL.

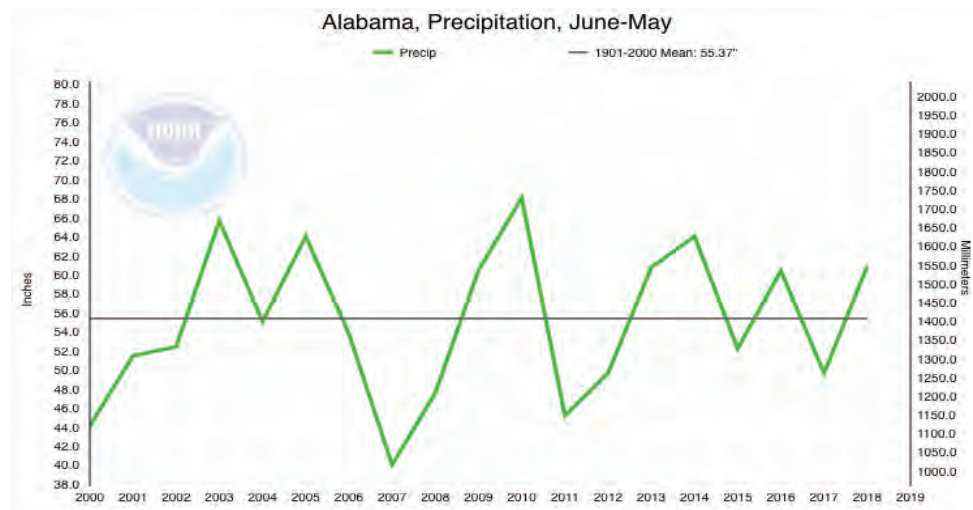


Figure 3. Time series data from NOAA on annual precipitation for Alabama from 2000-2019.



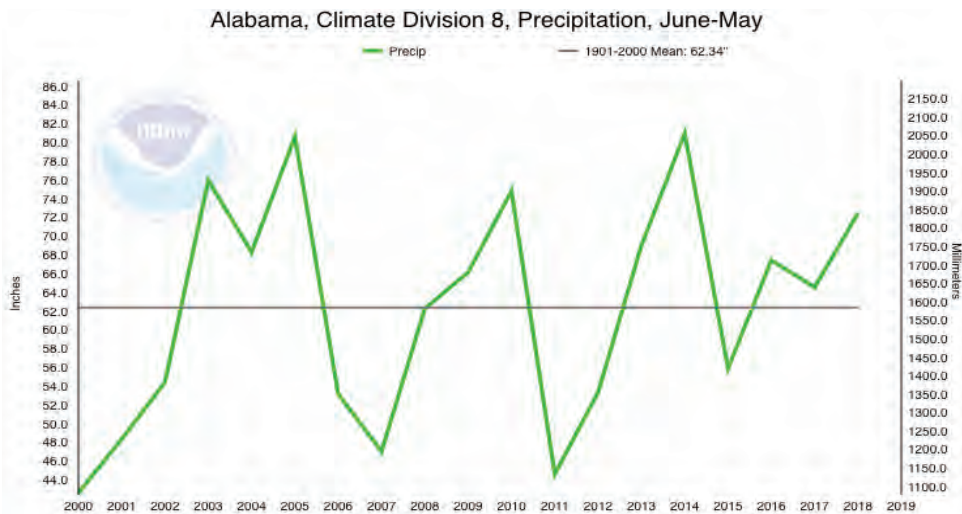


Figure 4. Time series data from NOAA on annual precipitation for District 8, Alabama from 2000-2019.

In fact, the year of 2010 was the highest years of precipitation for the state of Alabama (Figure 3) and one of the highest in the coastal counties (Figure 4) since 2000. Basing the entirety of the impacts from the project solely on 2010 will not show the true edge case scenarios including accurate representations of climatic, hydrologic, and other relevant conditions. Because of this it is likely not an accurate characterization of the full range of conditions that would result from the modifications to the ship channel, sea level rise, saltwater intrusion, and other impacts. The Corps must consider how models may change under severe or extreme droughts lasting two or more weeks.

### E. Better Define and Understand No Action and Alternative Projections

Mobile Baykeeper is concerned with the Corps current evaluations of projected outcomes if the project is not implemented. For instance, the Corps has estimated a significant increase of ship traffic will occur, one that is greater than if the deepening and widening project occurred. This assumption needs to be clearly validated and explained to ensure these projections are not overstating the Port's attraction without necessary improvements to remain competitive. Growth projections should also be built on a baseline of multiple years such as in the Savannah Harbor GRR.<sup>8</sup> We highly encourage the Corps to generate a more realistic No Action Alternative (NAA) that accurately predicts the environmental status without the proposed work. We request the Corps provide detailed information about the alternative analysis conducted and the rationale behind projected growth baselines for the different alternatives. Most importantly, the multiple depth

<sup>8</sup> United States, U.S. Army Corps of Engineers, Savannah District. (2012, January). *General Re-Evaluation Report Appendix A: Economics Savannah Harbor Expansion Project: Chatham County, Georgia and Jasper County, South Carolina*. Retrieved July 3, 2018, from [http://www.sas.usace.army.mil/Portals/61/docs/SHEP/reports/GRR/SHEP\\_FINAL\\_GRR\\_APPEN A Economics\\_Main Body.pdf](http://www.sas.usace.army.mil/Portals/61/docs/SHEP/reports/GRR/SHEP_FINAL_GRR_APPEN_A_Economics_Main_Body.pdf)

impact analysis conducted to evaluate the environmental impact for each depth and width option to make an informed decision on the final project proposal.

## **F. Cumulative Impacts**

As a part of the National Environmental Policy Act (NEPA) process applied by Council on Environmental Quality regulations, (40 CFR §§ 1500 -1508) federal agencies (including the Corps) are required to consider the cumulative impacts when making a decision. A cumulative impact is the “impact on the environment that results from the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions regardless of the agency (federal or non-federal) or person that undertakes such other actions; cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40CFR § 1508.7). Cumulative impact assessments are designed to understand and identify the uncertainties and regulations and indicate the need to include these uncertainties. They should be clearly stated if such information is lacking.

Mobile Baykeeper highly encourages the Corps to identify the major resources of concern and evaluate these concerns through a cumulative impact analysis. For each of the major resources identified, the cumulative impact analysis should include a discussion of geographic scope, a baseline condition or historical status, past, present, and future actions or stresses, present condition, capacity to withstand stress, incremental impacts, and alternatives to avoid, minimize, or mitigate cumulative effects. We also suggest conducting a sensitivity analysis to include scenarios with weather conditions like prolonged droughts and extreme weather, and the presence of sea level rise, overfishing, pollution, and other scenarios. These should be evaluated and considered in all models.

## **G. Indirect Impacts**

Under NEPA, the Corps must identify all indirect impacts resulting from the proposed ship channel enlargement<sup>9</sup> and perform compensatory mitigation for any unavoidable impacts. Indirect impacts are defined by NEPA as those impacts “caused by the action and are later in time and farther removed in distance, but are still reasonably foreseeable.” These impacts “...may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems.”

We request that the Corps fully model and understand the induced growth and encroachment or alteration effects<sup>10</sup> that will occur from the proposed ship channel enlargement and the indirect impacts that will occur from this induced growth. The high likelihood of induced growth is outlined by information provided by the Corps regarding this proposed project. In slides from the Corps’

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<sup>9</sup> 40 CFR 1508.8

<sup>10</sup> 3 NCHRP Report 466, “Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects” (2002), p. 55.

public meeting in September 2017 it is stated that there was a record 19% growth in containerized cargo in 2016. The Corps goes on to state that the Port of Mobile is one of the largest exporters of metallurgical coal and is the 2<sup>nd</sup> largest steel port in the nation and that growth is expected in both sectors. Further noting that the Port of Mobile serves manufacturing markets and agricultural markets both of which are steadily increasing. The Corps explains that there is a need to enlarge the ship channel because vessels would be able to bring in and ship out more cargo per ship (larger vessels) and do so more frequently (wider channel allowing for 24/7 and two-way traffic). Based on this evidence provided by the Corps, the enlargement of the Port of Mobile will induce substantial growth not only around the Port of Mobile but throughout the greater Mobile area as associated business, distributors, and suppliers grow to meet the needs of the expanded Port of Mobile. While this growth is a good thing for the economy of the Mobile area, the Corps must factor the indirect effects of this induced growth into its DSEIS.

For projects that have an explicit economic development purpose (such as the enlargement of the Mobile Ship Channel), it is generally assumed that the project will induce growth. This necessitates an in-depth indirect effect analysis. To perform such an analysis, the Corps must<sup>11</sup>:

- Make estimates based on best available data to show how much travel times will improve and what increases in imports/exports will be a result of the ship channel enlargement.
- Assess potential for induced growth resulting from the increased accessibility of the Port of Mobile.
  - This includes using land use models to generate quantitative projections of growth and changes in land cover/impervious surfaces along with qualitative assessments of projected growth.
- Finally, the Corps should assess the potential impact on sensitive resources (wetlands, air quality, water quality, stormwater runoff, etc.) caused by any induced growth.
  - This includes quantifying sensitive resources in the study area, identifying proximity of sensitive resources to locations where induced growth is most likely, and determining how to minimize and mitigate any reasonably foreseeable impacts.

An important note in identifying indirect impacts is that they do not have to be known but only need be “reasonably foreseeable”<sup>12</sup>. Specific growth induced and encroachment/alteration indirect impacts that Mobile Baykeeper believes are “reasonably foreseeable” and that the Corps should evaluate include but are not limited to:

- Wetland fill resulting from industrial growth

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<sup>11</sup> Center for Environmental Excellence by AASHTO (2016) *Assessing Indirect Effects and Cumulative Impacts Under NEPA (Aashto Practitioner's Handbook)*. Washington, DC: American Association of State Highway and Transportation Officials (AASHTO).

<sup>12</sup> CEQ, “Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations,” 46 Fed. Reg. 18026 (March 23, 1981), Response to Question 18.

- Increased impervious area from industrial (light and heavy) growth causing water quality degradation (increased water temperatures, decreased dissolved oxygen, etc.)
- Impacts to wetlands, SAVs, fisheries, oyster reef, etc. due to degraded water quality
- Decreased air quality resulting from increased traffic to Port of Mobile facilities and other nearby waterfront industry (Port of Chickasaw, Theodore Industrial Canal, etc)
- Damages to wetlands, SAVs, and shoreline caused by increased ship wake
- Damages to communities, wetlands, SAVs, and shoreline caused by increased storm surge etc.

Generally, we stress the need for the Corps to follow the mandates of NEPA and the CEQ by comprehensively assessing and mitigating for indirect impacts caused by the expanded ship channel.

## H. Monitoring & Plans

We strongly recommend taking extra precaution and preparation to ensure ample best management practices (BMPs) are implemented and that a comprehensive plan *is required*. Measures should be taken to ensure BMPs prevent sedimentation from dredging activities to protect the local water quality and avoid key species. We encourage the Corps to work with state agencies to determine the most protective BMPs for the area. The plan should also include a thorough monitoring plan and should be required to be submitted and open for public review. The monitoring plan should extend at least 10 years after construction to ensure all impacts are considered. It should also include areas around dredging operations and beneficial use disposal areas.

Mobile Baykeeper recommends the Corps consider implementing the project in phases that are strategically planned to minimize impacts and ensure proper monitoring of parameters like dissolved oxygen and turbidity can be conducted and adaptive management be possible.

## I. Mitigation

We encourage the Corps to consider our suggestions and others' comments to ensure the project's draft supplemental environmental impact statement accurately estimates the unavoidable impacts to our important natural resources. We are concerned with a project this large being proposed in a sensitive environment like an estuary and resulting in "no effects," which may indicate these studies underestimate the true impact. Once all feasible studies have been performed and avoidance and minimization has been considered, any remaining unavoidable adverse impacts to the environment must be addressed through appropriate and practical compensatory mitigation. We suggest including the community and environmental groups in the process of mitigation to select an existing needed project and/or create a synergistic project that includes buy-in from the community. Any mitigation identified should also directly correlate with the natural resource determined to be adversely impacted from the project's implementation. Several other port expansions have identified unavoidable impacts to wetlands, dissolved oxygen, and fish stocks. We encourage the Corps to carefully and comprehensively look at how this major project will impact our precious natural

resources and mitigate accordingly. These different mitigations should be studied as different alternatives to the project.

## **II. SPECIFIC CONSIDERATIONS FOR THE DSEIS**

The following comments have been gathered by members of Mobile Baykeeper, experts, stakeholders, and our research on similar port expansion projects. We want to emphasize the importance of each of the following specific items being addressed in the DSEIS.

### **A. Impacts to Wetlands**

Wetlands are known to provide several important ecological functions such as water purification, shoreline stabilization, flood protection, groundwater recharge, nutrient recycling, particle retention, surface water and subsurface storage, and habitat for fish and wildlife. They add intrinsic value to the community. Wetlands are known to be impacted by many anthropogenic activities including harbor expansion projects. The final EIS for Charleston's Harbor expansion indicated unavoidable impacts to 324 acres of wetlands from increases in salinity, requiring mitigation plans to preserve 665.6 acres of wetlands.<sup>13</sup> Similarly, the Savannah Harbor Expansion Project (SHEP) determined there would be "minor adverse effects to the fish and wildlife habitat function in 223 acres of tidal freshwater wetlands" and a conversion of 740 acres of saltmarsh to brackish marsh as a result of the project.<sup>14</sup> Both of these impact statements found adverse effects to local wetlands mainly from saltwater intrusion. Likewise, it is imperative that potential impacts are carefully evaluated and alternatives are studied (such as not dredging as deep as 50ft) and different mitigation alternatives are studied (such as wetland restoration in risk areas).

The Corps state there would be minimal or *no effects* on wetlands in the latest public workshop on February 22, 2018. The evaluations, however, may not be robust enough to predict the impacts from the proposed project. It is imperative that the Corps use multiple scenarios with varying salinity levels, sea level rise amounts (high, medium, low), and models are run in conjunction with other predicted changes such as dissolved oxygen, ship wake, and storm surge. To our knowledge, the Corps will use one month's data from 2010 to analyze the impact of saltwater intrusion on wetlands. We are concerned with this decision and would like to receive more information justifying why this dataset was the most representative of the area's different weather patterns, etc. For instance, when running models to predict how far and the extent of saltwater intrusion with a deeper channel hydrology, the high salinities are likely to be discovered during drought periods when freshwater flow is low and saline waters can be pushed farther up the delta.

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<sup>13</sup> Final Report and Environmental Impact Statement for Charleston's Harbor Expansion  
[http://www.sac.usace.army.mil/Portals/43/docs/civilworks/post45/finalreport/1\\_Main%20Report%20and%20EIS.pdf?ver=2015-07-10-131111-623](http://www.sac.usace.army.mil/Portals/43/docs/civilworks/post45/finalreport/1_Main%20Report%20and%20EIS.pdf?ver=2015-07-10-131111-623)

<sup>14</sup> Final Report and Environmental Impact Statement for Savannah Harbor Port Expansion  
<http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%201%20with%20TOC%20SHEP%20FINAL%20EIS.pdf>

To account for this, Mobile Baykeeper suggests the Corps look at additional year's data values that include drought periods, i.e. 2011, 2016. By looking at low freshwater flows from a lack of rainfall in the area, the models will likely better predict the maximum extent of saltwater intrusion. There have been numerous severe droughts over the last 10 years in the Mobile Bay area and the failure to look at how these relatively common droughts (some lasting for several months) will interact with a deeper channel could result in an underestimation of the project's impact on wetlands. In addition, we suggest the Corps model longer durations than one month (i.e. how will the survival or productivity rate change for wetlands enduring high salinity values for 60, 90, 120 days). As an example of a more responsible modeling of impacts to wetlands and marshes, The Savannah Harbor EIS utilizes eight months of average river flows from one year for a basic evaluation. Additional modeling was performed to evaluate different conditions. These included modeling effects of the proposed ship channel enlargement under low river flows (2001 conditions) and sea level rise of 25 cm and 50 cm.<sup>15</sup>

The Corps also indicated they would look at how inundation from a 0.5 m sea level rise scenario would impact the saltwater intrusion on wetlands. The concern again is if a representative drought scenario is not run, the model may not show how far upstream saline intrusion would reach, potentially underestimating the extent of mortality or productivity loss of wetlands in the upper delta. We highly encourage the Corps to be as thorough as possible with these evaluations to accurately characterize the cumulative impacts associated with this project.

## **B. Impacts to Submerged Aquatic Vegetation**

Submerged aquatic vegetation (SAV) is an important source of food for several species including manatees and over-wintering waterfowl. It provides habitat for macroinvertebrates and fishes, and helps prevent erosion through sediment stabilization. Over the past few decades, there have been dramatic declines in the SAV population in Mobile Bay<sup>16</sup>.

Changes to salinity from a deeper channel can modify the vegetative community (or SAVs) which can in turn, alter its use as protection for species and eliminate important food sources. Similar to our concerns detailed above for wetlands, this is also a concern for evaluating SAV population impacts. We encourage the Corps to use multiple duration scenarios when evaluating the impact of

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<sup>15</sup> U.S. Army Corps of Engineers, Savannah District. (2012). Final environmental impact statement: Savannah Harbor Expansion Project (SHEP). 5-9 – 5-10; Chatham County, Ga and Jasper County, SC. <http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%205%20SHEP%20FINAL%20EIS.pdf> Retrieved July 3, 2018

<sup>16</sup> Barry A. Vittor & Associates. (2005). Historical SAV Distribution in the Mobile Bay National Estuary Program Area and Ranking Analysis of Potential SAV Restoration Sites. [http://www.mobilebaynep.com/images/uploads/library/NEP\\_historicSAV.pdf](http://www.mobilebaynep.com/images/uploads/library/NEP_historicSAV.pdf)



saltwater intrusion on SAVs within the selected 2010 data and include additional scenarios for extreme droughts seen in other years.

Deepening the channel will decrease the ability for oxygen to reach waterbottoms. Additionally, dredging activities and wake energy produce low dissolved oxygen and high turbidity levels. These low oxygen conditions can negatively impact SAVs and if these SAVs die off, they can create even lower oxygen levels. In addition to salinity models, dissolved oxygen scenarios must also be considered in conjunction when evaluating the potential for impacts on SAV survival and productivity.

Increases in suspended sediments associated with dredging activities can cause changes in water quality along with a number of negative impacts to flora and fauna. High turbidity resulting from dredging can release nutrients, organic matter, and contaminants depending on the characteristics of the material dredged. These releases can reduce the ability for light to penetrate through the water column, restricting submerged aquatic vegetation ability to photosynthesize. A 2006 case study of dredging effects on seagrass found that, in ~60% of cases detrimental impacts to the seagrass beds were documented. These projects resulted in a cumulative loss of 81 mi<sup>2</sup> - more than 1,100 acres per project.<sup>17</sup> The releases can also create low oxygen conditions from organic-rich sediments that threaten fish and plant die off.<sup>18</sup> Sedimentation can be introduced from dredging activities and from wave energy that can turn up the bottom sediments. Both of these should be evaluated holistically to understand the full impact of suspended sediments resulting from the proposed enlargement of the ship channel on the health and productivity of SAVs.

We encourage the Corps to look at how changes in dissolved oxygen and salinity, turbid conditions resulting from dredging, and hydrodynamic changes resulting from channel enlargement will impact the local SAV population. When evaluating these factors, it is important to consider the cumulative impact of how SAVs will react when enduring all conditions. To our knowledge, the Corps has no intention of running different models that demonstrate the sediment impacts from the project in conjunction with salinity, dissolved oxygen, and hydrodynamic impacts. We encourage the Corps to think about these impacts comprehensively to ensure impacts from the project are not underestimated.

While looking at salinity scenarios only, initial results presented by the Corps during the February 22, 2018 public workshop indicated elevated stress of Eurasian watermilfoil (an invasive species), water celery, and coon's tail. To our knowledge, local manatees have been observed consuming all three of

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<sup>17</sup> Erftemeijer, P. L., & Lewis III, R. R. R. (2006). Environmental impacts of dredging on seagrasses: a review. *Marine pollution bulletin*, 52(12), 1553-1572.

<sup>18</sup> Chislock, M. F., Doster, E., Zitomer, R. A. & Wilson, A. E. (2013). Eutrophication: Causes, Consequences, and Controls in Aquatic Ecosystems. *Nature Education Knowledge* 4(4):10

these species and a depletion of these may have a negative impact on the endangered species. We encourage the Corps and the Fish and Wildlife Service (FWS) to consider this in its evaluation of impacts to the West Indian Manatee from the proposed project.

### C. Impacts to Oysters

Shellfish Harvesting Areas as seen below (Figure 1), are in proximity to the proposed activities (also seen in this [GIS map https://aldcnr.maps.arcgis.com/apps/webappviewer/index.html?id=a32dad8dadcd249ea86bcb80dd951a424](https://aldcnr.maps.arcgis.com/apps/webappviewer/index.html?id=a32dad8dadcd249ea86bcb80dd951a424)). The areas shaded in yellow, green, purple, and red are where shellfish have been harvested. Careful consideration of the proposed projects activities proximity to and impact on these locations must be taken to ensure our natural resources, such as shellfish, are not degraded from the proposed channel expansion.

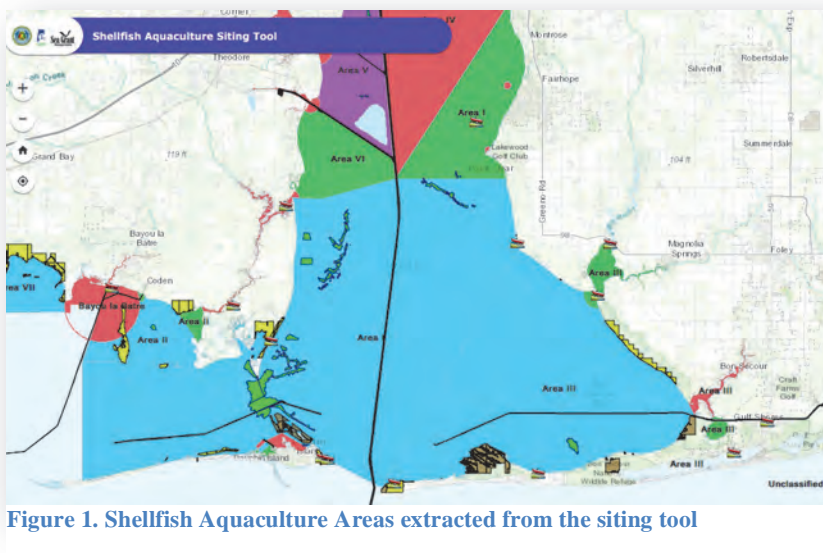


Figure 1. Shellfish Aquaculture Areas extracted from the siting tool

The Eastern oyster (*Crassostrea virginica*), which is important both commercially and ecologically for the area, is a specific concern for the proposed project. There are currently several commercial oyster farms in operation that generate half a million dollars in wholesale value and support local jobs.<sup>19</sup> Furthermore, in 2016, Alabama’s oyster farms generated at least \$1,956,776 in economic activity<sup>20</sup> and employed more than 30 individuals.<sup>21</sup>

Increases in salinity can have significant impacts on oyster productivity and could result in substantial profit loss to local oyster farming operations. The optimal range for oysters is between 14-28 parts per thousand (ppt). Anything greater can introduce stressors such as increased predation,

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<sup>19</sup> <http://alaquaculture.com/state/>

<sup>20</sup>Farm Gate Value - (net value of product once marketing costs are subtracted)

<sup>21</sup> [Grice R and Walton B, “Alabama Shellfish Aquaculture Situation And Outlook Report: Production Year 2016” \(Mississippi-Alabama Sea Grant Consortium\)](#)

which decreases overall spat recruitment<sup>22</sup>. Therefore, we are concerned with the potential for salinity changes from deepening and widening the ship channel, impacting the survival and growth of local oysters. Similar to our recommendations in the wetland and SAV evaluations, we suggest the Corps evaluate the impact of saltwater intrusion on oysters in longer durations and use scenarios for more extreme droughts such as those that occurred in 2007, 2011, and 2016 as well as sea level rise scenarios. Utilizing one year as a baseline for climatic and hydrologic conditions could result in severely erroneous assumptions. Alternatives, such as stopping maintenance dredging when the salinity level reaches a certain point should be analyzed and how different dredging depth alternatives impact SAVs.

At the latest presentation of the DSEIS on February 22, 2018, the Corps indicated 13 adult reefs were used for the assessment to determine how salinity and dissolved oxygen would impact local oysters. Several other locations of oyster reef have been identified by researchers and local fishermen in the area. Therefore it is imperative that the Corps coordinate with these individuals to ensure the models run are considering all locations throughout the project area. We also suggest that potential locations for future oyster farming and harvest locations be evaluated. Given the ecological value of estuarine oysters, oyster gardening has become more prevalent with collaborative efforts between Mobile Bay National Estuary Program, Auburn University Marine Extension and Research Center, and Mississippi-Alabama Sea Grant Consortium. These not for profit farms are currently implemented and will continue to be utilized to improve the water quality of our waterways and therefore must be considered when evaluating the proposed projects impacts.

Oyster aquaculture continues to expand and its success is a major focus for Coastal Alabama. Sedimentation and wave energy generated from the proposed project can have negative impacts on the productivity and survival of such oysters. Dredging activities and ship wake energy can create high turbidity conditions, which can cover or clog oysters. High turbidity can also create low oxygen conditions that could negatively impact oyster survival. Salinity models and dissolved oxygen scenarios should be considered in conjunction to understand survival and productivity. We encourage the Corps to evaluate how sediments, dissolved oxygen, salinity, and wave energy generated by ship wake will impact the local oyster population.

In addition to changes in adult oyster populations on known farms, the Corps must consider impacts to all life stages of oysters. One major concern with the proposed project is the potential disruption of the larvae movement and distribution across the Bay. We suggest the Corps include the existing larvae distribution model from Dr. Carmichael and the associated Principal Investigators work from the Dauphin Island Sea Lab and use multiple scenarios when running these evaluations to ensure larvae are not flushed out of the system from the deepening and widening of the channel.

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<sup>22</sup> Lorio, J.W. and Petrone, C., 1994. The cultivation of American oysters. *Crassostrea virginica*.

There are several community members who are currently or may in the future, raise oysters off of their docks, piers, etc. but may be unable to if the larvae distribution is interrupted or ship wave activity prohibits settling. We strongly encourage the Corps also consider how ship wake waves will disrupt or prohibit oyster spat settling and growth along shorelines of Mobile Bay.

#### D. Impacts to Benthic Communities

Benthic communities are known to play a critical role in the health and functioning of estuarine systems. For instance, organic matter not used in the water column settles on the bottom floor where it can be remineralized by benthic organisms to become nutrients that can then be used in the water column. This remineralization contributes the nutrients necessary to increase primary productivity and is an important link in the food web of an estuary.

Examples of the important benthic species that support our recreational or commercial fishing industries include benthic invertebrate species like Blue crabs (*Callinectes sapidus*), shrimp species, and several species of flounders that occupy areas surrounding the ship channel and other areas of Mobile Bay and coastal communities. There are specific areas determined as important for local shrimp species (Brown Shrimp, White Shrimp, Pink Shrimp, etc) in Mobile Bay and Mobile River. Shrimp nursery areas, shown in blue in Figure 3, are restricted from shrimp fisheries to allow for the population to replenish and continue to grow. These locations are also in close proximity to the proposed project activities which pose a potential threat to the juvenile shrimp species. We suggest the Corps consider the impacts from the project on these important nursery grounds for shrimp, an important source of commercial and recreational income for the area.

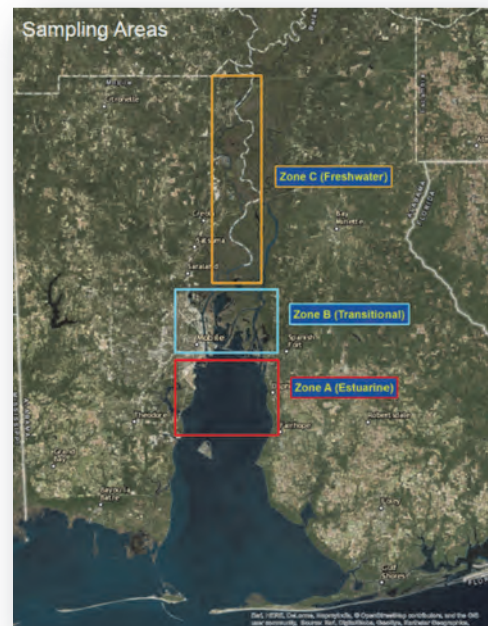


Figure 2. Map of selected sample areas extracted from Corps public workshop

Dredging activities can negatively impact benthic communities either directly or indirectly. The extent of these impacts can vary greatly and depend on many factors including the type of community present, the duration of, and type of dredging. Excavation and smothering by sediment can cause lethal impacts to these communities.<sup>23,24</sup> The specific benthic communities along the

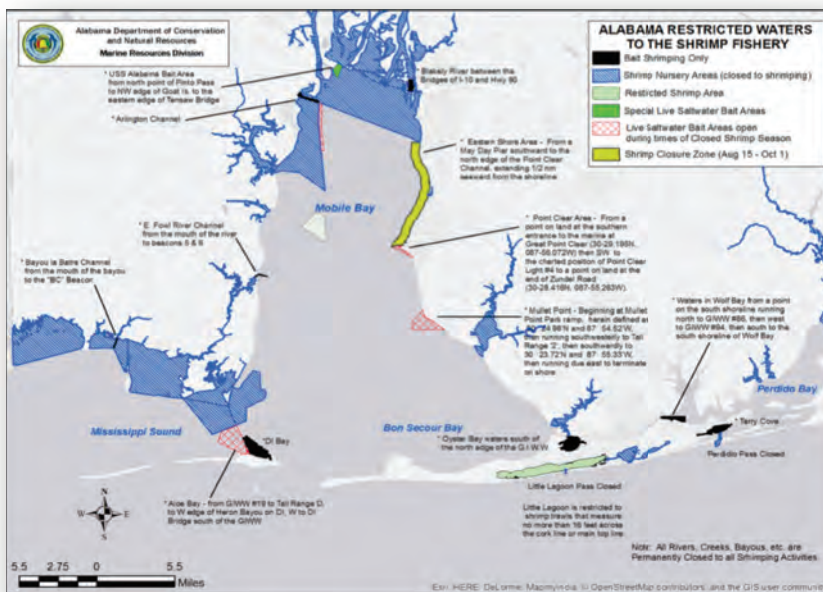
<sup>23</sup> Morton, R. A. (1977). Historical shoreline changes and their causes: Transactions Gulf Coast Association of Geological Societies, v. 27, p. 352-364.

<sup>24</sup> Guillory, V. (1982). Environmental effects of estuarine dredging and spoil disposal, a literature review. Contributions of the Marine Research Laboratory, Technical Bulletin 35, Louisiana Department of



proposed expansion should be characterized to understand what species will be disturbed from dredging and if damage is irreversible or if the area contains recolonizing types that have a more rapid recovery period<sup>25</sup>. For instance, benthic assemblages that are physically buried from sediment deposited may be able to recolonize depending on the species and frequency of dredging and sediment deposited from the project. It is also important to consider the ongoing stress or flux that the benthic species will endure from sedimentation and shoaling processes that will continue as maintenance dredging occurs in the navigation channel.

Additionally, we are concerned with a potential data gap in the Corps sampling for benthics. It is our understanding from the Corps presentations that the benthic collection is only being conducted for the lower channel where the proposed widening activities will take place. This does not adequately cover the benthic assemblages in 1) the upper channel where turn modifications are proposed and 2) the entire channel where deepening activities will occur. We suggest taking additional samples or coordinating with local benthic ecologists like Dr. Kelly Dorgan at the Dauphin Island Sea Lab to ensure full impacts to benthic communities are considered on the complete spatial scale.



**Figure 3. Map of Alabama's restricted areas for shrimp harvesting extracted from Alabama Department of Conservation and Natural Resources - Marine Resources Division**

Wildlife and Fisheries, 37-61.

<sup>25</sup> ICES International Council for the Exploration of the Sea. (1992). Report of the ICES working group on the effects of extraction of marine sediments on fisheries. Copenhagen (Denmark): ICES Cooperative Research Report # 182. <https://www.nfsc.noaa.gov/publications/tm/tm209/pdfs/ch6.pdf>

The Corps should also identify the project effects on dissolved oxygen levels and exacerbated occurrences of hypoxic conditions which will impact or prevent benthic habitat access. Furthermore, we suggest considering the alternative of phasing dredging activities to allow for the rebound of benthic communities.

## E. Impacts to Fish

### i. *Dredging Activities*

The proposed dredging has the potential to adversely affect fish in a variety of ways. The sediment removal, dredge plume turbidity, pumping of water, suction functions, noise, and lights can have negative impacts on various life stages of fish species. Dredging activities can cause direct mortality or injury to individual fish (depending on the species, time of year, and location) of all life stages (adults, subadults, juveniles, larvae, and/or eggs). The physical presence of dredging equipment in the channel and the changes in physical and chemical compositions of the water is also a major concern for fish and shellfish movement. These physical factors can 1) interrupt fish movement, (particularly with anadromous fishes that move from nursery grounds to spawning areas within estuaries), 2) block migration routes, and 3) create high turbidity conditions that can impact early life stages (eggs, larvae) transport from sediment material in the water column. High turbidity can also physically impact species through clogging fish gills and damaging filter feeding organisms. Given the multiple venues for how dredging activities can either directly or indirectly impact fish species, we encourage the Corps to consider habitat suitability for all life stages including adult, juvenile, and larvae as well as spawning and nursery locations. It is also critical that the Corps identify migratory paths and temporal movement patterns for local species to have the least impact possible during dredging activities. We suggest working with the Fish and Wildlife Service and National Marine Fisheries Service to identify proper measures of avoidance.

### ii. *Saltwater Intrusion into Estuarine and Freshwater Areas*

Mobile Bay is a sensitive estuary containing marshes, wetlands, and many important estuarine and freshwater species. The potential areas that will be impacted by saltwater intrusion should be identified along with the habitats that exist in those areas to evaluate the extent of degradation. Potential loss of wetlands, marshes, and SAVs from increased salinity should be accounted for and how those changes will then alter fish assemblages from critical habitat loss.

Another species of concern is the Red Drum (*Sciaenops ocellatus*) because the NMFS Gulf of Mexico Fisheries Management Council has identified the entirety of Mobile Bay (and the Mississippi Sound) to be habitat which is “essential to a species’ long-term survival and health” and therefore designated as Essential Fish Habitat. Red Drum are also considered a prized game fish throughout the Gulf of Mexico, and saw major declines after the mid-1980s from commercial harvest. A fishery management plan was developed for Red Drum along with several regulations, including a moratorium on commercial harvest to protect and replenish its population. Negative impacts to the essential habitat areas for Red Drum could counteract improvements made in population levels to date from federal regulations. Several scientists and graduate students from the University of South



Alabama are studying fish movements of Red Drum that may be useful for understanding how they will be impacted from the proposed project (Dr. Sean Powers, Reid Nelson). We encourage the Corps to work closely with relevant scientists and agencies to better understand the potential impacts from the proposed project.

iii. *Changes to Dissolved Oxygen*

Dissolved oxygen is a major concern with the proposed expansion project. Deepening the channel will decrease the ability for oxygen to reach the bottom of the water column and generate lower dissolved oxygen values on average in the waterbottoms. It will also enable saltwater to travel into upper portions of the channel, which can reduce the amount of oxygen entering the system from the air. With these physical changes, there is a possibility that dissolved oxygen may become lowered to levels that have deleterious or damaging effects on fish. It is well known that low dissolved oxygen or hypoxic/anoxic conditions can lead to fish kills. Savannah Harbor Expansion Project identified dissolved oxygen impacts from its project and is installing a dissolved oxygen injection system that will restore oxygen to acceptable levels for fish and plantlife. In addition to salinity models, dissolved oxygen scenarios must also be considered when evaluating the potential for impacts on fish species. Alternative analysis should be conducted to see how a dissolved oxygen injection system may reduce or account for impacts from project implementation.

iv. *Impacts to Fish and Wildlife from More Noise and Light Pollution*

We recommend the Corps evaluate the direct impacts to fish and wildlife from increased noise and light with increased shipping traffic and indirect impacts from port operations as a result of the harbor expansion. Noise has been documented to influence aquatic species behavior and can disrupt behaviors such as feeding, migration, and spawning. Consideration should be given to programs that will reduce the impact of light and noise on organisms.

## **F. Shorebirds and Waterfowl**

The Mobile Bay area is known to have many shorebirds and migratory waterfowl. Harbor, inshore shorelines, and coastal beaches are important for nesting, foraging, and general habitat for birds. We encourage the Corps to consider how bird populations will be impacted from erosion of these areas. Birds may be impacted from dredging and ship activities if noise and light disrupt their flight. Waterfowl may also be negatively impacted if the SAV populations decrease, as they are an essential food source for these bird species. We encourage the Corps to evaluate how projected impacts to coastal erosion, beach loss, and SAV loss will impact birds that need these resources.

## **G. Threatened and Endangered Species**

The state of Alabama is ranked second in the number of extinctions and fourth for species at risk of extinction in the nation. The following species in the Mobile Bay area considered threatened or endangered include: Alabama sturgeon, Gulf sturgeon, West Indian Manatee, Alabama Beach mouse, Perdido Beach mouse, Alabama Red-bellied turtle, Gopher Tortoise, Kemp's Ridley sea turtle, Green Sea turtle, Loggerhead Sea turtle, Piping Plover, Red-Cockaded woodpecker, and

Wood Stork. We suggest the Corps conduct a biological assessment (BATES or similar) to evaluate the impacts of the project on each of these threatened or endangered species.

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, per its amendment (16 U.S.C. § 1531 et seq.), requires each federal agency to “insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species.” We encourage coordination with FWS and the National Marine Fisheries Service (NMFS) to develop Biological Opinions for sea turtles, manatees, Gulf Sturgeon among others to make recommendations on hopper dredging activities.

i. *Habitats*

Currently, the Fish and Wildlife Service has designated the Isle Aux Herbs (a.k.a. Coffee Island), Dauphin Island, Pelican Island, and portions of Bon Secour National Wildlife Refuge (including Little Dauphin Island) as critical habitat areas for Piping Plover. Please consider habitat impacts to these areas from the proposed project, in particular beach erosion on Dauphin Island. Similarly, sea turtles like Loggerheads, Kemp Ridley’s, etc. are known to utilize beach environments as nesting grounds. Therefore this erosion to important nesting locations must be considered along with plans to conduct reasonable and prudent measures for protecting sea turtles during dredging activities to comply with the provisions of Section 9.

ii. *Dredging Activities*

Dredging can also result in direct mortality or injury of aquatic species, including all life stages of fish species (adults, subadults, juveniles, larvae, and/or eggs) through the removal or smothering of benthic organisms. In some cases, these direct takes of species can impact threatened or endangered species populations. Savannah Harbor’s expansion project underestimated the amount of direct take and had to amend its Incidental Take Statement from the National Marine Fisheries Service (NMFS) to increase the amount of Green Sea Turtles and Shortnose Sturgeon that were impacted from dredging. Dredging activities and location of disposal can also result in an indirect mortality or injury of aquatic species, from a loss of dissolved oxygen in the water column.

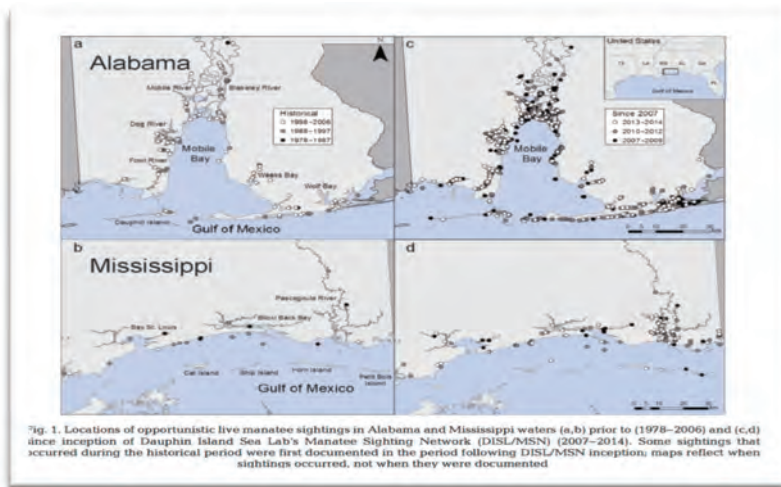
In Savannah Harbor’s final EIS, Shortnose sturgeon (*Acipenser brevirostrum*) were determined to be negatively impacted from the deepening of the harbor due to saltwater intrusion and marsh degradation, a critical habitat for the species. Cite. A fish species of concern for Mobile Harbor’s expansion is the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), which is considered a **threatened species** by U.S. Fish and Wildlife Service due to habitat destruction and degradation. Gulf Sturgeon are considered anadromous, meaning they live in saltwater and spawn in freshwater. The Corps needs to work with the state and federal agencies to understand what areas are considered Essential Fish Habitat (EFH), “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”, and what are considered Habitat Areas of Particular Concern (HAPC), a component of EFH, includes those waters and substrates “which are rare, particularly susceptible to

human-induced degradation, especially ecologically important, or located in an environmentally stressed area”. Additionally, we encourage the Corps to carefully evaluate the impacts to benthic organisms known to support juvenile Gulf Sturgeon.

Light has also been documented to impact wildlife and has been associated with impacting migration and spawning behaviors. Threatened and endangered turtles found in the project area are affected by light. Dredge equipment and associated tugs and barges should be verified to ensure they meet Corps, U.S. Coast Guard, and OSHA light standards for safety. Measures should be agreed upon and implemented to reduce potential disorientation of female sea turtles approaching nesting beaches and/or hatchlings heading seaward from beaches due to lighting produced by dredging activities. The Corps could mitigate the negative impacts of ships’ light by 1) restricting the time of year designated for dredging activities to ensure that they do not coincide with spawning periods of impacted species, and 2) complete field observations onboard all dredging activities to document mortality of threatened and endangered species or mammals. Without additional measures, these listed species will be harmed. We encourage the Corps to consider all impact from light and noise on aquatic species and work with state and federal agencies to develop a Biological Opinion to analyze reasonable and prudent measures that minimize the negative impacts to key species.

iii. *Impacts to Mammals*

Mobile Bay is home to several mammals including the West Indian Manatee (*Trichechus manatus*), a species considered one of the most **endangered** marine mammals within the coastal waters of the United States. Sightings of the West Indian Manatee have been well documented by the “Manatee Sighting Network” through Dr. Carmichael’s lab at the Dauphin Island Sea Lab (Figure 4).<sup>26</sup>



**Figure 4. Excerpt from the Dauphin Island Sea Lab’s Manatee Sighting Network study on Manatee sightings throughout Alabama and Mississippi**

<sup>26</sup> Hieb, E.E., R.H. Carmichael, A. Aven, C. Nelson-Seely, N. Taylor. Sighting demographics of the West Indian Manatee (*Trichechus manatus*) in the north central Gulf of Mexico. *Endangered Species Research* 32:321-332

Manatees are known herbivores that consume many types of aquatic plants. Changes to SAVs and local seagrass beds could have a significant impact on the available food source for manatees. The Corps should carefully evaluate how changes to specific SAV populations (particularly Eurasian watermilfoil, water celery, and coon's tail that were identified as at risk from the Corps' preliminary results) will impact local manatees.

Ship-strikes are also a major threat to mammals in the area including manatees and dolphins. Ships are known to injure mammals within harbors and ports. The potential for increased ship-strike occurrences needs to be evaluated from deep draft vessels and dredging equipment that will be frequently travelling in the harbor.

Given the potential for harm to the endangered West Indian Manatee, we encourage the Corps to work with federal and state entities and create a Biological Opinion on dredging and vessel operations. We also strongly encourage the Corps to coordinate with Dr. Carmichael, a professor at the University of South Alabama, to acquire information on the species that has been collected for more than a decade.

## **H. Impacts to Shorelines**

Shorelines are vitally important to the health of the community, ecosystem, and economy. Our shorelines are critical for a number of species like turtles, birds, crabs, and so much more. They are also utilized by many community members who reside on shorelines or use them for recreation. They support our tourism industry and the many businesses and industry that surround our waterways. Shorelines are also important because they are known to be a natural protector against storms and act as filters to our water. The proposed deepening and widening of the Mobile Harbor has the potential to make significant changes to these shorelines and erode our coastal beaches. Therefore it is of the utmost importance that all factors are thoroughly studied and considered in the DSEIS including: sediment transport analysis, ship wake analysis, bank erosion analysis, and coastal erosion analysis.

### *i. Shoreline Erosion from Ship Wake and Dredging Activities*

With larger, heavier, and potentially more frequent ships, the ships' size and the frequency of the ship wake would increase. This increase in wave height and wave energy has the potential to cause erosion to our shorelines and impact the settling and survival of oysters. The Corps has initially indicated that with a deeper and wider channel, the economic study shows fewer ships that are more heavily loaded than if the channel was not modified. It is our understanding that the Corps is looking at the wave energy totals for its comparison. We suggest that in addition to these studies, the Corps look at maximum or peak waves which could potentially be generated from the larger and more heavily loaded ships. We suggest these scenarios are tested to see both how these higher wave heights erode shorelines and how they may disturb the bottom sediment. We strongly suggest the Corps evaluate how a Vessel Speed Reduction (VSR) program would impact the project's impact on

shorelines and air quality. There are several other locations that have successfully implemented VSR programs to reduce the negative impacts from ship wake and air emissions on their surrounding communities including the Port of Los Angeles, Port of Long Beach, Port of San Diego, Port Authority of New York and New Jersey. Several community members along the western shore of Mobile Bay have expressed great concern about the impacts of the project on their shorelines. We encourage the Corps to thoroughly consider this alternative and evaluate how different vessel speeds change the impact analysis.

Dredging activities may also contribute heavily to wake activity and contribute to erosion. The Corps should consider the impact from increased ship wake resulting from both the dredging activities and increased ship traffic and ship load on both sides of Mobile Bay, Dauphin Island, and other downdrift MS-AL barrier islands. Additionally, the Corps should consider current and planned living shoreline project locations in this evaluation and create robust plans to minimize impact to projects during the early stages of implementation when they are the most sensitive to wave energy.

ii. *Sediment Transport Analysis- Loss of Littoral Sediments and Changes to Sediment Budgets*

It is well established that the removal of sediments disrupts the littoral system that transports sand and nourishes barrier islands. With the expansion and alteration of the channel configuration, the potential for increased sedimentation and change to the local sediment budget needs to be carefully evaluated. Furthermore, the potential for increased loss of littoral drift sediments from the deepened channel needs to be identified and how this decrease will consequently impact the existing erosion issues alongside Mobile Bay and Dauphin Island shorelines (as required by River and Harbor Act of 1935 Federal Law: Shoreline Changes). The historical sand deficit caused by dredging and removal of sediment needs to be evaluated and added to the cost of further erosion from additional deepening and widening activities (and overall reduction of sediment supply to the littoral zone). The projected frequency and potential for increased need of maintenance dredged post-construction should be evaluated to determine the sediment budget long-term. The Corps needs to ensure adequate consideration of each potential long-term consequence that a deeper and wider ship channel will have on shorelines of Mobile Bay, Dauphin Island, and other downdrift MS-AL barrier islands affected by this reduction in littoral sediment deposit. Additionally, we urge all parties to develop a comprehensive plan to account for unavoidable impacts to these shorelines.

The Corps has disposed dredged sands in the Sand Island Beneficial Use Area (SIBUA) south of the lighthouse for years with the explanation being that these sands are moved by currents to Dauphin Island to counter erosion. Observations indicate most of the sands are not moved, but accumulate at that location, while Sand Island has almost disappeared and Dauphin Island continues to erode. This leads to the conclusion that the SIBUA is failing to meet its intended purpose. At the last public workshop, the Corps reported initial findings indicating increases in average annual shoaling of 5-20% estimated within the navigation channel. It is our understanding that the Corps intends to propose expanding the existing SIBUA with the intent to improve the rate of shoaling. We applaud the Corps commitment to address this issue and encourage further study to ensure the new disposal



area produces a higher rate of shoaling. With a project this large, we need to ensure the Corps designates proper areas for disposal to counter the erosion from the loss and littoral drift processes.

We feel it is also vital that the Corps fully incorporate the Alabama Barrier Island Restoration Assessment (ABIRA) as a part of the General Reevaluation Report and DSEIS. The results from ABIRA could play an important role in informing decisions about how to use dredged spoils and areas of potential erosion issues. It is our understanding that the Corps intends on using parts of the analyses from the ABIRA in the DSEIS. We encourage the Corps to ensure the study is used to the maximum extent possible when determining potential impacts and disposal options.

iii. *Coastal Resiliency - Changes to Storm Surge and Resiliency*

With a new channel that is deeper and wider, there is a potential for the storm surges to have a greater impact on the surrounding infrastructure and coastline. The Corps should consider severe weather conditions such as drought, storms, and hurricanes when modeling future projections and evaluating long-term impacts. Furthermore, we suggest the Corps consider the effects of sea level rise by incorporating multiple scenarios varying in intensity from low to high influx rates. From the latest public workshop in February 2018, the Corps identified a 0.5 m sea level rise scenario for all models related to environmental impacts. The EIS for Charleston's harbor expansion used a 0.57 ft in low scenario, 1.08 ft in intermediate, and 2.74 ft in high scenarios, significantly higher than the flat rate that the Corps intends on using for the Mobile Harbor. We encourage the Corps to utilize the high, intermediate, and low rates similar to those used in other harbor expansion projects.

## **I. Air Quality**

The EPA created a report in 2009 on the "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report" that provides a framework to help identify all the air emissions that should be studied in the DSEIS. We encourage the Corps to include air impacts resulting from criteria pollutants, hazardous air pollutants (HAPs), and greenhouse gases. We also want to ensure that air impacts are quantified from these deep-draft containerships that are expected to utilize the port. Additionally, we ask the Corps to consider the emissions from the equipment that will be used to service the vessels and the expected emissions from the additional privately-owned terminals in the harbor area that might be constructed as a result of this expansion. We also encourage the Corps to consider air emissions as a result of dredging activities for new work as well as maintenance work. The Corps should also predict the increase in air emissions from the port and surrounding neighborhoods where truckloads will traffic. All of these activities are important to evaluate in accordance with 40 CFR § 1508.8, which requires analysis of direct and indirect impacts on the environment that are associated with the proposed action.

## **J. Introduction of Invasive Species**

Larger and more frequent post-Panamax ships could introduce invasive species into the bay from the ships' hulls or ballast water discharge. Invasive species have the potential to threaten or displace native species, degrade habitats, and spread diseases. The National Invasive Species Act of 1996



begins to address these issues with voluntary guidelines to control the introduction of invasive species in aquatic systems. We recommend the Corps evaluate the potential for invasive species being introduced and what enforcement or control measures will be needed to protect Mobile Bay.

We encourage all feasible and prudent measures be written and formalized in a plan to minimize the risk of detrimental effects on an ecosystem from the introduction of non-native or invasive species. The marine industry has recognized the issues related to ballast water and introduction of non-native species. One of the most stringent ballast water management programs is in the Great Lakes (St. Lawrence Seaway System), successfully eliminating species introduction since it was created in 2006. The Corps has the opportunity to evaluate invasive species introduction into Mobile Bay from port activities and adequately generate a plan for how to combat this risk.

## **K. Dredge Material & Placement**

### *i. Release of Contaminated Sediments into the Water Column*

Dredged material has the potential to be contaminated with harmful substances such as heavy metals, pesticides, PCBs, oil, etc. particularly in ports and harbors. Many of these substances are historical and therefore can be buried within or locked in seabed sediments. Dredging can suspend these into the water column where they can cause contamination of shellfish and/or fish species. Many of these metals typically do not manifest until some time has passed and different chemical, hydrographical, and geological processes have had an opportunity to alter these newly disturbed sediments. Evaluating the long-term impacts and monitoring the material to be dredged is essential for managing the potential for contamination.

It is well established that ports and harbors can act as sinks for effluent from surrounding and upstream industry inheriting a legacy of contamination and numerous studies have shown issues caused by dredging sediments that have high levels of contaminants. It is well documented that dredging can cause increases in heavy metals. Further, many of these metals typically do not manifest until some time has passed and different chemical, hydrographical, and geological processes have had an opportunity to alter these newly disturbed sediments. To demonstrate this, some studies have shown substantial increase in several metals with commencement of dredging activities. This clearly indicates that resuspension of contaminated sediments can expose aquatic organisms to substantial amounts of metal contaminants.

In addition to harmful metals and chemicals, it has also been well documented that dredging operations can cause significant increases in fecal coliform.<sup>27</sup> In 2017 alone, there were more than 26 million gallons of sewage overflows reported in Mobile and Baldwin Counties. Resuspension of

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<sup>27</sup> Grimes, D.J. (1975). Release of Sediment-Bound Fecal Coliforms by Dredging. *Applied Microbiology*, 29(1), p.109.

contaminated sediments containing such materials can pose a threat to human health and the ability to fish, swim, and play in the Bay. We highly encourage the Corps to evaluate fecal coliform in the sediment sample studies and the likelihood for resuspension. The areas surrounding dredging activities will have the highest risk for exposure to bacteria. As a result, we suggest the Corps consider the proximity of designated use areas for shellfish and recreation (swimming, etc.) in association with dredging activities and plume impact distance.

Resuspension of contaminated sediments into the water column has been shown to cause major ecological impacts over large spatial scales. Studies have also shown that dredging can cause severe impacts on estuaries through releases of high concentrations of ammonia leading to algal blooms in turn followed by increases in pH, and BOD. Nutrients can also be disturbed from dredging and cause a number of problems. We recommend the Corps evaluate whether this project would impact nutrient concentrations, nutrient loading, and nutrient cycling in Mobile Bay.

The Corps has stated that, “sediment testing has not been performed on the entirety of the project area. and Limited data is available.” The Corps must explain what they have done since that statement was made and what do they plan to do to ensure that they thoroughly understand what contaminants are present in sediments, and the potential magnitude of impacts that may result from the disturbance and release of these sediments.

ii. *New Work*

As discussed earlier, new work sediment should be investigated (core samples) for the following parameters: bacteria, metals, PCBs, Polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, phenols, pesticides, dioxin congeners, cyanide, organotins, and nutrients. There are also concerns with where the new work will be placed. To our understanding, the Corps has identified three potential locations: Relic Shell Mined Area, Ocean Dredged Material Disposal Site (ODMDS), and the Sand Island/Pelican Island Beneficial Use Area (SIBUA).

There have been several concerns about the placement of dredged material in the Relic Shell Mined Area due to its proximity to recreationally important fish species including Tarpon and Red Drum. Observations from local fishermen and tracking studies conducted by the Dauphin Island Sea Lab confirm Tarpon utilize the designated area. We highly encourage the Corps to communicate with local scientists and ensure they have the most accurate data when considering placement of new work material. By not considering all available data, the Corps risks making decisions that may negatively impact local recreational fisheries.



Figure 5. Map of new work material placement extracted from Corps presentation.

iii. *Maintenance Work*

Mobile Baykeeper understands the necessity to consider potential beneficial use options for maintenance dredging per the regulations of the 1966 Water Resources Development Act. It is necessary that these options are chosen wisely so as to not negatively contribute to the negative impacts of the project.

iv. *Upper Mobile Bay - Beneficial Use Site*

To our knowledge, the design and environmental coordination of this proposed project has been funded by RESTORE (although waiting on the receipt of those funds) and the construction and implementation phases have not yet been approved for funding. The current proposal involves constructing 1,200 acres of semi-contained, open water dredged material to generate tidal marsh in the upper Mobile Bay. After distribution of this potential project at various public scoping meetings, there have been several local fisherman who have identified the proposed location as important recreational fishing habitat and known productive commercial crabbing area. Mobile Baykeeper opposes the selection of this project as a Beneficial Use Site given its existing high quality and purpose. Other Beneficial Use Site alternatives should be considered. Additionally, we feel this project may be counterintuitive to the efforts by the ADCNR to protect shrimp nursery areas by creating restricted areas (including the area of the proposed fill). We highly suggest considering other potential areas for disposal and not utilizing RESTORE funds for the completion of this project.

v. *In Bay Disposal*

Several citizens have raised concerns regarding the disposal of maintenance material in a thin layer fashion (Figure 7). One of the main concerns was with the possibility for disposal to result in boat navigation issues when adding more material to an already shallow area. It is our understanding from the Corps that the placement of maintenance material will only occur in areas with a depth of at least 12-15ft. We encourage the Corps to carefully consider how this placement may impact local boating. Another concern is with the placement of



Figure 6. Map of the proposed beneficial use site in the Upper Mobile Bay as presented by the Corps at the public workshop

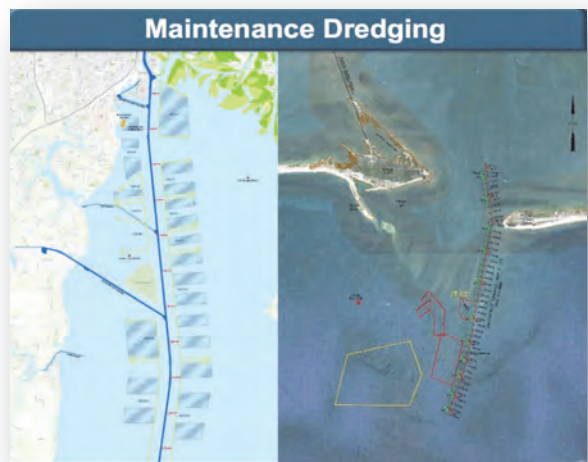


Figure 7. Map of the maintenance dredging disposal plans as presented by the Corps at a public workshop.

the material over existing habitats important to the area, which could potentially impact benthic communities and existing fishing grounds. There are also concerns with how this disposal over a large area will affect local water quality, changes in pH, Dissolved Oxygen, turbidity, TSS, ammonia, and nitrates. We encourage the Corps study the impacts of thin layer disposal in Mobile Bay to ensure this long-term solution is not detrimental for the productivity and quality of these areas.

Mobile Baykeeper appreciates the opportunity to provide input on the Mobile Harbor General Reevaluation Report and the DSEIS. We understand this is a long and tenuous process and appreciate the Corps taking the time to address the public's concerns and take comments into consideration to ensure all impacts are properly evaluated.

Ultimately, we encourage the Corps to select a plan that addresses the triple bottom line - the economy, environment, and community. Supporting all three of these values will continue to allow Mobile Bay thrive and continue to support its many uses.

Thank you in advance for your consideration and response to each of these comments. We request a written response to each of the provided comments. Please feel free to contact us with any questions at (251)-433-4229.

Sincerely,



Casi (kc) Callaway  
Executive Director



Cade Kistler  
Program Director



Laura Stone Jackson  
Program and Grants Coordinator

Cc: Fish and Wildlife Service, Alabama Department of Environmental Management, Environmental Protection Agency Region Four

**From:** [REDACTED] (b)(6)  
**To:** [REDACTED] (b)(6)  
**Subject:** FW: Form comment letter  
**Date:** Tuesday, July 10, 2018 8:15:00 AM  
**Attachments:** [Pages from Comments Appendix 6-1-18.pdf](#)

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[REDACTED] (b)(6)

Just making sure that you are joining our conference call this morning.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 09, 2018 4:38 PM  
**To:** [REDACTED] (b)(6)  
**Subject:** Form comment letter

[REDACTED] (b)

Here's the form letter you requested. Our response :

- For erosion concerns on Dauphin Island see section 5.3.3 and 6.1.
- For SIBUA analysis see section 4.2.2.3.

Let me know if you need anything else.

[REDACTED] (b)(6)



March 31, 2018

COL James A. DeLapp  
U.S. Army Corps of Engineers, Mobile District  
109 Saint Joseph Street  
Mobile, AL 36602

Dear COL DeLapp;

This is to follow-up the Corps' February 22, 2018 public meeting on the Mobile Harbor General Reevaluation Report (GRR) Study. I am writing to inform you of my strong views on the actions the Corps **MUST** take before releasing the Draft GRR and Supplement to the Environmental Impact Statement for public review.

The Corps has now admitted that half of the dredged sands placed in the Sand Island Beneficial Use Area (SIBUA) are accumulating instead of rejoining the natural littoral drift system to nourish Dauphin Island as the Corps consistently promised would occur over the past 20 years. That means, since 1999 when the SIBUA began to be used, Dauphin Island has been robbed of at least 7 million cubic yards of beach quality sands, causing significant erosion of the island. **If that volume of sands was spread 3 feet deep, it would cover an area 852 feet wide along the entire 14-mile length of the island.** The Corps' admission supports the observed erosion of the island and the Corps' own 1978 report, the National Park Service's 2006 report, and the US Geological Survey's 2007 report – all identifying the Mobile Harbor project as a contributor to the erosion of Dauphin Island and the Alabama-Mississippi barrier island system.

The Draft GRR will present the Corps' Tentatively Selected Plan (TSP) to deepen and widen Mobile Harbor. To comply with all federal laws and regulations, the TSP **MUST** include a Mitigation Plan to both halt future erosion and to restore Dauphin Island's historically eroded shoreline. The Mitigation Plan should consist of two features: (1) all future sands dredged from the Outer Bar Channel should be disposed in shallow waters to assure 100% of the sands are returned to the littoral drift system; and (2) the historic Gulf shoreline of Dauphin Island must be restored to at least the conditions that existed in 1999 before the Corps began use of the SIBUA.

In Section 302 of the Water Resources Development Act of 1996, Congress provided the Corps the specific authority to use Mobile Harbor dredged material to accomplish environmental restoration. It is time the Corps finally did the right thing and tell the Alabama State Port Authority that together they must develop and implement an acceptable Mitigation Plan to correct the adverse effects the Mobile Harbor project is having on the erosion of Dauphin Island – Alabama's only barrier island. The impending Draft GRR is the appropriate vehicle to take that important step.

Sincerely,

Print Name:

(b)(6)

Address:

(b)(6)



**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** FW: RPRB Outstanding Issues  
**Date:** Tuesday, July 10, 2018 2:54:00 PM  
**Attachments:** [SAM Outstanding Issues Jul 2018.pptx](#)

---

(b)(6)

See below. Please let me know if either of these dates work...

-----Original Message-----

**From:** (b)(6)  
**Sent:** Tuesday, July 10, 2018 2:05 PM  
**To:** (b)(6)

(b)(6)

Subject: FW: RPRB Outstanding Issues

FYI, we are pushing back the release of the Mobile Harbor GRR to 27 July which means we can't hold the public workshop on 21 Aug as we penciled in. Looking at COL Joly's calendar, am thinking probably 5 or 6 Sept...after the Labor Day weekend. Know we had some Rucker/WFG stuff planned, but this would take precedence.

(b)(6) will you have AECOM check on the viability of those dates for a facility? We'll lock in once we absolutely have our release firm.

(b)(6)

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Tuesday, July 10, 2018 10:50 AM  
**To:** (b)(6)  
**Subject:** RPRB Outstanding Issues

(b)(6)

This is what I sent SAD.

(b)(6) said to change GRR submittal to EPA to 20 Jul with public release 27 Jul. We are meeting with (b)(6) and the PDT and they have some significant changes.

I just said Aug 2018 for public meeting.

I did not include Village Creek since we have not heard from the mayor yet.

Thank you,

(b)(6)

(b)(6)

# MOBILE DISTRICT

## Outstanding Project Issues

### Mississippi Coastal Improvement Program (MsCIP)

- Ship Island Phase I sand placement 35% complete; est completion Oct 18
- Phase II construction award (>\$50M) 13 Aug 18; Phase V (<\$4M) award 13 Jul 18

### Mobile Harbor GRR

- FY18 Workplan provided \$2.1M to complete GRR
- Draft report released to EPA 20 Jul 18
- Public release of draft report 27 Jul 18; next public meeting Aug 18

### ACE

- Development/implementation of species monitoring plans continues; received BO for oval pigtoe 25 Jun 18
- Litigation moved to Northern District of Georgia District Court
- Reviewing comments from State of Georgia on water supply storage contracts

### ACT (Allatoona Water Supply Reallocation Study/WCM Updates for Weiss & Logan Martin)

- Interagency Scoping Meeting 12 Jul 18
- Public Scoping Meetings week of 30 Jul – 3 Aug 18; five meetings - 2 (GA), 3 (AL)
- Contributed Funds agreement at OMB; negotiations initiated with the State of Georgia



**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** RE: Mobile Harbor GRR page counts  
**Date:** Tuesday, July 10, 2018 8:02:00 AM

---

That's fine. Just let me know what you need.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Tuesday, July 10, 2018 7:10 AM  
**To:** [REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** RE: Mobile Harbor GRR page counts

H [REDACTED] (b)(6)

So I'm looking at the page counts and there is quite a bit more documentation on the screen shot you sent as compared to what we put in the PWS for Battelle to bid on. I didn't even have any of the 'Attachment C' docs in my list (538 pgs). All told, Battelle was expecting 1,205 pages and we're up to 2,418 (including 100 pages of public comments).

Battelle will have no choice but to request a mod to the contract, which will cost more and potentially delay review completion. This is why I really need to have an accurate accounting of things on the front end as it's a good bit of time/money all the way around to process a mod (me, you, IWR, Battelle, etc.).

I'll chat with [REDACTED] (b)(6) today and give her a head's up. We'll need to get the MIPRs you sent to Battelle and IWR increased and I'll also need more funds to process things but please stand by until I have more info from IWR. I need to clear a few things first then will get this moving...

Thanks,

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Monday, July 9, 2018 9:03 AM  
**To:** [REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
**Subject:** Mobile Harbor GRR page counts

[REDACTED] (b)(6)

The attached image provides the updated page counts for the Mobile Harbor GRR.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Monday, July 09, 2018 9:00 AM

To: (b)(6)

Subject:

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** FW: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS  
**Date:** Wednesday, July 11, 2018 9:14:00 AM  
**Attachments:** [2018 Mobile-Baykeeper DSEIS Comment Letter Mobile Harbor.pdf](#)

---

(b)(6) See attached.

(b)(6) Let's make sure that the report reflects well our defense of the use of 2010 data.

[REDACTED] (b)(6)

-----Original Message-----

From: Laura Jackson [<mailto:ljackson@mobilebaykeeper.org>]  
Sent: Friday, July 06, 2018 3:30 PM  
To: DeLapp, James Andrew (Jim) COL USARMY CESAM (US) <James.A.Delapp@usace.army.mil>  
Cc: Cade Kistler <[ckistler@mobilebaykeeper.org](mailto:ckistler@mobilebaykeeper.org)>; Casi (kc) Callaway <[callaway@mobilebaykeeper.org](mailto:callaway@mobilebaykeeper.org)> (b)(6)

[REDACTED] (b)(6)

Subject: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

Hi Col. DeLapp,

Attached you will find Mobile Baykeeper's comment letter on the Draft Supplemental Environmental Impact Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Please let me know that you have received our submission and feel free to reach out with any questions.

Thank you and have a great weekend.  
-Laura

--  
Laura Stone Jackson

Program & Grants Coordinator  
Mobile Baykeeper  
450-C Government Street  
Mobile, Alabama 36602



Phone 251-433-4229  
Cell 480-707-3787  
Fax 251-432-8197

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Volunteer <Blocked<http://www.mobilebaykeeper.org/volunteer-home/>> today!

<Blocked<https://www.facebook.com/mobilebaykeeper>> <Blocked<https://twitter.com/MobileBaykeeper>>  
<Blocked[https://www.youtube.com/channel/UCAaAXTy3q\\_8FydkH61bhxRQ](https://www.youtube.com/channel/UCAaAXTy3q_8FydkH61bhxRQ)> Read Our Programs Blog Here!  
<Blocked<http://www.mobilebaykeeper.org/program-blog/>>

"Clean Water, Clean Air, Healthy Communities"

Please consider the environment before printing this email



Providing citizens a means to protect the beauty, health and heritage of the Mobile Bay Watershed, Alabama's waterways and coastal communities.

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July 6, 2018

U.S. Army Corps of Engineers, Mobile District  
Attn: Colonel James A. Delapp  
109 Saint Joseph Street  
Mobile, AL 36602

RE: Draft Supplemental Environmental Impact Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Dear District Commander,

We are Mobile Baykeeper, a twenty-one-year-old nonprofit organization with the mission of providing citizens a means to protect the beauty, health and heritage of the Mobile Bay Watershed and coastal communities. We are submitting comments on behalf of our board, officers, staff and more than 4,500 members regarding a Draft Supplemental Environmental Impact Statement to evaluate improvements to the Mobile Ship Channel. Mobile Bay is a complex and highly sensitive ecosystem considered to be one of the most biodiverse ecosystems in North America<sup>1</sup>. Mobile Bay is Alabama's central estuary serving as a transitional zone where the river's fresh water can mingle with tidally influenced marine waters making it a highly productive and diverse nursery as well as exceedingly environmentally and economically important. Mobile Bay is valuable to several industries including: commercial and recreational fisheries, tourism, coastal development, and recreation (boating, paddling, swimming, etc.). Each of these industries contribute significantly to our economic prosperity and growth making it vitally important to evaluate all potential impacts to our natural resources. To protect our economy, community, and quality of life, we must ensure that we mitigate for any impacts associated with a major development project. Mobile Baykeeper recognizes the economic value of the Port as it contributes \$19.4 billion to our regional economy and know that improvements could make our Port more competitive in the industry<sup>2</sup>. By thoroughly studying and developing a comprehensive plan for the port expansion, we can grow responsibly and minimize negative impacts to the very natural resources that support so many economic sectors and our quality of life.

We applaud the U.S. Army Corps of Engineers (USACE) for its efforts since

<sup>1</sup> Duncan, Scot. *Southern Wonder: Alabama's Surprising Biodiversity*. Tuscaloosa: University of Alabama Press, 2013.

<sup>2</sup> USACE public scoping document

2015 to communicate with and involve the community in the project evaluation. Throughout this time, community members have had the opportunity to attend public scoping meetings and provide feedback on different project components. Since the public has not had all information used in this DSEIS available to them, these involvement opportunities (while helpful) should not be considered comprehensive. We also appreciate that you have a responsibility to meaningfully consider all comments made during this period. Mobile Baykeeper has provided several comment letters during the assessment of the potential impacts associated with deepening and widening the Mobile Bay navigation channel, some of the essential points of which will be restated in this comment letter along with several novel considerations and concerns. We request the Corps fully evaluate the following comments formulated based on the concerns of our members and partners and provide a written response for how each will be addressed and incorporated into the Draft Supplemental Environmental Impact Statement (DSEIS).

## **EXECUTIVE SUMMARY**

### **I. GENERAL CONSIDERATIONS:**

- A. Consider All Impacts From the Proposed Project** – The draft SEIS must include all aspects of the proposed activity from start to finish (dredging activities, impacts from new channel hydrodynamics, and long-term impacts including potential for further development and upgrades at associated port facilities). This includes indirect and cumulative effects.
- B. Coordinate with All Appropriate Audiences** – The Corps should meaningfully coordinate with all the appropriate audiences to develop the DSEIS – including state and federal agencies, commercial and recreational fishermen, and environmental justice communities.
- C. High Quality Accurate Scientific Data** – To ensure the Corps is utilizing the best available science, they must connect with the local scientists and researchers who specialize in subjects that are relevant and pertain directly to the study. These individuals have extensive and critical information. Failure to acquire information from these individuals may reduce the ability to produce “high-quality information and accurate scientific data” necessary to complete a DSEIS (40 C.F.R. § 1500.1(b)).
- D. Utilization of 2010 as Climatic Baseline** – The Corps should use more than one year as a model for the entire project. 2010 did not have any extreme droughts or severe flood events; Basing the entirety of the impacts from the project solely on 2010 will not show the true edge case scenarios including accurate representations of climatic, hydrologic, and other relevant conditions. Because of this it is likely not an accurate characterization of the full range of conditions that would result from the modifications to the ship channel, sea level rise, saltwater intrusion, and other impacts.
- E. Better Define and Understand No Action and Alternative Projections** – We are concerned about the preliminary finding of “no impact” that has been presented. Predicting ship traffic will be greater without the ship channel deepening and widening project than with the project is a tenuous assumption. It is entirely possible that it is in large part due to this assumption that the Corps is able to predict no impact and, therefore, avoid mitigation

for the impacts that will certainly come an enlarged ship channel. We request that the Corps review impacts under multiple growth (negative, neutral, and positive) scenarios to accurately understand what impacts will be under these potential growth scenarios.

- F. Cumulative Impacts** – NEPA requires the Corps to identify the major resources of concern and evaluate those resources through a cumulative impact analysis. According to the CEFQ, a cumulative impact “is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts include those coming from affiliated industries that will need or wish to expand due to the Port’s expansion as well as prospective new growth due to a deeper and wider ship channel. The cumulative analysis needs be sensitive enough to include other important factors such as but not limited to: extreme weather events, pollution, wetland loss, fishery habitat impacts, and sea level rise.
- G. Indirect Impacts** – The Corps must identify all indirect impacts and perform compensatory mitigation for any unavoidable impacts. Indirect impacts are defined as those impacts “caused by the action and are later in time and farther removed in distance, but are still reasonably foreseeable.” These impacts “...may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems.”
- H. Monitoring and Protective Plans** – We suggest the Corps work in cooperation with state agencies to develop a comprehensive plan to use protective BMPs for the proposed activities. We suggest a long-term monitoring plan be implemented that monitors dredging and disposal areas for at least 10 years.
- I. Mitigation** – We encourage the Corps to consider public comments to ensure impacts are not underestimated. If any unavoidable impacts are identified, we suggest the Corps work with the community and environmental groups to ensure projects are supported that will adequately address the impacts identified. Different mitigation measures for A-K below should be considered and studied as separate alternatives. A project of this size and scope will undoubtedly have some unavoidable impacts if implemented. All other similar projects (Jacksonville, Savannah, Houston, Charleston etc.) reviewed by Mobile Baykeeper throughout the region have found unavoidable impacts. If in this case the Corps attempts to ignore or conceal these impacts to improve perception and adoption of this project, it could result in significant liability to the Corps and the project sponsor under environmental statutes in the future.

### **Specific Considerations:**

- A. Wetlands** – The Corps presented minimal to no effects on wetlands in the latest public workshop. This is very concerning given many other large ship channel enlargement projects identified unavoidable impacts from their studies. Evaluations used must be robust enough to predict the impacts from the proposed project. Currently, it appears that these evaluations may not be able to fully predict these impacts. Therefore, we suggest the Corps use multiple

scenarios with varying salinity levels, particularly during longer drought durations and varying sea level rise scenarios (high, medium, low). These models should be run in conjunction with other predicted changes such as increased wave energy from larger vessels, sedimentation and turbidity impacts, and changes in dissolved oxygen. Indirect effects such as development of wetland areas due to industrial growth induced by the ship channel enlargement must be considered as required by NEPA.

- B. SAVs** – We encourage the Corps to evaluate how changes to factors including but not limited to: salinity, turbid conditions produced as a result of dredging, changes in wave energy due to larger vessels, and changes to dissolved oxygen levels will impact the local Sub Aquatic Vegetation (SAV) population. When evaluating these factors, it is important to consider the indirect and cumulative impact of how SAVs will react when enduring all conditions and induced and incremental changes.
- C. Shellfish/Oysters** – We suggest the Corps review impacts to all lifestages of oysters including the use of larvae distribution models created by the Dauphin Island Sea Lab. We also recommend that a cumulative impact analysis be conducted to see how changes in salinity, dissolved oxygen, wake/waves, and sedimentation will impact the species. When looking at the existing oyster reefs, we advise including oyster farms, gardens, and planned oyster production. Aquaculture is expanding dramatically across Mobile Bay. Both the western and eastern shores must be analyzed to determine how enlarging the channel will impact the viability of these operations.
- D. Benthic Communities** – To ensure the full extent of impact is evaluated, we encourage the Corps to characterize the different benthic communities throughout the project and not limit the samples to a portion of the project disturbance. The Corps should also consider the ongoing stress or flux benthic communities will endure from sedimentation and shoaling processes that will continue as maintenance dredging occurs in the navigation channel.
- E. Fish** – We encourage the Corps to consider habitat suitability for all life stages including adult, juvenile, and larvae as well as spawning, nursery, and important migratory and movement areas. The Corps needs to work with the state and federal agencies to understand what areas are considered Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC). Lastly, we strongly encourage the Corps to use cumulative impact analysis to evaluate how multiple factors (salinity, dissolved oxygen, etc.) will impact local species, particularly the Gulf Sturgeon and Red Drum.
- F. Shorebirds, Waterfowl, and Migratory Birds** – We encourage the Corps to evaluate how projected impacts including but not limited to: coastal erosion, beach loss, SAV loss, induced growth, and cumulative impacts will affect birds that rely on these resources.
- G. Threatened and Endangered Species** – We suggest the Corps conduct a biological opinion to evaluate the impacts of the project on each of these threatened or endangered species. We encourage the Corps to coordinate with Dr. Ruth Carmichael at the Dauphin Island Sea Lab to acquire the best available science on the West Indian Manatee. The Corps should carefully evaluate how changes to specific SAV populations (particularly Eurasian watermilfoil, water celery, and coon's tail that were identified as at risk from preliminary

results) will impact the local manatee population. Under ESA, the Corps must also consider any impacts from future state or private activities that are reasonably foreseeable and indirect impacts such as induced growth.

- H. Shorelines** – The Corps should consider the impact from increased ship wake on both sides of Mobile Bay, Dauphin Island, other downdrift MS-AL barrier islands and coordinate with stakeholders to ensure consideration of current, planned, and reasonably foreseeable living shoreline projects. The Corps needs to ensure adequate consideration of all the long-term effects that a deeper and wider ship channel will have from the reduction in littoral sediment deposition on shorelines and develop a protective comprehensive plan to account for unavoidable impacts. The Corps needs to consider how a Vessel Speed Reduction (VSR) program could be implemented to reduce the ship wake energy impacting shorelines and viability for oyster farming.
- I. Air Quality** – We ask the Corps to include air impacts resulting from criteria pollutants, Hazardous Air Pollutants (HAPs), and greenhouse gases from all sources, directly and indirectly caused, as a result of this expansion. This includes induced growth and increases in ship, truck, rail and other traffic. We also want to understand how the Corps will identify baseline conditions for air quality. We request that monitoring is conducted to understand current conditions and compare to expected conditions. The Corps should also consider how implementing a Vessel Speed Reduction program could reduce emissions experienced across our area.
- J. Invasive Species** – We encourage the Corps to evaluate the potential for invasive species introduction into Mobile Bay from increased port activities and adequately develop a plan that mitigates this threat.
- K. Dredged Material and Placement** – The Corps meeting on February 22, 2018 stated that the rate of movement of dredged material out of the Sand Island Beneficial Use Area (SIBUA) was approximately half of the rate that it was being added to the area. The Corps also stated that they would evaluate placement of dredged spoils from the ship channel enlargement and maintenance activities closer to Dauphin Island. Mobile Baykeeper requests that the Corps ensure that dredged materials are placed in appropriate depth and proximity to Dauphin Island. This will enable the dredged spoil to accrete on the island at a sufficient rate to adequately nourish the island and prevent erosion of the island caused by disruption of the littoral drift system. Additionally, given the recreational importance for Tarpon and Red Drum, the placement of dredged material in the Relic Shell Mined Area should be evaluated utilizing all data available to ensure these habitats and other relevant habitats are not destroyed or impaired. To accurately understand the effects of the proposed project, the Corps must investigate sediment for parameters including but not limited to: bacteria, metals, Polychlorinated biphenyl (PCBs), Polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, phenols, pesticides, dioxin congeners, cyanide, organotins, and nutrients and other legacy pollutants.



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## I. GENERAL CONSIDERATIONS FOR THE DSEIS

The following comments relate to the process and implementation of completing the DSEIS. More information on how each of these topics may impact specific species or habitats are described in more detail in the Specific Considerations section below. Careful consideration must be applied to the proposed project's evaluation to ensure all impacts are considered using the most up to date and valid scientific information.

### A. **Consider All Impacts From the Proposed Project**

To our understanding, the Corps announced at the February 22, 2018 public workshop that the draft SEIS will only consider impacts from the specific dredging activities proposed. Although the dredging operations will encompass a portion of the environmental impacts associated with the proposed project, it does not adequately cover the extent of environmental issues that will likely occur from the approval of this project. In addition to direct impacts, the Corps must ensure that all cumulative and indirect effects (addressed in more detail in sections F and G) resulting from the project are evaluated and mitigate for where unavoidable impacts are identified. Below are some of the areas of direct impact that should be considered if the project moves forward. Each of these has been evaluated in similar port expansion EIS evaluations. Environmental impact statements should include all impacts in the evaluation process, including but not limited to: dredging activities (sediment plumes, release of contaminated sediments, etc.); and having a deeper channel (saltwater intrusion, dissolved oxygen changes, etc.), and; the attraction of ships and vessels of all sizes (ship wake, ballast water discharge, noise, air pollution, etc.). Currently the Corps is considering these in separate silos and comprehensively which could underestimate the impacts of the proposed project on our natural resources.

#### i. *Evaluate Impacts from Dredging Activities*

Dredging can cause an increase in suspended sediment concentrations or cloudy water conditions, the potential release of contaminated material, an increase in erosion to nearby shorelines, and the disturbance of habitats particularly within the vicinity of the dredging activities. To our understanding, the Corps plans to utilize a hopper dredge to hydraulically remove sediment from the navigation channel and then store that material in hoppers on the dredge. During this activity, fine sediments (including clays, silt, and fine-sands) generate turbid conditions. Turbidity plumes and sedimentation are a result of overflow and washing practices. The sediment plumes can extend long distances depending upon the type of dredge, operation practices, wind/currents, and the type of sediments located in the excavation area. High turbidity or sediment levels resulting from hopper dredge operations have been documented to redistribute up to 12% of dredged material into the environment with the sediment plume extending more than 5,200 meters from the site of excavation<sup>3,4</sup>. To make the improvements proposed in this project, dredging would span across a

---

<sup>3</sup> Nichols, M., Diaz, R. J., & Schaffner, L. C. (1990). Effects of hopper dredging and sediment dispersion, Chesapeake Bay. *Environmental Geology and Water Sciences*, 15(1), 31-43.

large area and potentially make a substantial impact in its path. It will be important to know, plan, and reduce the extent of the sediment plume along with the environments within that vicinity that will be impacted.

ii. *Evaluate Impacts from a Deeper and Wider Channel*

Deepening the channel can increase saltwater intrusion<sup>5</sup>, causing seawater to advance farther upstream. Changing the salinity regime threatens the freshwater and estuarine marshes and ultimately the species that rely on them. There are several examples of hydrological changes determined as unavoidable impacts in the final EIS evaluating similar harbor capital expansion projects (Savannah Harbor, Charleston Harbor, and Jacksonville Harbor); it seems unlikely that the proposed enlargement of the Mobile Bay Ship Channel would not demonstrate similar effects. Changes to salinity should be analyzed both for vertical and horizontal redistribution to predict water quality changes typically associated with redistribution of vertical salinity zones. Redistribution of horizontal salinity zones are important to evaluate the potential for habitat loss and degradation to wetlands, marshes, tidal rivers, and tributaries. This evaluation should identify the extent of altered salinity regimes and other water quality parameters both on a spatial and temporal scale.

In addition to changes in salinity, a deeper channel can also produce significant changes to dissolved oxygen levels<sup>6</sup>. Harbor deepening concerns for dissolved oxygen include: 1) as depth of the channel increases, the ability of oxygen to reach the bay and river bottoms decreases, generating, on average, lower levels of dissolved oxygen (particularly in the bottom portions where several critical species live), and 2) increased saltwater intrusion, bringing additional saltwater to the upper portions of the estuary and making it more difficult for those areas to receive oxygen from the air, and 3) velocity on average can decrease and reduce the capability of oxygen entering through mixing. Low dissolved oxygen concentrations, particularly for extended periods, could have deleterious effects on fish and other aquatic plants and organisms. Dissolved oxygen is also vitally important for giving the estuary the ability to adjust and handle point and non-point source pollution loads. With lower dissolved oxygen concentrations, we may see a decreased resiliency to these existing and continuing issues.

It is vital that the DSEIS consider changes in salinity, dissolved oxygen, and other water quality parameters and evaluate the attendant consequences on 1) wetlands; 2) threatened and endangered

---

<sup>4</sup> Blair *et al.* (1990). Environmental Impacts of the Bal Harbor Beach Nourishment Project: Mechanical and Sediment Impact on Hard Bottom Areas Adjacent to the Borrow Area.

<sup>5</sup> Zhu, J., Weisberg, R. H., Zheng, L., & Han, S. (2015). Influences of channel deepening and widening on the tidal and nontidal circulations of Tampa Bay. *Estuaries and Coasts*, 38(1), 132-150.

<sup>6</sup> U.S. Army Corps of Engineers, Savannah District. (2012). Final environmental impact statement: Savannah Harbor Expansion Project (SHEP). 5-42 – 5-55; Chatham County, Ga and Jasper County, SC.

<http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%205%20SHEP%20FINAL%20EIS.pdf> Retrieved July 3, 2018

species; 3) anadromous fish populations; 4) spawning and nursery habitats; 4) other locally significant organisms (Red Drum, Speckled Trout, Southern Flounder, Blue Crab, Brown and White Shrimp, etc.).

iii. *Evaluate Indirect Impacts Post Expansion*

The channel improvements will make the Port of Mobile more competitive among other U.S. ports by allowing for larger or more heavily loaded ships and the potential for increased frequency of ship travel in our harbor. Heavier ships will produce larger waves resulting in the potential for: increased shoreline erosion surrounding the channel, increased sedimentation from wake activity, and disruption of habitat including oyster, submerged aquatic vegetation, and wetlands. Bigger ships may bring further development along the port – an indirect impact that must be considered in full.

In the DSEIS, impacts from the proposed dredging activities, the changed hydrology, and the increased activity and opportunity from a larger port should all be evaluated. Simply analyzing the impacts from the proposed dredged activity, may result in inadequately characterizing the full environmental impacts the project may produce on Mobile Bay and surrounding communities.

## **B. Coordinate with All Appropriate Audiences**

i. *State and Federal Agencies*

Mobile Baykeeper strongly suggests close coordination and communication with state and federal agencies including but not limited to the following: U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), Alabama Department of Environmental Management (ADEM), Alabama Department of Conservation and Natural Resources (ADCNR), and the National Marine Fisheries Service (NMFS). Other port expansion projects across the nation have coordinated with agencies, particularly in generating and receiving Biological Opinions and avoidance strategies that are required.

ii. *Commercial and Recreational Fishermen*

Mobile Bay and surrounding waterways are utilized heavily by both commercial and recreational fishermen. Knowledge from local fishermen is a valuable resource in gathering information about local fishing grounds, productivity of particular areas of interest, and depth and navigation, among others. Failure to communicate with the community of fishermen can limit the understanding of the local ecosystem and result in mistakes in selecting project locations. We applaud the Corps for their efforts to communicate with local fishermen thus far and we encourage them to continue meaningful efforts to collect information from local fishermen to ensure all impacts from proposed activities are considered.

iii. *Environmental Justice Communities*

It is important that the Corps comply with the Executive Order 12898 requiring federal agencies to ensure minority and low-income populations will not experience disproportionately high and adverse impacts from federal projects. These communities often bear the brunt of impacts while

receiving the least consideration when development projects take place. It is critical that they are meaningfully engaged in creation of the SEIS and impacts to these communities are thoroughly considered as mitigation measures are selected. We encourage the Corps to meet with all potentially impacted environmental justice communities to allow for individuals in low-income communities and communities of color to understand the proposed project and have the opportunity to voice any concerns. From our discussions, with some stakeholders in these communities we know air quality, including understanding how baseline conditions will be established, how impacts will be identified, and indirect air quality impacts from induced growth are significant concerns. We also encourage the Corps present the draft SEIS to the community upon release as well as specifically to environmental justice communities.

### **C. High Quality Accurate Scientific Data**

The development of the DSEIS should rely on and utilize the most up to date techniques for data collection and consider alternative studies to improve understanding. A DSEIS must include “high-quality information and accurate scientific data” per 40 C.F.R. § 1500.1(b) to ensure that its own determination is based on the best scientific and current data available. This proposed project is fortunate to have several research institutes containing many scientists and graduate students who study the area. Collectively, the Dauphin Island Sea Lab and Auburn Shellfish Lab have numerous principal investigators who are considered experts in different subjects including marine mammals, oysters, fisheries, benthic organisms, physical oceanography, amongst many others. These individuals and their associated work present a wealth of knowledge that must be utilized during the creation of any serious environmental impact statement. Failure to connect with these individuals and the studies conducted in the area may greatly reduce the accuracy of the Corps study.

Additionally, all existing community plans need to be incorporated in the review to eliminate one plan contradicting another (for example: Map for Mobile, Alabama Coastal Comprehensive Plan, Comprehensive Conservation Management Plan, Plan for Spanish Fort and Mobile Bay Causeway, Watershed Management Plans, etc).

### **D. Utilization of 2010 for Climatic Baseline**

Mobile Baykeeper is concerned with the use of a singular year for basing all environmental impact analyses. We would like to see the justification for this decision and highly encourage the Corps should use more than one year to model outcomes for the entire project. The Corps is currently using the year 2010 for all of the model analyses for wetlands, SAVs, oysters, benthics, fish, birds, and threatened and endangered species. The year of 2010 did not have any severe (D3) or extreme (D4) droughts in consecutive weeks (lasting at least 2 weeks), yet we see examples of these in 2000 and in 2011 (as seen in Figure 1 and Figure 2).<sup>7</sup> Drought is extremely important to include in impact

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<sup>7</sup> United States Drought Monitor (USDM). Retrieved on July 5 2018 at <http://droughtmonitor.unl.edu/Data.aspx>



analyses particularly when considering the extent of saltwater intrusion.

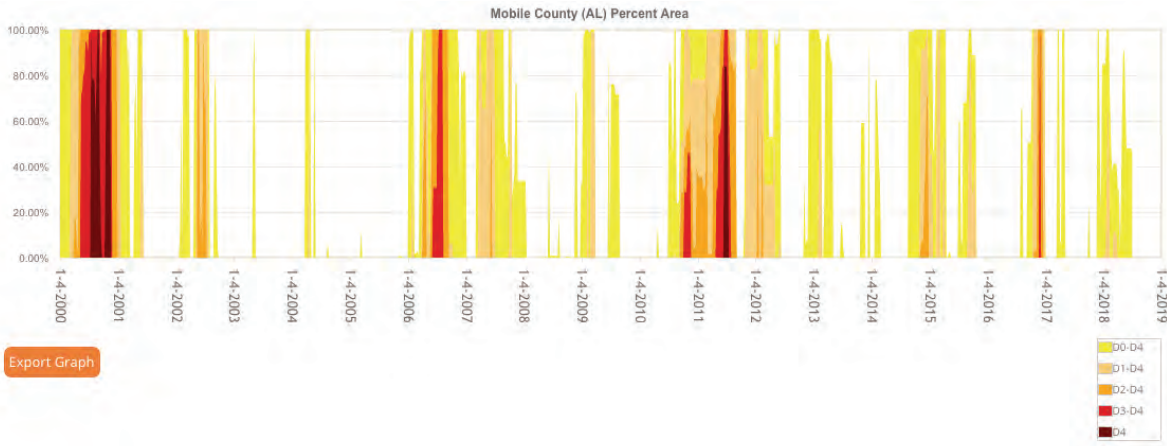


Figure 1. Time series drought data from 2000-2019 extracted from USDM for Mobile County, AL.

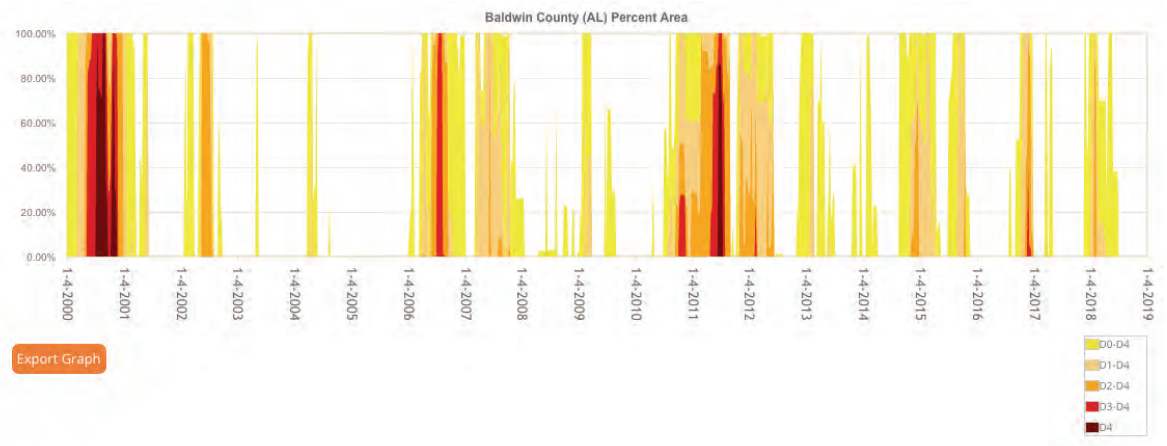


Figure 2. Time series drought data from 2000-2019 extracted from USDM for Baldwin County, AL.

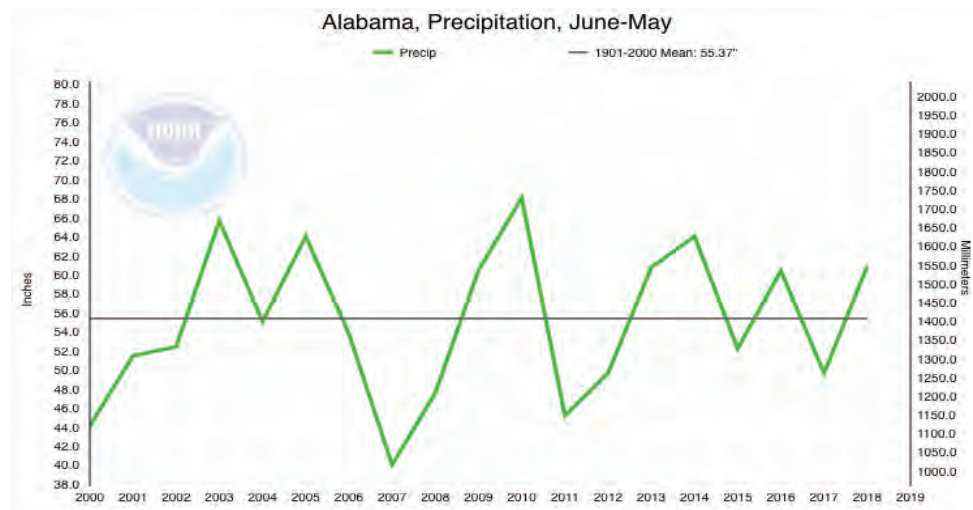


Figure 3. Time series data from NOAA on annual precipitation for Alabama from 2000-2019.



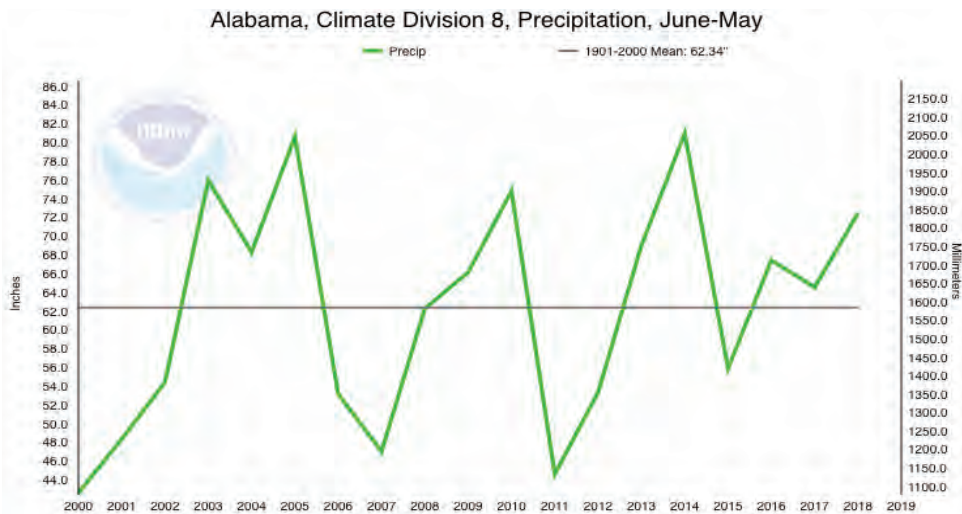


Figure 4. Time series data from NOAA on annual precipitation for District 8, Alabama from 2000-2019.

In fact, the year of 2010 was the highest years of precipitation for the state of Alabama (Figure 3) and one of the highest in the coastal counties (Figure 4) since 2000. Basing the entirety of the impacts from the project solely on 2010 will not show the true edge case scenarios including accurate representations of climatic, hydrologic, and other relevant conditions. Because of this it is likely not an accurate characterization of the full range of conditions that would result from the modifications to the ship channel, sea level rise, saltwater intrusion, and other impacts. The Corps must consider how models may change under severe or extreme droughts lasting two or more weeks.

### E. Better Define and Understand No Action and Alternative Projections

Mobile Baykeeper is concerned with the Corps current evaluations of projected outcomes if the project is not implemented. For instance, the Corps has estimated a significant increase of ship traffic will occur, one that is greater than if the deepening and widening project occurred. This assumption needs to be clearly validated and explained to ensure these projections are not overstating the Port's attraction without necessary improvements to remain competitive. Growth projections should also be built on a baseline of multiple years such as in the Savannah Harbor GRR.<sup>8</sup> We highly encourage the Corps to generate a more realistic No Action Alternative (NAA) that accurately predicts the environmental status without the proposed work. We request the Corps provide detailed information about the alternative analysis conducted and the rationale behind projected growth baselines for the different alternatives. Most importantly, the multiple depth

<sup>8</sup> United States, U.S. Army Corps of Engineers, Savannah District. (2012, January). *General Re-Evaluation Report Appendix A: Economics Savannah Harbor Expansion Project: Chatham County, Georgia and Jasper County, South Carolina*. Retrieved July 3, 2018, from [http://www.sas.usace.army.mil/Portals/61/docs/SHEP/reports/GRR/SHEP\\_FINAL\\_GRR\\_APPEN A Economics\\_Main Body.pdf](http://www.sas.usace.army.mil/Portals/61/docs/SHEP/reports/GRR/SHEP_FINAL_GRR_APPEN_A_Economics_Main_Body.pdf)

impact analysis conducted to evaluate the environmental impact for each depth and width option to make an informed decision on the final project proposal.

## **F. Cumulative Impacts**

As a part of the National Environmental Policy Act (NEPA) process applied by Council on Environmental Quality regulations, (40 CFR §§ 1500 -1508) federal agencies (including the Corps) are required to consider the cumulative impacts when making a decision. A cumulative impact is the “impact on the environment that results from the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions regardless of the agency (federal or non-federal) or person that undertakes such other actions; cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40CFR § 1508.7). Cumulative impact assessments are designed to understand and identify the uncertainties and regulations and indicate the need to include these uncertainties. They should be clearly stated if such information is lacking.

Mobile Baykeeper highly encourages the Corps to identify the major resources of concern and evaluate these concerns through a cumulative impact analysis. For each of the major resources identified, the cumulative impact analysis should include a discussion of geographic scope, a baseline condition or historical status, past, present, and future actions or stresses, present condition, capacity to withstand stress, incremental impacts, and alternatives to avoid, minimize, or mitigate cumulative effects. We also suggest conducting a sensitivity analysis to include scenarios with weather conditions like prolonged droughts and extreme weather, and the presence of sea level rise, overfishing, pollution, and other scenarios. These should be evaluated and considered in all models.

## **G. Indirect Impacts**

Under NEPA, the Corps must identify all indirect impacts resulting from the proposed ship channel enlargement<sup>9</sup> and perform compensatory mitigation for any unavoidable impacts. Indirect impacts are defined by NEPA as those impacts “caused by the action and are later in time and farther removed in distance, but are still reasonably foreseeable.” These impacts “...may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems.”

We request that the Corps fully model and understand the induced growth and encroachment or alteration effects<sup>10</sup> that will occur from the proposed ship channel enlargement and the indirect impacts that will occur from this induced growth. The high likelihood of induced growth is outlined by information provided by the Corps regarding this proposed project. In slides from the Corps’

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<sup>9</sup> 40 CFR 1508.8

<sup>10</sup> 3 NCHRP Report 466, “Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects” (2002), p. 55.

public meeting in September 2017 it is stated that there was a record 19% growth in containerized cargo in 2016. The Corps goes on to state that the Port of Mobile is one of the largest exporters of metallurgical coal and is the 2<sup>nd</sup> largest steel port in the nation and that growth is expected in both sectors. Further noting that the Port of Mobile serves manufacturing markets and agricultural markets both of which are steadily increasing. The Corps explains that there is a need to enlarge the ship channel because vessels would be able to bring in and ship out more cargo per ship (larger vessels) and do so more frequently (wider channel allowing for 24/7 and two-way traffic). Based on this evidence provided by the Corps, the enlargement of the Port of Mobile will induce substantial growth not only around the Port of Mobile but throughout the greater Mobile area as associated business, distributors, and suppliers grow to meet the needs of the expanded Port of Mobile. While this growth is a good thing for the economy of the Mobile area, the Corps must factor the indirect effects of this induced growth into its DSEIS.

For projects that have an explicit economic development purpose (such as the enlargement of the Mobile Ship Channel), it is generally assumed that the project will induce growth. This necessitates an in-depth indirect effect analysis. To perform such an analysis, the Corps must<sup>11</sup>:

- Make estimates based on best available data to show how much travel times will improve and what increases in imports/exports will be a result of the ship channel enlargement.
- Assess potential for induced growth resulting from the increased accessibility of the Port of Mobile.
  - This includes using land use models to generate quantitative projections of growth and changes in land cover/impervious surfaces along with qualitative assessments of projected growth.
- Finally, the Corps should assess the potential impact on sensitive resources (wetlands, air quality, water quality, stormwater runoff, etc.) caused by any induced growth.
  - This includes quantifying sensitive resources in the study area, identifying proximity of sensitive resources to locations where induced growth is most likely, and determining how to minimize and mitigate any reasonably foreseeable impacts.

An important note in identifying indirect impacts is that they do not have to be known but only need be “reasonably foreseeable”<sup>12</sup>. Specific growth induced and encroachment/alteration indirect impacts that Mobile Baykeeper believes are “reasonably foreseeable” and that the Corps should evaluate include but are not limited to:

- Wetland fill resulting from industrial growth

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<sup>11</sup> Center for Environmental Excellence by AASHTO (2016) *Assessing Indirect Effects and Cumulative Impacts Under NEPA (Aashto Practitioner's Handbook)*. Washington, DC: American Association of State Highway and Transportation Officials (AASHTO).

<sup>12</sup> CEQ, “Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations,” 46 Fed. Reg. 18026 (March 23, 1981), Response to Question 18.

- Increased impervious area from industrial (light and heavy) growth causing water quality degradation (increased water temperatures, decreased dissolved oxygen, etc.)
- Impacts to wetlands, SAVs, fisheries, oyster reef, etc. due to degraded water quality
- Decreased air quality resulting from increased traffic to Port of Mobile facilities and other nearby waterfront industry (Port of Chickasaw, Theodore Industrial Canal, etc)
- Damages to wetlands, SAVs, and shoreline caused by increased ship wake
- Damages to communities, wetlands, SAVs, and shoreline caused by increased storm surge etc.

Generally, we stress the need for the Corps to follow the mandates of NEPA and the CEQ by comprehensively assessing and mitigating for indirect impacts caused by the expanded ship channel.

## H. Monitoring & Plans

We strongly recommend taking extra precaution and preparation to ensure ample best management practices (BMPs) are implemented and that a comprehensive plan *is required*. Measures should be taken to ensure BMPs prevent sedimentation from dredging activities to protect the local water quality and avoid key species. We encourage the Corps to work with state agencies to determine the most protective BMPs for the area. The plan should also include a thorough monitoring plan and should be required to be submitted and open for public review. The monitoring plan should extend at least 10 years after construction to ensure all impacts are considered. It should also include areas around dredging operations and beneficial use disposal areas.

Mobile Baykeeper recommends the Corps consider implementing the project in phases that are strategically planned to minimize impacts and ensure proper monitoring of parameters like dissolved oxygen and turbidity can be conducted and adaptive management be possible.

## I. Mitigation

We encourage the Corps to consider our suggestions and others' comments to ensure the project's draft supplemental environmental impact statement accurately estimates the unavoidable impacts to our important natural resources. We are concerned with a project this large being proposed in a sensitive environment like an estuary and resulting in "no effects," which may indicate these studies underestimate the true impact. Once all feasible studies have been performed and avoidance and minimization has been considered, any remaining unavoidable adverse impacts to the environment must be addressed through appropriate and practical compensatory mitigation. We suggest including the community and environmental groups in the process of mitigation to select an existing needed project and/or create a synergistic project that includes buy-in from the community. Any mitigation identified should also directly correlate with the natural resource determined to be adversely impacted from the project's implementation. Several other port expansions have identified unavoidable impacts to wetlands, dissolved oxygen, and fish stocks. We encourage the Corps to carefully and comprehensively look at how this major project will impact our precious natural

resources and mitigate accordingly. These different mitigations should be studied as different alternatives to the project.

## **II. SPECIFIC CONSIDERATIONS FOR THE DSEIS**

The following comments have been gathered by members of Mobile Baykeeper, experts, stakeholders, and our research on similar port expansion projects. We want to emphasize the importance of each of the following specific items being addressed in the DSEIS.

### **A. Impacts to Wetlands**

Wetlands are known to provide several important ecological functions such as water purification, shoreline stabilization, flood protection, groundwater recharge, nutrient recycling, particle retention, surface water and subsurface storage, and habitat for fish and wildlife. They add intrinsic value to the community. Wetlands are known to be impacted by many anthropogenic activities including harbor expansion projects. The final EIS for Charleston's Harbor expansion indicated unavoidable impacts to 324 acres of wetlands from increases in salinity, requiring mitigation plans to preserve 665.6 acres of wetlands.<sup>13</sup> Similarly, the Savannah Harbor Expansion Project (SHEP) determined there would be "minor adverse effects to the fish and wildlife habitat function in 223 acres of tidal freshwater wetlands" and a conversion of 740 acres of saltmarsh to brackish marsh as a result of the project.<sup>14</sup> Both of these impact statements found adverse effects to local wetlands mainly from saltwater intrusion. Likewise, it is imperative that potential impacts are carefully evaluated and alternatives are studied (such as not dredging as deep as 50ft) and different mitigation alternatives are studied (such as wetland restoration in risk areas).

The Corps state there would be minimal or *no effects* on wetlands in the latest public workshop on February 22, 2018. The evaluations, however, may not be robust enough to predict the impacts from the proposed project. It is imperative that the Corps use multiple scenarios with varying salinity levels, sea level rise amounts (high, medium, low), and models are run in conjunction with other predicted changes such as dissolved oxygen, ship wake, and storm surge. To our knowledge, the Corps will use one month's data from 2010 to analyze the impact of saltwater intrusion on wetlands. We are concerned with this decision and would like to receive more information justifying why this dataset was the most representative of the area's different weather patterns, etc. For instance, when running models to predict how far and the extent of saltwater intrusion with a deeper channel hydrology, the high salinities are likely to be discovered during drought periods when freshwater flow is low and saline waters can be pushed farther up the delta.

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<sup>13</sup> Final Report and Environmental Impact Statement for Charleston's Harbor Expansion  
[http://www.sac.usace.army.mil/Portals/43/docs/civilworks/post45/finalreport/1\\_Main%20Report%20and%20EIS.pdf?ver=2015-07-10-131111-623](http://www.sac.usace.army.mil/Portals/43/docs/civilworks/post45/finalreport/1_Main%20Report%20and%20EIS.pdf?ver=2015-07-10-131111-623)

<sup>14</sup> Final Report and Environmental Impact Statement for Savannah Harbor Port Expansion  
<http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%201%20with%20TOC%20SHEP%20FINAL%20EIS.pdf>

To account for this, Mobile Baykeeper suggests the Corps look at additional year's data values that include drought periods, i.e. 2011, 2016. By looking at low freshwater flows from a lack of rainfall in the area, the models will likely better predict the maximum extent of saltwater intrusion. There have been numerous severe droughts over the last 10 years in the Mobile Bay area and the failure to look at how these relatively common droughts (some lasting for several months) will interact with a deeper channel could result in an underestimation of the project's impact on wetlands. In addition, we suggest the Corps model longer durations than one month (i.e. how will the survival or productivity rate change for wetlands enduring high salinity values for 60, 90, 120 days). As an example of a more responsible modeling of impacts to wetlands and marshes, The Savannah Harbor EIS utilizes eight months of average river flows from one year for a basic evaluation. Additional modeling was performed to evaluate different conditions. These included modeling effects of the proposed ship channel enlargement under low river flows (2001 conditions) and sea level rise of 25 cm and 50 cm.<sup>15</sup>

The Corps also indicated they would look at how inundation from a 0.5 m sea level rise scenario would impact the saltwater intrusion on wetlands. The concern again is if a representative drought scenario is not run, the model may not show how far upstream saline intrusion would reach, potentially underestimating the extent of mortality or productivity loss of wetlands in the upper delta. We highly encourage the Corps to be as thorough as possible with these evaluations to accurately characterize the cumulative impacts associated with this project.

## **B. Impacts to Submerged Aquatic Vegetation**

Submerged aquatic vegetation (SAV) is an important source of food for several species including manatees and over-wintering waterfowl. It provides habitat for macroinvertebrates and fishes, and helps prevent erosion through sediment stabilization. Over the past few decades, there have been dramatic declines in the SAV population in Mobile Bay<sup>16</sup>.

Changes to salinity from a deeper channel can modify the vegetative community (or SAVs) which can in turn, alter its use as protection for species and eliminate important food sources. Similar to our concerns detailed above for wetlands, this is also a concern for evaluating SAV population impacts. We encourage the Corps to use multiple duration scenarios when evaluating the impact of

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<sup>15</sup> U.S. Army Corps of Engineers, Savannah District. (2012). Final environmental impact statement: Savannah Harbor Expansion Project (SHEP). 5-9 – 5-10; Chatham County, Ga and Jasper County, SC. <http://www.sas.usace.army.mil/Portals/61/docs/SHEP/Reports/EIS/Section%205%20SHEP%20FINAL%20EIS.pdf> Retrieved July 3, 2018

<sup>16</sup> Barry A. Vittor & Associates. (2005). Historical SAV Distribution in the Mobile Bay National Estuary Program Area and Ranking Analysis of Potential SAV Restoration Sites. [http://www.mobilebaynep.com/images/uploads/library/NEP\\_historicSAV.pdf](http://www.mobilebaynep.com/images/uploads/library/NEP_historicSAV.pdf)



saltwater intrusion on SAVs within the selected 2010 data and include additional scenarios for extreme droughts seen in other years.

Deepening the channel will decrease the ability for oxygen to reach waterbottoms. Additionally, dredging activities and wake energy produce low dissolved oxygen and high turbidity levels. These low oxygen conditions can negatively impact SAVs and if these SAVs die off, they can create even lower oxygen levels. In addition to salinity models, dissolved oxygen scenarios must also be considered in conjunction when evaluating the potential for impacts on SAV survival and productivity.

Increases in suspended sediments associated with dredging activities can cause changes in water quality along with a number of negative impacts to flora and fauna. High turbidity resulting from dredging can release nutrients, organic matter, and contaminants depending on the characteristics of the material dredged. These releases can reduce the ability for light to penetrate through the water column, restricting submerged aquatic vegetation ability to photosynthesize. A 2006 case study of dredging effects on seagrass found that, in ~60% of cases detrimental impacts to the seagrass beds were documented. These projects resulted in a cumulative loss of 81 mi<sup>2</sup> - more than 1,100 acres per project.<sup>17</sup> The releases can also create low oxygen conditions from organic-rich sediments that threaten fish and plant die off.<sup>18</sup> Sedimentation can be introduced from dredging activities and from wave energy that can turn up the bottom sediments. Both of these should be evaluated holistically to understand the full impact of suspended sediments resulting from the proposed enlargement of the ship channel on the health and productivity of SAVs.

We encourage the Corps to look at how changes in dissolved oxygen and salinity, turbid conditions resulting from dredging, and hydrodynamic changes resulting from channel enlargement will impact the local SAV population. When evaluating these factors, it is important to consider the cumulative impact of how SAVs will react when enduring all conditions. To our knowledge, the Corps has no intention of running different models that demonstrate the sediment impacts from the project in conjunction with salinity, dissolved oxygen, and hydrodynamic impacts. We encourage the Corps to think about these impacts comprehensively to ensure impacts from the project are not underestimated.

While looking at salinity scenarios only, initial results presented by the Corps during the February 22, 2018 public workshop indicated elevated stress of Eurasian watermilfoil (an invasive species), water celery, and coon's tail. To our knowledge, local manatees have been observed consuming all three of

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<sup>17</sup> Erftemeijer, P. L., & Lewis III, R. R. R. (2006). Environmental impacts of dredging on seagrasses: a review. *Marine pollution bulletin*, 52(12), 1553-1572.

<sup>18</sup> Chislock, M. F., Doster, E., Zitomer, R. A. & Wilson, A. E. (2013). Eutrophication: Causes, Consequences, and Controls in Aquatic Ecosystems. *Nature Education Knowledge* 4(4):10

these species and a depletion of these may have a negative impact on the endangered species. We encourage the Corps and the Fish and Wildlife Service (FWS) to consider this in its evaluation of impacts to the West Indian Manatee from the proposed project.

### C. Impacts to Oysters

Shellfish Harvesting Areas as seen below (Figure 1), are in proximity to the proposed activities (also seen in this [GIS map https://aldcnr.maps.arcgis.com/apps/webappviewer/index.html?id=a32dad8dadcd249ea86bcb80dd951a424](https://aldcnr.maps.arcgis.com/apps/webappviewer/index.html?id=a32dad8dadcd249ea86bcb80dd951a424)). The areas shaded in yellow, green, purple, and red are where shellfish have been harvested. Careful consideration of the proposed projects activities proximity to and impact on these locations must be taken to ensure our natural resources, such as shellfish, are not degraded from the proposed channel expansion.

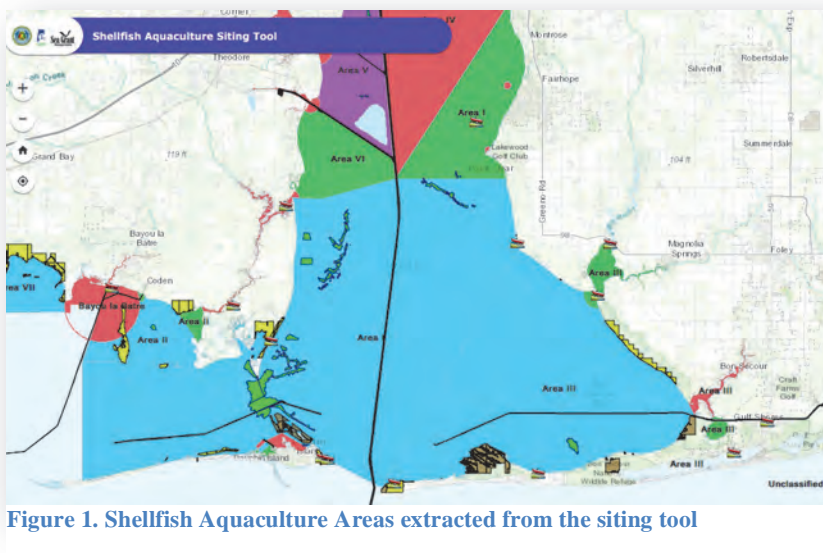


Figure 1. Shellfish Aquaculture Areas extracted from the siting tool

The Eastern oyster (*Crassostrea virginica*), which is important both commercially and ecologically for the area, is a specific concern for the proposed project. There are currently several commercial oyster farms in operation that generate half a million dollars in wholesale value and support local jobs.<sup>19</sup> Furthermore, in 2016, Alabama’s oyster farms generated at least \$1,956,776 in economic activity<sup>20</sup> and employed more than 30 individuals.<sup>21</sup>

Increases in salinity can have significant impacts on oyster productivity and could result in substantial profit loss to local oyster farming operations. The optimal range for oysters is between 14-28 parts per thousand (ppt). Anything greater can introduce stressors such as increased predation,

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<sup>19</sup> <http://alaquaculture.com/state/>

<sup>20</sup>Farm Gate Value - (net value of product once marketing costs are subtracted)

<sup>21</sup> [Grice R and Walton B, “Alabama Shellfish Aquaculture Situation And Outlook Report: Production Year 2016” \(Mississippi-Alabama Sea Grant Consortium\)](#)

which decreases overall spat recruitment<sup>22</sup>. Therefore, we are concerned with the potential for salinity changes from deepening and widening the ship channel, impacting the survival and growth of local oysters. Similar to our recommendations in the wetland and SAV evaluations, we suggest the Corps evaluate the impact of saltwater intrusion on oysters in longer durations and use scenarios for more extreme droughts such as those that occurred in 2007, 2011, and 2016 as well as sea level rise scenarios. Utilizing one year as a baseline for climatic and hydrologic conditions could result in severely erroneous assumptions. Alternatives, such as stopping maintenance dredging when the salinity level reaches a certain point should be analyzed and how different dredging depth alternatives impact SAVs.

At the latest presentation of the DSEIS on February 22, 2018, the Corps indicated 13 adult reefs were used for the assessment to determine how salinity and dissolved oxygen would impact local oysters. Several other locations of oyster reef have been identified by researchers and local fishermen in the area. Therefore it is imperative that the Corps coordinate with these individuals to ensure the models run are considering all locations throughout the project area. We also suggest that potential locations for future oyster farming and harvest locations be evaluated. Given the ecological value of estuarine oysters, oyster gardening has become more prevalent with collaborative efforts between Mobile Bay National Estuary Program, Auburn University Marine Extension and Research Center, and Mississippi-Alabama Sea Grant Consortium. These not for profit farms are currently implemented and will continue to be utilized to improve the water quality of our waterways and therefore must be considered when evaluating the proposed projects impacts.

Oyster aquaculture continues to expand and its success is a major focus for Coastal Alabama. Sedimentation and wave energy generated from the proposed project can have negative impacts on the productivity and survival of such oysters. Dredging activities and ship wake energy can create high turbidity conditions, which can cover or clog oysters. High turbidity can also create low oxygen conditions that could negatively impact oyster survival. Salinity models and dissolved oxygen scenarios should be considered in conjunction to understand survival and productivity. We encourage the Corps to evaluate how sediments, dissolved oxygen, salinity, and wave energy generated by ship wake will impact the local oyster population.

In addition to changes in adult oyster populations on known farms, the Corps must consider impacts to all life stages of oysters. One major concern with the proposed project is the potential disruption of the larvae movement and distribution across the Bay. We suggest the Corps include the existing larvae distribution model from Dr. Carmichael and the associated Principal Investigators work from the Dauphin Island Sea Lab and use multiple scenarios when running these evaluations to ensure larvae are not flushed out of the system from the deepening and widening of the channel.

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<sup>22</sup> Lorio, J.W. and Petrone, C., 1994. The cultivation of American oysters. *Crassostrea virginica*.

There are several community members who are currently or may in the future, raise oysters off of their docks, piers, etc. but may be unable to if the larvae distribution is interrupted or ship wave activity prohibits settling. We strongly encourage the Corps also consider how ship wake waves will disrupt or prohibit oyster spat settling and growth along shorelines of Mobile Bay.

#### D. Impacts to Benthic Communities

Benthic communities are known to play a critical role in the health and functioning of estuarine systems. For instance, organic matter not used in the water column settles on the bottom floor where it can be remineralized by benthic organisms to become nutrients that can then be used in the water column. This remineralization contributes the nutrients necessary to increase primary productivity and is an important link in the food web of an estuary.

Examples of the important benthic species that support our recreational or commercial fishing industries include benthic invertebrate species like Blue crabs (*Callinectes sapidus*), shrimp species, and several species of flounders that occupy areas surrounding the ship channel and other areas of Mobile Bay and coastal communities. There are specific areas determined as important for local shrimp species (Brown Shrimp, White Shrimp, Pink Shrimp, etc) in Mobile Bay and Mobile River. Shrimp nursery areas, shown in blue in Figure 3, are restricted from shrimp fisheries to allow for the population to replenish and continue to grow. These locations are also in close proximity to the proposed project activities which pose a potential threat to the juvenile shrimp species. We suggest the Corps consider the impacts from the project on these important nursery grounds for shrimp, an important source of commercial and recreational income for the area.

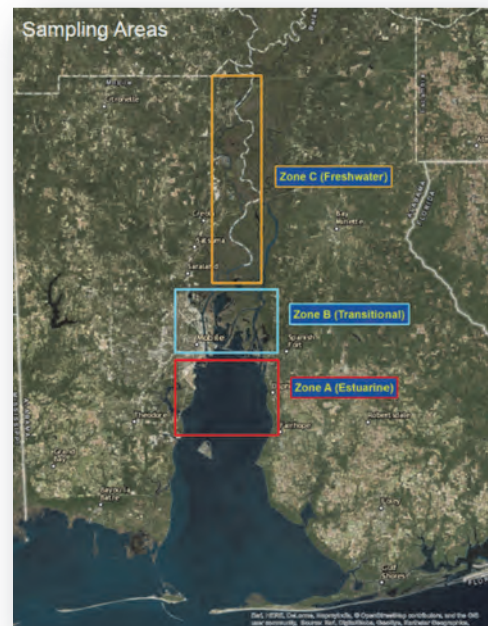


Figure 2. Map of selected sample areas extracted from Corps public workshop

Dredging activities can negatively impact benthic communities either directly or indirectly. The extent of these impacts can vary greatly and depend on many factors including the type of community present, the duration of, and type of dredging. Excavation and smothering by sediment can cause lethal impacts to these communities.<sup>23,24</sup> The specific benthic communities along the

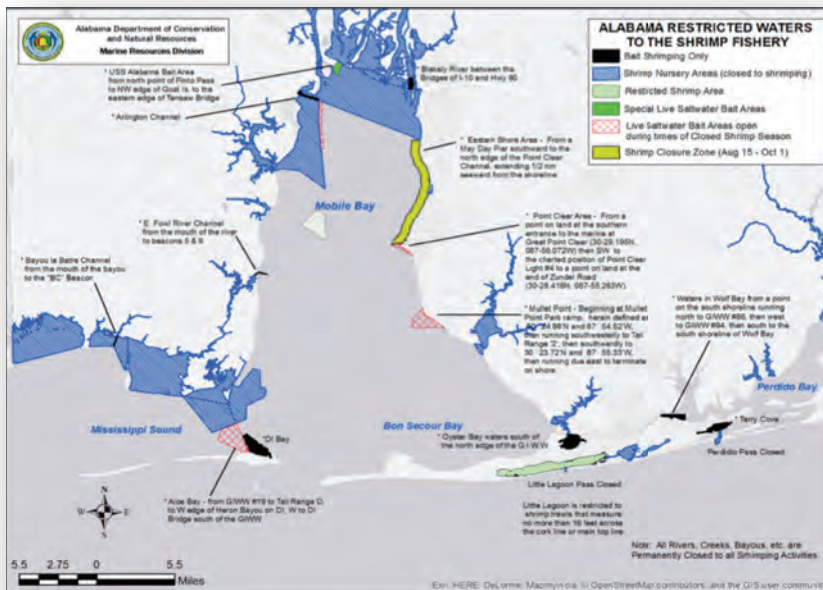
<sup>23</sup> Morton, R. A. (1977). Historical shoreline changes and their causes: Transactions Gulf Coast Association of Geological Societies, v. 27, p. 352-364.

<sup>24</sup> Guillory, V. (1982). Environmental effects of estuarine dredging and spoil disposal, a literature review. Contributions of the Marine Research Laboratory, Technical Bulletin 35, Louisiana Department of



proposed expansion should be characterized to understand what species will be disturbed from dredging and if damage is irreversible or if the area contains recolonizing types that have a more rapid recovery period<sup>25</sup>. For instance, benthic assemblages that are physically buried from sediment deposited may be able to recolonize depending on the species and frequency of dredging and sediment deposited from the project. It is also important to consider the ongoing stress or flux that the benthic species will endure from sedimentation and shoaling processes that will continue as maintenance dredging occurs in the navigation channel.

Additionally, we are concerned with a potential data gap in the Corps sampling for benthics. It is our understanding from the Corps presentations that the benthic collection is only being conducted for the lower channel where the proposed widening activities will take place. This does not adequately cover the benthic assemblages in 1) the upper channel where turn modifications are proposed and 2) the entire channel where deepening activities will occur. We suggest taking additional samples or coordinating with local benthic ecologists like Dr. Kelly Dorgan at the Dauphin Island Sea Lab to ensure full impacts to benthic communities are considered on the complete spatial scale.



**Figure 3. Map of Alabama's restricted areas for shrimp harvesting extracted from Alabama Department of Conservation and Natural Resources - Marine Resources Division**

Wildlife and Fisheries, 37-61.

<sup>25</sup> ICES International Council for the Exploration of the Sea. (1992). Report of the ICES working group on the effects of extraction of marine sediments on fisheries. Copenhagen (Denmark): ICES Cooperative Research Report # 182. <https://www.nefsc.noaa.gov/publications/tm/tm209/pdfs/ch6.pdf>

The Corps should also identify the project effects on dissolved oxygen levels and exacerbated occurrences of hypoxic conditions which will impact or prevent benthic habitat access. Furthermore, we suggest considering the alternative of phasing dredging activities to allow for the rebound of benthic communities.

## E. Impacts to Fish

### i. *Dredging Activities*

The proposed dredging has the potential to adversely affect fish in a variety of ways. The sediment removal, dredge plume turbidity, pumping of water, suction functions, noise, and lights can have negative impacts on various life stages of fish species. Dredging activities can cause direct mortality or injury to individual fish (depending on the species, time of year, and location) of all life stages (adults, subadults, juveniles, larvae, and/or eggs). The physical presence of dredging equipment in the channel and the changes in physical and chemical compositions of the water is also a major concern for fish and shellfish movement. These physical factors can 1) interrupt fish movement, (particularly with anadromous fishes that move from nursery grounds to spawning areas within estuaries), 2) block migration routes, and 3) create high turbidity conditions that can impact early life stages (eggs, larvae) transport from sediment material in the water column. High turbidity can also physically impact species through clogging fish gills and damaging filter feeding organisms. Given the multiple venues for how dredging activities can either directly or indirectly impact fish species, we encourage the Corps to consider habitat suitability for all life stages including adult, juvenile, and larvae as well as spawning and nursery locations. It is also critical that the Corps identify migratory paths and temporal movement patterns for local species to have the least impact possible during dredging activities. We suggest working with the Fish and Wildlife Service and National Marine Fisheries Service to identify proper measures of avoidance.

### ii. *Saltwater Intrusion into Estuarine and Freshwater Areas*

Mobile Bay is a sensitive estuary containing marshes, wetlands, and many important estuarine and freshwater species. The potential areas that will be impacted by saltwater intrusion should be identified along with the habitats that exist in those areas to evaluate the extent of degradation. Potential loss of wetlands, marshes, and SAVs from increased salinity should be accounted for and how those changes will then alter fish assemblages from critical habitat loss.

Another species of concern is the Red Drum (*Sciaenops ocellatus*) because the NMFS Gulf of Mexico Fisheries Management Council has identified the entirety of Mobile Bay (and the Mississippi Sound) to be habitat which is “essential to a species’ long-term survival and health” and therefore designated as Essential Fish Habitat. Red Drum are also considered a prized game fish throughout the Gulf of Mexico, and saw major declines after the mid-1980s from commercial harvest. A fishery management plan was developed for Red Drum along with several regulations, including a moratorium on commercial harvest to protect and replenish its population. Negative impacts to the essential habitat areas for Red Drum could counteract improvements made in population levels to date from federal regulations. Several scientists and graduate students from the University of South



Alabama are studying fish movements of Red Drum that may be useful for understanding how they will be impacted from the proposed project (Dr. Sean Powers, Reid Nelson). We encourage the Corps to work closely with relevant scientists and agencies to better understand the potential impacts from the proposed project.

iii. *Changes to Dissolved Oxygen*

Dissolved oxygen is a major concern with the proposed expansion project. Deepening the channel will decrease the ability for oxygen to reach the bottom of the water column and generate lower dissolved oxygen values on average in the waterbottoms. It will also enable saltwater to travel into upper portions of the channel, which can reduce the amount of oxygen entering the system from the air. With these physical changes, there is a possibility that dissolved oxygen may become lowered to levels that have deleterious or damaging effects on fish. It is well known that low dissolved oxygen or hypoxic/anoxic conditions can lead to fish kills. Savannah Harbor Expansion Project identified dissolved oxygen impacts from its project and is installing a dissolved oxygen injection system that will restore oxygen to acceptable levels for fish and plantlife. In addition to salinity models, dissolved oxygen scenarios must also be considered when evaluating the potential for impacts on fish species. Alternative analysis should be conducted to see how a dissolved oxygen injection system may reduce or account for impacts from project implementation.

iv. *Impacts to Fish and Wildlife from More Noise and Light Pollution*

We recommend the Corps evaluate the direct impacts to fish and wildlife from increased noise and light with increased shipping traffic and indirect impacts from port operations as a result of the harbor expansion. Noise has been documented to influence aquatic species behavior and can disrupt behaviors such as feeding, migration, and spawning. Consideration should be given to programs that will reduce the impact of light and noise on organisms.

## **F. Shorebirds and Waterfowl**

The Mobile Bay area is known to have many shorebirds and migratory waterfowl. Harbor, inshore shorelines, and coastal beaches are important for nesting, foraging, and general habitat for birds. We encourage the Corps to consider how bird populations will be impacted from erosion of these areas. Birds may be impacted from dredging and ship activities if noise and light disrupt their flight. Waterfowl may also be negatively impacted if the SAV populations decrease, as they are an essential food source for these bird species. We encourage the Corps to evaluate how projected impacts to coastal erosion, beach loss, and SAV loss will impact birds that need these resources.

## **G. Threatened and Endangered Species**

The state of Alabama is ranked second in the number of extinctions and fourth for species at risk of extinction in the nation. The following species in the Mobile Bay area considered threatened or endangered include: Alabama sturgeon, Gulf sturgeon, West Indian Manatee, Alabama Beach mouse, Perdido Beach mouse, Alabama Red-bellied turtle, Gopher Tortoise, Kemp's Ridley sea turtle, Green Sea turtle, Loggerhead Sea turtle, Piping Plover, Red-Cockaded woodpecker, and

Wood Stork. We suggest the Corps conduct a biological assessment (BATES or similar) to evaluate the impacts of the project on each of these threatened or endangered species.

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, per its amendment (16 U.S.C. § 1531 et seq.), requires each federal agency to “insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species.” We encourage coordination with FWS and the National Marine Fisheries Service (NMFS) to develop Biological Opinions for sea turtles, manatees, Gulf Sturgeon among others to make recommendations on hopper dredging activities.

i. *Habitats*

Currently, the Fish and Wildlife Service has designated the Isle Aux Herbs (a.k.a. Coffee Island), Dauphin Island, Pelican Island, and portions of Bon Secour National Wildlife Refuge (including Little Dauphin Island) as critical habitat areas for Piping Plover. Please consider habitat impacts to these areas from the proposed project, in particular beach erosion on Dauphin Island. Similarly, sea turtles like Loggerheads, Kemp Ridley’s, etc. are known to utilize beach environments as nesting grounds. Therefore this erosion to important nesting locations must be considered along with plans to conduct reasonable and prudent measures for protecting sea turtles during dredging activities to comply with the provisions of Section 9.

ii. *Dredging Activities*

Dredging can also result in direct mortality or injury of aquatic species, including all life stages of fish species (adults, subadults, juveniles, larvae, and/or eggs) through the removal or smothering of benthic organisms. In some cases, these direct takes of species can impact threatened or endangered species populations. Savannah Harbor’s expansion project underestimated the amount of direct take and had to amend its Incidental Take Statement from the National Marine Fisheries Service (NMFS) to increase the amount of Green Sea Turtles and Shortnose Sturgeon that were impacted from dredging. Dredging activities and location of disposal can also result in an indirect mortality or injury of aquatic species, from a loss of dissolved oxygen in the water column.

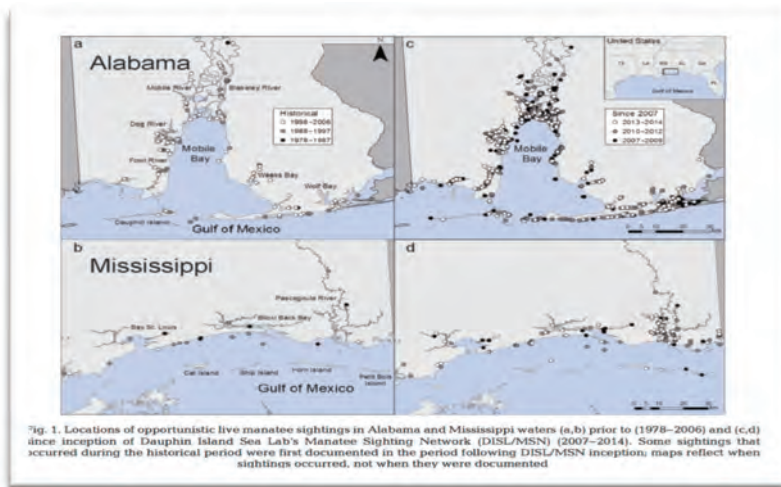
In Savannah Harbor’s final EIS, Shortnose sturgeon (*Acipenser brevirostrum*) were determined to be negatively impacted from the deepening of the harbor due to saltwater intrusion and marsh degradation, a critical habitat for the species. Cite. A fish species of concern for Mobile Harbor’s expansion is the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), which is considered a **threatened species** by U.S. Fish and Wildlife Service due to habitat destruction and degradation. Gulf Sturgeon are considered anadromous, meaning they live in saltwater and spawn in freshwater. The Corps needs to work with the state and federal agencies to understand what areas are considered Essential Fish Habitat (EFH), “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity”, and what are considered Habitat Areas of Particular Concern (HAPC), a component of EFH, includes those waters and substrates “which are rare, particularly susceptible to

human-induced degradation, especially ecologically important, or located in an environmentally stressed area”. Additionally, we encourage the Corps to carefully evaluate the impacts to benthic organisms known to support juvenile Gulf Sturgeon.

Light has also been documented to impact wildlife and has been associated with impacting migration and spawning behaviors. Threatened and endangered turtles found in the project area are affected by light. Dredge equipment and associated tugs and barges should be verified to ensure they meet Corps, U.S. Coast Guard, and OSHA light standards for safety. Measures should be agreed upon and implemented to reduce potential disorientation of female sea turtles approaching nesting beaches and/or hatchlings heading seaward from beaches due to lighting produced by dredging activities. The Corps could mitigate the negative impacts of ships’ light by 1) restricting the time of year designated for dredging activities to ensure that they do not coincide with spawning periods of impacted species, and 2) complete field observations onboard all dredging activities to document mortality of threatened and endangered species or mammals. Without additional measures, these listed species will be harmed. We encourage the Corps to consider all impact from light and noise on aquatic species and work with state and federal agencies to develop a Biological Opinion to analyze reasonable and prudent measures that minimize the negative impacts to key species.

iii. *Impacts to Mammals*

Mobile Bay is home to several mammals including the West Indian Manatee (*Trichechus manatus*), a species considered one of the most **endangered** marine mammals within the coastal waters of the United States. Sightings of the West Indian Manatee have been well documented by the “Manatee Sighting Network” through Dr. Carmichael’s lab at the Dauphin Island Sea Lab (Figure 4).<sup>26</sup>



**Figure 4. Excerpt from the Dauphin Island Sea Lab's Manatee Sighting Network study on Manatee sightings throughout Alabama and Mississippi**

<sup>26</sup> Hieb, E.E., R.H. Carmichael, A. Aven, C. Nelson-Seely, N. Taylor. Sighting demographics of the West Indian Manatee (*Trichechus manatus*) in the north central Gulf of Mexico. *Endangered Species Research* 32:321-332

Manatees are known herbivores that consume many types of aquatic plants. Changes to SAVs and local seagrass beds could have a significant impact on the available food source for manatees. The Corps should carefully evaluate how changes to specific SAV populations (particularly Eurasian watermilfoil, water celery, and coon's tail that were identified as at risk from the Corps' preliminary results) will impact local manatees.

Ship-strikes are also a major threat to mammals in the area including manatees and dolphins. Ships are known to injure mammals within harbors and ports. The potential for increased ship-strike occurrences needs to be evaluated from deep draft vessels and dredging equipment that will be frequently travelling in the harbor.

Given the potential for harm to the endangered West Indian Manatee, we encourage the Corps to work with federal and state entities and create a Biological Opinion on dredging and vessel operations. We also strongly encourage the Corps to coordinate with Dr. Carmichael, a professor at the University of South Alabama, to acquire information on the species that has been collected for more than a decade.

## **H. Impacts to Shorelines**

Shorelines are vitally important to the health of the community, ecosystem, and economy. Our shorelines are critical for a number of species like turtles, birds, crabs, and so much more. They are also utilized by many community members who reside on shorelines or use them for recreation. They support our tourism industry and the many businesses and industry that surround our waterways. Shorelines are also important because they are known to be a natural protector against storms and act as filters to our water. The proposed deepening and widening of the Mobile Harbor has the potential to make significant changes to these shorelines and erode our coastal beaches. Therefore it is of the utmost importance that all factors are thoroughly studied and considered in the DSEIS including: sediment transport analysis, ship wake analysis, bank erosion analysis, and coastal erosion analysis.

### *i. Shoreline Erosion from Ship Wake and Dredging Activities*

With larger, heavier, and potentially more frequent ships, the ships' size and the frequency of the ship wake would increase. This increase in wave height and wave energy has the potential to cause erosion to our shorelines and impact the settling and survival of oysters. The Corps has initially indicated that with a deeper and wider channel, the economic study shows fewer ships that are more heavily loaded than if the channel was not modified. It is our understanding that the Corps is looking at the wave energy totals for its comparison. We suggest that in addition to these studies, the Corps look at maximum or peak waves which could potentially be generated from the larger and more heavily loaded ships. We suggest these scenarios are tested to see both how these higher wave heights erode shorelines and how they may disturb the bottom sediment. We strongly suggest the Corps evaluate how a Vessel Speed Reduction (VSR) program would impact the project's impact on

shorelines and air quality. There are several other locations that have successfully implemented VSR programs to reduce the negative impacts from ship wake and air emissions on their surrounding communities including the Port of Los Angeles, Port of Long Beach, Port of San Diego, Port Authority of New York and New Jersey. Several community members along the western shore of Mobile Bay have expressed great concern about the impacts of the project on their shorelines. We encourage the Corps to thoroughly consider this alternative and evaluate how different vessel speeds change the impact analysis.

Dredging activities may also contribute heavily to wake activity and contribute to erosion. The Corps should consider the impact from increased ship wake resulting from both the dredging activities and increased ship traffic and ship load on both sides of Mobile Bay, Dauphin Island, and other downdrift MS-AL barrier islands. Additionally, the Corps should consider current and planned living shoreline project locations in this evaluation and create robust plans to minimize impact to projects during the early stages of implementation when they are the most sensitive to wave energy.

ii. *Sediment Transport Analysis- Loss of Littoral Sediments and Changes to Sediment Budgets*

It is well established that the removal of sediments disrupts the littoral system that transports sand and nourishes barrier islands. With the expansion and alteration of the channel configuration, the potential for increased sedimentation and change to the local sediment budget needs to be carefully evaluated. Furthermore, the potential for increased loss of littoral drift sediments from the deepened channel needs to be identified and how this decrease will consequently impact the existing erosion issues alongside Mobile Bay and Dauphin Island shorelines (as required by River and Harbor Act of 1935 Federal Law: Shoreline Changes). The historical sand deficit caused by dredging and removal of sediment needs to be evaluated and added to the cost of further erosion from additional deepening and widening activities (and overall reduction of sediment supply to the littoral zone). The projected frequency and potential for increased need of maintenance dredged post-construction should be evaluated to determine the sediment budget long-term. The Corps needs to ensure adequate consideration of each potential long-term consequence that a deeper and wider ship channel will have on shorelines of Mobile Bay, Dauphin Island, and other downdrift MS-AL barrier islands affected by this reduction in littoral sediment deposit. Additionally, we urge all parties to develop a comprehensive plan to account for unavoidable impacts to these shorelines.

The Corps has disposed dredged sands in the Sand Island Beneficial Use Area (SIBUA) south of the lighthouse for years with the explanation being that these sands are moved by currents to Dauphin Island to counter erosion. Observations indicate most of the sands are not moved, but accumulate at that location, while Sand Island has almost disappeared and Dauphin Island continues to erode. This leads to the conclusion that the SIBUA is failing to meet its intended purpose. At the last public workshop, the Corps reported initial findings indicating increases in average annual shoaling of 5-20% estimated within the navigation channel. It is our understanding that the Corps intends to propose expanding the existing SIBUA with the intent to improve the rate of shoaling. We applaud the Corps commitment to address this issue and encourage further study to ensure the new disposal



area produces a higher rate of shoaling. With a project this large, we need to ensure the Corps designates proper areas for disposal to counter the erosion from the loss and littoral drift processes.

We feel it is also vital that the Corps fully incorporate the Alabama Barrier Island Restoration Assessment (ABIRA) as a part of the General Reevaluation Report and DSEIS. The results from ABIRA could play an important role in informing decisions about how to use dredged spoils and areas of potential erosion issues. It is our understanding that the Corps intends on using parts of the analyses from the ABIRA in the DSEIS. We encourage the Corps to ensure the study is used to the maximum extent possible when determining potential impacts and disposal options.

iii. *Coastal Resiliency - Changes to Storm Surge and Resiliency*

With a new channel that is deeper and wider, there is a potential for the storm surges to have a greater impact on the surrounding infrastructure and coastline. The Corps should consider severe weather conditions such as drought, storms, and hurricanes when modeling future projections and evaluating long-term impacts. Furthermore, we suggest the Corps consider the effects of sea level rise by incorporating multiple scenarios varying in intensity from low to high influx rates. From the latest public workshop in February 2018, the Corps identified a 0.5 m sea level rise scenario for all models related to environmental impacts. The EIS for Charleston's harbor expansion used a 0.57 ft in low scenario, 1.08 ft in intermediate, and 2.74 ft in high scenarios, significantly higher than the flat rate that the Corps intends on using for the Mobile Harbor. We encourage the Corps to utilize the high, intermediate, and low rates similar to those used in other harbor expansion projects.

## **I. Air Quality**

The EPA created a report in 2009 on the "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report" that provides a framework to help identify all the air emissions that should be studied in the DSEIS. We encourage the Corps to include air impacts resulting from criteria pollutants, hazardous air pollutants (HAPs), and greenhouse gases. We also want to ensure that air impacts are quantified from these deep-draft containerships that are expected to utilize the port. Additionally, we ask the Corps to consider the emissions from the equipment that will be used to service the vessels and the expected emissions from the additional privately-owned terminals in the harbor area that might be constructed as a result of this expansion. We also encourage the Corps to consider air emissions as a result of dredging activities for new work as well as maintenance work. The Corps should also predict the increase in air emissions from the port and surrounding neighborhoods where truckloads will traffic. All of these activities are important to evaluate in accordance with 40 CFR § 1508.8, which requires analysis of direct and indirect impacts on the environment that are associated with the proposed action.

## **J. Introduction of Invasive Species**

Larger and more frequent post-Panamax ships could introduce invasive species into the bay from the ships' hulls or ballast water discharge. Invasive species have the potential to threaten or displace native species, degrade habitats, and spread diseases. The National Invasive Species Act of 1996



begins to address these issues with voluntary guidelines to control the introduction of invasive species in aquatic systems. We recommend the Corps evaluate the potential for invasive species being introduced and what enforcement or control measures will be needed to protect Mobile Bay.

We encourage all feasible and prudent measures be written and formalized in a plan to minimize the risk of detrimental effects on an ecosystem from the introduction of non-native or invasive species. The marine industry has recognized the issues related to ballast water and introduction of non-native species. One of the most stringent ballast water management programs is in the Great Lakes (St. Lawrence Seaway System), successfully eliminating species introduction since it was created in 2006. The Corps has the opportunity to evaluate invasive species introduction into Mobile Bay from port activities and adequately generate a plan for how to combat this risk.

## **K. Dredge Material & Placement**

### *i. Release of Contaminated Sediments into the Water Column*

Dredged material has the potential to be contaminated with harmful substances such as heavy metals, pesticides, PCBs, oil, etc. particularly in ports and harbors. Many of these substances are historical and therefore can be buried within or locked in seabed sediments. Dredging can suspend these into the water column where they can cause contamination of shellfish and/or fish species. Many of these metals typically do not manifest until some time has passed and different chemical, hydrographical, and geological processes have had an opportunity to alter these newly disturbed sediments. Evaluating the long-term impacts and monitoring the material to be dredged is essential for managing the potential for contamination.

It is well established that ports and harbors can act as sinks for effluent from surrounding and upstream industry inheriting a legacy of contamination and numerous studies have shown issues caused by dredging sediments that have high levels of contaminants. It is well documented that dredging can cause increases in heavy metals. Further, many of these metals typically do not manifest until some time has passed and different chemical, hydrographical, and geological processes have had an opportunity to alter these newly disturbed sediments. To demonstrate this, some studies have shown substantial increase in several metals with commencement of dredging activities. This clearly indicates that resuspension of contaminated sediments can expose aquatic organisms to substantial amounts of metal contaminants.

In addition to harmful metals and chemicals, it has also been well documented that dredging operations can cause significant increases in fecal coliform.<sup>27</sup> In 2017 alone, there were more than 26 million gallons of sewage overflows reported in Mobile and Baldwin Counties. Resuspension of

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<sup>27</sup> Grimes, D.J. (1975). Release of Sediment-Bound Fecal Coliforms by Dredging. *Applied Microbiology*, 29(1), p.109.

contaminated sediments containing such materials can pose a threat to human health and the ability to fish, swim, and play in the Bay. We highly encourage the Corps to evaluate fecal coliform in the sediment sample studies and the likelihood for resuspension. The areas surrounding dredging activities will have the highest risk for exposure to bacteria. As a result, we suggest the Corps consider the proximity of designated use areas for shellfish and recreation (swimming, etc.) in association with dredging activities and plume impact distance.

Resuspension of contaminated sediments into the water column has been shown to cause major ecological impacts over large spatial scales. Studies have also shown that dredging can cause severe impacts on estuaries through releases of high concentrations of ammonia leading to algal blooms in turn followed by increases in pH, and BOD. Nutrients can also be disturbed from dredging and cause a number of problems. We recommend the Corps evaluate whether this project would impact nutrient concentrations, nutrient loading, and nutrient cycling in Mobile Bay.

The Corps has stated that, “sediment testing has not been performed on the entirety of the project area. and Limited data is available.” The Corps must explain what they have done since that statement was made and what do they plan to do to ensure that they thoroughly understand what contaminants are present in sediments, and the potential magnitude of impacts that may result from the disturbance and release of these sediments.

ii. *New Work*

As discussed earlier, new work sediment should be investigated (core samples) for the following parameters: bacteria, metals, PCBs, Polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons, phenols, pesticides, dioxin congeners, cyanide, organotins, and nutrients. There are also concerns with where the new work will be placed. To our understanding, the Corps has identified three potential locations: Relic Shell Mined Area, Ocean Dredged Material Disposal Site (ODMDS), and the Sand Island/Pelican Island Beneficial Use Area (SIBUA).

There have been several concerns about the placement of dredged material in the Relic Shell Mined Area due to its proximity to recreationally important fish species including Tarpon and Red Drum. Observations from local fishermen and tracking studies conducted by the Dauphin Island Sea Lab confirm Tarpon utilize the designated area. We highly encourage the Corps to communicate with local scientists and ensure they have the most accurate data when considering placement of new work material. By not considering all available data, the Corps risks making decisions that may negatively impact local recreational fisheries.



Figure 5. Map of new work material placement extracted from Corps presentation.

iii. *Maintenance Work*

Mobile Baykeeper understands the necessity to consider potential beneficial use options for maintenance dredging per the regulations of the 1966 Water Resources Development Act. It is necessary that these options are chosen wisely so as to not negatively contribute to the negative impacts of the project.

iv. *Upper Mobile Bay - Beneficial Use Site*

To our knowledge, the design and environmental coordination of this proposed project has been funded by RESTORE (although waiting on the receipt of those funds) and the construction and implementation phases have not yet been approved for funding. The current proposal involves constructing 1,200 acres of semi-contained, open water dredged material to generate tidal marsh in the upper Mobile Bay. After distribution of this potential project at various public scoping meetings, there have been several local fisherman who have identified the proposed location as important recreational fishing habitat and known productive commercial crabbing area. Mobile Baykeeper opposes the selection of this project as a Beneficial Use Site given its existing high quality and purpose. Other Beneficial Use Site alternatives should be considered. Additionally, we feel this project may be counterintuitive to the efforts by the ADCNR to protect shrimp nursery areas by creating restricted areas (including the area of the proposed fill). We highly suggest considering other potential areas for disposal and not utilizing RESTORE funds for the completion of this project.

v. *In Bay Disposal*

Several citizens have raised concerns regarding the disposal of maintenance material in a thin layer fashion (Figure 7). One of the main concerns was with the possibility for disposal to result in boat navigation issues when adding more material to an already shallow area. It is our understanding from the Corps that the placement of maintenance material will only occur in areas with a depth of at least 12-15ft. We encourage the Corps to carefully consider how this placement may impact local boating. Another concern is with the placement of



Figure 6. Map of the proposed beneficial use site in the Upper Mobile Bay as presented by the Corps at the public workshop

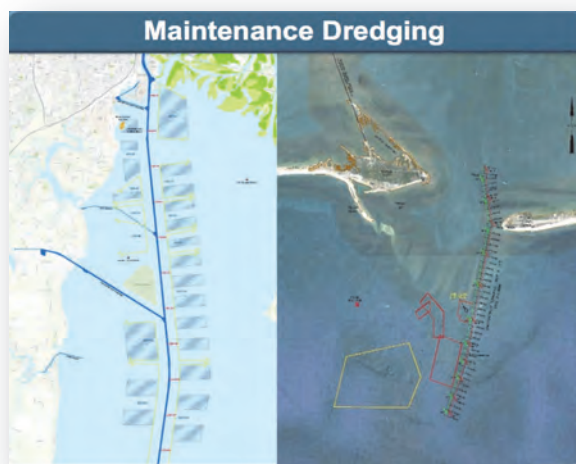


Figure 7. Map of the maintenance dredging disposal plans as presented by the Corps at a public workshop.

the material over existing habitats important to the area, which could potentially impact benthic communities and existing fishing grounds. There are also concerns with how this disposal over a large area will affect local water quality, changes in pH, Dissolved Oxygen, turbidity, TSS, ammonia, and nitrates. We encourage the Corps study the impacts of thin layer disposal in Mobile Bay to ensure this long-term solution is not detrimental for the productivity and quality of these areas.

Mobile Baykeeper appreciates the opportunity to provide input on the Mobile Harbor General Reevaluation Report and the DSEIS. We understand this is a long and tenuous process and appreciate the Corps taking the time to address the public's concerns and take comments into consideration to ensure all impacts are properly evaluated.

Ultimately, we encourage the Corps to select a plan that addresses the triple bottom line - the economy, environment, and community. Supporting all three of these values will continue to allow Mobile Bay thrive and continue to support its many uses.

Thank you in advance for your consideration and response to each of these comments. We request a written response to each of the provided comments. Please feel free to contact us with any questions at (251)-433-4229.

Sincerely,



Casi (kc) Callaway  
Executive Director



Cade Kistler  
Program Director



Laura Stone Jackson  
Program and Grants Coordinator

Cc: Fish and Wildlife Service, Alabama Department of Environmental Management, Environmental Protection Agency Region Four

**From:** [REDACTED] (b)(6)  
**To:** [REDACTED] (b)(6)  
**Subject:** RE: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS (UNCLASSIFIED)  
**Date:** Wednesday, July 11, 2018 9:38:00 AM

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Good morning, [REDACTED] (b)(6)

We are going to try to have all of the updates complete by COB this Friday but we are not going to submit to EPA. I have all of the notes for changes made to Section 2.4 and 4 in a hardcopy binder of the report that I will provide to [REDACTED] (b)(6). Also, [REDACTED] (b)(6) has provided his tracked changes version from yesterday to the N drive in the main report folder. It is the only file with today's date.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Wednesday, July 11, 2018 9:18 AM  
**To:** [REDACTED] (b)(6)  
**Subject:** RE: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Is our schedule still to finalize the report for submitting to EPA this Friday? Also was there any revisions to sections in the main report yesterday that should also get revised in the engineering appendix?

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Wednesday, July 11, 2018 9:15 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** FW: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

[REDACTED] (b)(6) See attached.

[REDACTED] (b)(6) Let's make sure that the report reflects well our defense of the use of 2010 data.

[REDACTED] (b)(6)

(b)(6)

-----Original Message-----

From: Laura Jackson [<mailto:ljackson@mobilebaykeeper.org>]

Sent: Friday, July 06, 2018 3:30 PM

To: DeLapp, James Andrew (Jim) COL USARMY CESAM (US) <[James.A.Delapp@usace.army.mil](mailto:James.A.Delapp@usace.army.mil)>

Cc: Cade Kistler <[ckistler@mobilebaykeeper.org](mailto:ckistler@mobilebaykeeper.org)>; Casi (kc) Callaway <[callaway@mobilebaykeeper.org](mailto:callaway@mobilebaykeeper.org)>

(b)(6)

(b)(6)

Subject: [Non-DoD Source] Mobile Baykeeper's Comments on Mobile Ship Channel DSEIS

Hi Col. DeLapp,

Attached you will find Mobile Baykeeper's comment letter on the Draft Supplemental Environmental Impact Statement (DSEIS) to evaluate improvements to the Mobile Harbor Federal Navigation Channel, Mobile, AL.

Please let me know that you have received our submission and feel free to reach out with any questions.

Thank you and have a great weekend.

-Laura

--

Laura Stone Jackson

Program & Grants Coordinator  
Mobile Baykeeper  
450-C Government Street  
Mobile, Alabama 36602  
Phone 251-433-4229  
Cell 480-707-3787  
Fax 251-432-8197

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"Clean Water, Clean Air, Healthy Communities"



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CLASSIFICATION: UNCLASSIFIED

**From:**

**To:**

**Cc:**

**Subject:**

**Date:**

Report Updates - Mobile Harbor GRR  
Wednesday, July 11, 2018 9:11:00 AM

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(b)(6)

Hey (b)(6)

From yesterday's discussion, please provide the following updates to Section 2 of the report:

- 1.) Information on bulk carriers.
- 2.) Corrected data based on Martin and Associates
- 3.) Re-write of Section 2.2.1.1 to include updates to Blakely Island Terminal and Plains.
- 4.) Re-write of Section 2.2.1.2 of APM Terminals
- 5.) Provide update to last paragraph of Section 2.5.13

Please provide the updates as soon as possible. I know these notes are a little cryptic so give me a call if you have questions.

(b)(6)

**From:**

**To:**

**Cc:**

(b)(6)

**Subject:**

FW: Beneficial Use.docx

**Date:**

Thursday, July 12, 2018 9:31:00 AM

**Attachments:**

[Beneficial Use.docx](#)

---

(b)(6) One of the comments that came out of the meeting Tuesday was that we needed to update the ODMDS area shown in the beneficial use map (attached) to the smaller ODMDS that is currently planned to be permitted and to correct the title to "placement" rather than "disposal."

Is this something you can provide fairly easily?

(b)(6)

-----Original Message-----

**From:**

(b)(6)

**Sent:** Thursday, July 12, 2018 9:05 AM

**To:**

(b)(6)

(b)(6)

**Cc:**

(b)(6)

**Subject:** Beneficial Use.docx

(b)(6)

Let me know if you're okay with the attached proposed changes to the beneficial use paragraphs.

(b)(6)

-----

(b)(5), Draft

**Subject:** COMPLETION OF DQC REVIEW - Mobile Harbor GRR  
**Date:** Friday, July 13, 2018 1:14:00 PM  
**Attachments:** [COMPLETION OF DQC REVIEW.docx](#)  
[Final DQC Certification and Comments Panama City Harbor LRR.pdf](#)

---

Attached is a draft of the certification letter for the Mobile Harbor GRR DQC and an example of what we did for Panama City Harbor. Will try to have all evaluations to comments completed today. Please help ensure that comments are backchecked and closed in Dr. Checks by Wednesday, 18 July.

**COMPLETION OF DISTRICT QUALITY CONTROL REVIEW**  
*Mobile Harbor GRR/SEIS*

**FINAL REPORT**  
**July 18, 2018**

District Quality Control Review (DQC) has been completed for the Panama City Harbor East Leg Channel Improvements Limited Reevaluation Report (LRR), Draft Report. This DQC was performed in compliance with the requirements of EC 1165-2-217.

The review commenced on May 31, 2018 and was completed on July 18, 2018. Two hundred ninety-eight (298) comments resulted from the general DQC of the final documents, all of which were closed without controversy. During the DQC review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the results, including whether the product meets the sponsor's needs consistent with law and existing U.S. Army Corps of Engineers policy.

---

(b)(5)

---

Date

---

(b)(5)

---

Date

**CERTIFICATION OF**  
**DISTRICT QUALITY CONTROL/QUALITY ASSURANCE REVIEW**

As noted above, all concerns resulting from the DQC review of the project have been fully resolved.

---

(b)(5)

---

Date



**COMPLETION OF DISTRICT QUALITY CONTROL REVIEW**  
*Panama City Harbor Improvements to Bay Harbor Channel*  
**Limited Re-evaluation Report**

**FINAL REPORT**  
**March 17, 2016**

District Quality Control Review (DQC) has been completed for the Panama City Harbor East Leg Channel Improvements Limited Reevaluation Report (LRR), Draft Report. This DQC was performed in compliance with the requirements of EC 1165-2-214.

The review commenced on March 7, 2016 and was completed on March 11, 2016. Nineteen (19) comments resulted from the general DQC of the final documents, all of which were closed without controversy. During the DQC review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the results, including whether the product meets the sponsor's needs consistent with law and existing U.S. Army Corps of Engineers policy.

(b)(5)

3/18/16

Date

(b)(5)

3/18/16

Date

**CERTIFICATION OF**  
**DISTRICT QUALITY CONTROL/QUALITY ASSURANCE REVIEW**

As noted above, all concerns resulting from the DQC review of the project have been fully resolved.

(b)(5)

23 MARCH 2016

Date

Comment Report: All Comments

Project: Panama City Harbor East Leg Channel Improvements LRR

Review: DQC Final LRR

Displaying 19 comments for the criteria specified in this report.

<b>Id</b>	<b>Discipline</b>	<b>Section/Figure</b>	<b>Page Number</b>	<b>Line Number</b>
6424018	Navigation	4.2.3	Main Report	n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

(b)(5)

Pages 5 through 12 redacted for the following reasons:

-----  
(b)(5), Internal/Draft Comments/FOUO

**From:** [REDACTED]  
**To:** [REDACTED]  
**Cc:**  
**Subject:** Focus Group Meetings.docx  
**Date:** Friday, July 13, 2018 3:12:00 PM  
**Attachments:** [Focus Group Meetings.docx](#)

---

[REDACTED]

I was supposed to send the focus group meeting that have been held for the public involvement. See attached.

[REDACTED]

## **Scoping Meeting**

Jan 12, 2016 – Public Scoping Meeting

## **General Public Meetings**

Mar 16, 2017 – General Public Meeting, Mobile Cruise Terminal

Sep 14, 2017 – General Public Meeting, Daphne

Feb 22, 2018 – General Public Meeting, Convention Center, Mobile

## **Focus Group Meetings**

Aug 09, 2016 – Meeting with Dauphin Island Interests in Mobile District Office

Feb 10, 2017 – Col. DeLapp Meeting with Audubon Society, Mobile District Office

Mar 01, 2017 – Col. DeLapp Meeting with Mobile Baykeepers, Mobile District Office

Apr 20, 2017 – Attended Propeller Club Meeting, Battle House Conference Room

May 11, 2017 – Meeting at Dauphin Island between Col. DeLapp, DI Mayor and property owners

May 18, 2017 – Attended Partners for Environmental Progress Meeting

Jun 14, 2017 – Col DeLapp presentation at Coastal Business and Environmental Issues, Dauphin Island

Jul 12, 2017 – Meeting with Crabbers and Fishmongers, Bayou La Batre

Jul 19, 2017 – Sierra Club, NEPA compliance Concerns for the SEIS, Mobile District

Aug 17-18, 2017 – Focus Group Meeting, South Mobile County Commercial Fishing Interests, Bayou La Batre

Sep 28, 2017 – Focus Group Meeting in Africatown

Dec 08, 2017 –Eastern Shore Commercial Seafood Interests, Bon Secour

Dec 12, 2017 – Meeting with Dauphin Island Property Owners and Interests, Mobile District Office

Dec 13, 2017 – Local Environmental NGO's, Mobile District Office

Jan 18, 2018 – Recreational Sportsmen Interests, ASPA Office

Mar 16, 2018 – Meeting with DIPOA Boards Members and Engineering reps, ASPA Office

Jun 05, 2018 – Meeting with Maysville Community, Maysville

Jun 25, 2018 – Ecumenical Ministries, Mobile

Jun 25, 2018 – Meeting with Down the Bay Community, Mobile



**From:** [REDACTED] (b)(6)  
**To:** [REDACTED] (b)(6)  
**Subject:** FW: IWR Deliverable: Mobile Harbor CAP IEPR - Selected Panel Document  
**Date:** Friday, July 13, 2018 10:59:00 AM  
**Attachments:** [IWR Selected Panel Members for the Mobile Harbor IEPR.pdf](#)

---

Just want to make sure that you guys are okay with the proposed IEPR reviewers...

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Friday, July 13, 2018 10:51 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** FW: IWR Deliverable: Mobile Harbor CAP IEPR - Selected Panel Document

Hi [REDACTED] (b)(6)

Please see attached. I need your feedback on whether or not the proposed Panel members for the Mobile Harbor IEPR are free from any known conflicts of interest. Sometimes a reviewer may slip through and a PDT knows that they shouldn't be doing the review. Need your feedback before next Wed (18 July) please.

Thanks and please let me know if you have any questions,

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Thursday, July 12, 2018 10:00 AM  
**To:** [REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** [Non-DoD Source] IWR Deliverable: Mobile Harbor CAP IEPR - Selected Panel Document

Hello,

Please find attached information on the selected panel members for the Mobile Harbor IEPR. This is being delivered to you under Contract W912HQ-15-D-0001, Task Order W912HQ18F0078. The attached PDF file contains the qualifications and short bios for the four primary candidates. We have selected the most qualified panel to meet the PWS requirements.

Battelle requests USACE feedback on this deliverable which should include confirming that panel members being presented do not have any conflicts of interest that may not have been identified during the recruiting process. According to the National Academy of Sciences (NAS) Policy on Committee Composition and Balance and Conflicts of Interest , “In every case, the assessment of the qualifications of potential candidates for committee membership and the final determination of the individuals to be selected for membership on a committee rest solely with the institution.” EC 1165-2-214 indicates that NAS Policy should be followed and that USACE Headquarters has confirmed that the “institution” is the OEO (i.e., Battelle). To ensure that panel selection is consistent with NAS Policy and to eliminate additional effort in panel selection, we request that feedback not include the following:

- \* Requesting specific panel members be used or suggesting that someone from a specific company be contacted and used on the panel
- \* Requesting that a specific panel member not be used because of potential bias that is not consistent with NAS Policy
- \* Changing the technical requirements for the panel after they have been selected

We look forward to receiving your response regarding the selected candidates no later than COB, Wednesday, July 18th so that we can finalize subcontracting activities with the panel by July 27, 2018.

Thank you,

(b)(6)

(b)(6)

(b)(6)

Facebook <Blocked<http://www.facebook.com/battelle>> | LinkedIn  
<Blocked<http://www.linkedin.com/company/battelle>>

Twitter <Blocked<http://www.twitter.com/Battelle>> | YouTube  
<Blocked<http://www.youtube.com/user/battelleinnovations>>

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P Please consider the environment before printing this e-mail.

# **SELECTED PEER REVIEWERS**

## **INDEPENDENT EXTERNAL PEER REVIEW**

**of the**

### **Mobile Harbor, Alabama, Draft Integrated General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS)**

Prepared by  
Battelle  
505 King Avenue  
Columbus, OH 43201

Prepared for  
U.S. Army Corps of Engineers  
Deep Draft Navigation Planning Center of Expertise  
New Orleans District

Contract No. W912HQ-15-D-0001  
Task Order: W912HQ18F0078

July 12, 2018

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## 1.0 IEPR PANEL TECHNICAL REQUIREMENTS

Battelle is presenting a panel of four subject matter experts for the Independent External Peer Review (IEPR) of the Mobile Harbor, Alabama, Draft Integrated General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS) (hereinafter: Mobile Harbor). The team of reviewers must cover the following areas:

- Civil Works planning/economics (one panel member in dual role)
- Environmental (one panel member)
- Hydraulic/coastal engineering (one panel member)
- Geotechnical engineering (one panel member).

Battelle proposes that four experts instead of five provide the expertise sought in the Performance Work Statement (PWS). Battelle is proposing one panel member, (b)(6), to represent the Civil Works planning and economics disciplines. Mr. (b)(6) is qualified to serve in both positions (see below), he is available, and he is a quality reviewer (he has served on previous IEPR panels in this dual capacity).

## 2.0 CONFLICT OF INTEREST DETERMINATION

Battelle has screened all panel members for conflict of interest (COI) and has determined that none of the candidates possesses a COI.

## 3.0 SUMMARY OF PANEL MEMBERS

Table 1 summarizes the general background of each panel member. Table 2 provides an overview of the panel members' expertise and qualifications as they relate to the technical evaluation criteria requested in the PWS dated June 26, 2018. Following Table 2, Section 4.0 presents a waiver statement for one of the proposed experts, and Section 5.0 presents more detailed biographical information and technical expertise for each panel member.

**Table 1. Mobile Harbor IEPR Panel: Summary of Panel Members**

Name	Affiliation	Location	Education	P.E.	Exp. (yrs)
<b>Civil Works Planning / Economics (Dual Role)</b>					
(b)(6)			B.S., Civil Engineering	Yes	(b)(6)
<b>Environmental</b>					
(b)(6)			M.S., Ecology	NA	(b)(6)
<b>Hydraulic/Coastal Engineering</b>					
(b)(6)			Ph.D., Civil and Environmental Engineering	Yes	(b)(6)
<b>Geotechnical Engineering</b>					
(b)(6)			Ph.D., Civil Engineering	Yes	(b)(6)



**Table 2. Mobile Harbor IEPR Panel: Technical Criteria and Areas of Expertise**

Technical Criterion	(b)(6)			
Minimum 10 years of demonstrated experience as a water resources planner for Deep Draft Navigation (DDN) projects	X			
Demonstrated experience applying USACE plan formulation processes, procedures, and standards to DDN channel improvement projects and dredged material management plans	X			
Minimum of 15 years of demonstrated experience or combined equivalent of education and experience in DDN economics, specifically with container, bulk, and tanker trade	X			
Demonstrated experience in applying USACE procedures and standards for DDN economic analyses and in formulating and evaluating alternative plans for those projects	X			
Knowledge of tools employed for economic analysis, risk analysis, including HarborSym, risk analysis multiport analysis and trade forecasts	X			
M.S. degree in a related field	W <sup>1</sup>			
Active participation in related professional societies	X			
<b>Environmental</b>				
At least 15 years of demonstrated experience directly related to water resource environmental evaluation and NEPA compliance for DDN channel improvement and offshore dredged material management projects (i.e., to include open water, ocean disposal, and beneficial use)		X		
Minimum M.S. degree or higher in a related field		X		
Expert in coastal and estuarine habitats and associated natural resources and the environmental impacts of harbor deepening		X		
Familiar with dredged material disposal and Offshore Dredge Material Disposal Sites		X		
Expert in compliance requirements of environmental laws, policies, and regulations, including the Fish and Wildlife Coordination Act and the Endangered Species Act		X		
<b>Hydraulic/Coastal Engineer</b>				
15 years of demonstrated experience or combined equivalent of education and experience in DDN channel design			X	
M.S. degree in coastal or hydraulic engineering			X	
Knowledge of coastal processes to evaluate the impacts of deepening and/or widening the navigation channel on hydrodynamics, water quality, sediment transport, ship wake induced erosion, and channel design			X	

**Technical Criterion**

(b)(6)

Experience in the design and use of dredged material placement areas (open water, ocean disposal, and beneficial use)

Familiar with standard USACE hydrologic and hydraulic computer models

X

Five to 10 years of experience working with numerical modeling applications for navigation projects

X

Registered Professional Engineer

X

**Geotechnical Engineer**

Minimum of 15 years of demonstrated engineering experience or combined equivalent of education and experience in geo-civil design and geotechnical evaluation of DDN projects

X

M.S. degree or higher in geotechnical engineering

X

Must have an understanding of the behavior of aquifers and soils, as well as the classification, dredging, and disposal of material for deep draft navigation projects

X

Experience in geotechnical risk analysis

X

Active participation in related professional engineering and scientific societies

X

Registered Professional Engineer

X

W<sup>1</sup> - See Section 4.0 Panel Member Waiver Statements

**4.0 PANEL MEMBER WAIVER STATEMENT**

Battelle is proposing four highly qualified experts for this IEPR with the following educational waiver (W<sup>1</sup>) for one of the experts. As noted in Table 2 above, the performance work statement states that the Civil Works Planner/economist panel member should have "Minimum M.S. degree or higher in a related field."

(b)(6) earned a B.S. in civil engineering and has 39 years of experience directly related to Civil Works planning and economic analysis, including 19 years with USACE. He also has relevant expertise in the project area. Battelle is confident that (b)(6) is a qualified expert for this panel position.

## 5.0 PANEL MEMBER BIOSKETCHES

<b>Name</b>	(b)(6)
<b>Role</b>	(b)(6)
<b>Affiliation</b>	(b)(6)

(b)(6)

(b)(6) has worked on dozens of USACE Civil Works projects (b)(6) and is very familiar with applying the Principles and Guidelines (P&G). He has taken part in previous IEPR panels for Battelle as an economist/Civil Works planning expert.

(b)(6) is experienced in water resources planning and economics, specifically with container, bulk, and tanker trade for deep draft navigation (DDN) projects, for which he has provided DDN studies, reconnaissance studies, feasibility studies, limited reevaluation reports, GRRs, major rehabilitation reports, and continuing authority studies. Relevant studies include the (b)(6)

(b)(6)

(b)(6) private sector experience includes deep and shallow draft navigation, structural and non-structural flood risk management projects, water quality, and water supply studies

(b)(6) has direct experience in USACE plan formulation processes, procedures, and standards on DDN channel improvement projects and dredged material management plans. (b)(6) years in the Planning Divisions of the (b)(6) Districts. He then moved to Project Management, where he continued to lead planning projects such as the (b)(6)

(b)(6)

(b)(6) led the development of dredged material management plans (DMMPs) for (b)(6) (b)(6) He also served as a senior technical advisor for preparation of the (b)(6) (b)(6)

He applied the USACE six-step planning process, governed by Engineer Regulation (ER) 1105-2-100 (Planning Guidance Notebook), for DMMPs, reconnaissance studies, feasibility studies, limited reevaluation reports, general reevaluation reports, major rehabilitation reports, and continuing authority studies. Within the context of the risk-informed decision-making process for these studies, he has evaluated whether adequate information was available and appropriate technical analyses were completed to support selection of a tentatively selected plan (TSP).

(b)(6) has experience with deep draft navigation planning procedures and standards. (b)(6)

(b)(6) he has conducted traditional National Economic Development (NED) plan benefits analyses associated with navigation and flood risk management projects. This includes economic analyses for DMMPs for (b)(6) He also served on the IEPR Panel for the (b)(6)

In addition (b)(6) has knowledge of tools employed for economic analysis, risk analysis (including HarborSym), risk analysis multiport analysis, and trade forecasts (b)(6) (b)(6) Feasibility Reports are examples of his experience with multiport analysis and trade forecasts.

Name Role Affiliation	(b)(6)
-----------------------------	--------

(b)(6)

(b)(6) He has managed and participated as principal investigator in a variety of projects and programs with varied environmental impacts including environmental assessments under NEPA, water quality and storm water studies, wetlands delineation, assessment, mitigation and permitting, and essential fish habitat investigation.

(b)(6) as expertise in water resource environmental evaluation and NEPA compliance for DDN channel improvement and offshore dredged material management projects (i.e., to include open water, ocean disposal, and beneficial use) as demonstrated by his work experience on a variety of projects throughout the United States. He has served as an IEPR panel member for several flood control and ecological restoration projects on behalf of USACE, including those with coastal components and dredging issues such as (b)(6)

(b)(6) xperience in ecotoxicology and management of contaminated sediments is extensive: he has worked on ecological risk assessments nationwide on behalf of USACE, EPA, and private entities (b)(6)

(b)(6) is an expert in coastal and estuarine habitats and associated natural resources and in the environmental impacts of harbor deepening. He is familiar with dredged material disposal and Offshore Dredge Material Disposal Sites. (b)(6)

(b)(6)

(b)(6) has expertise in compliance requirements of environmental laws, policies, and regulations, including the Fish and Wildlife Coordination Act and the Endangered Species Act. He is a Licensed Site Remediation Professional (LSRP) in (b)(6) and has extensive experience as a USACE and EPA contractor in investigation and remediation of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites. He is also a certified Professional Wetland Scientist (PWS), a Certified Energy Manager (CEM), and is a LEED® Accredited Professional (LEED AP) (b)(6)

(b)(6)

(b)(6)

Name Role Affiliation	(b)(6)
-----------------------------	--------

(b)(6)

(b)(6) He has a strong background in coastal engineering, river hydrology, and hydraulics (b)(6) education and experience in biological engineering, environmental engineering, and civil engineering have provided him with an understanding of the biological processes that occur in the environment and unique insight into the biological effects and hydrodynamics within coastal and riverine environments.

Dr. (b)(6) coastal expertise includes experience in DDN channel design. (b)(6) (b)(6) to study the hydrodynamics in and around the navigation channel, as well as the water quality within the channels and effects from potential channel deepening.

Through his work in hydrodynamic modeling, (b)(6) knowledgeable in coastal processes to evaluate the impacts of deepening and/or widening the navigation channel on hydrodynamics, water quality, sediment transport, ship wake induced erosion, and channel design. He has done extensive hydrodynamic modeling in and around the coastal areas (b)(6)

(b)(6) extensive background in the coastal and hydraulic evaluation of nearshore restoration actions in these areas. (b)(6) modeling work was completed in support of restoring more than 350 acres of coastal marsh and supplying sediment and nutrients to the marsh under various restoration scenarios; (b)(6) conducted to evaluate the impacts of various (b)(6) scenarios on salinity in the system. His riverine experience includes scour analysis and supercritical flow from his work (b)(6)

(b)(6) He has modeling experience with the Adaptive Hydraulics Modeling System (ADH), Environmental Fluid Dynamics Code (EFDC), HEC-RAS, and HEC-Reservoir System Simulation (ResSim).

(b)(6) has experience in the design and use of dredged material placement areas (open water, ocean disposal, and beneficial use). His modeling work (b)(6) the beneficial use of dredged material for marsh creation, levee building, and terrace construction. As the coastal engineer for (b)(6) he reviewed and evaluated the use of captured river sediments as beach nourishment.

(b)(6)

(b)(6) led the modification of the HEC-ResSim model to evaluate effects from model changes on the water quality results downstream.

Name Role Affiliation	(b)(6)
-----------------------------	--------

(b)(6)

(b)(6)

(b)(6) has conducted IEPRs for major USACE flood control and storm damage risk reduction projects and river ecosystem restoration projects. He understands the behavior of aquifers and soils based on his extensive geotechnical and geo-environmental experience.

(b)(6) experienced in geotechnical risk analysis and is familiar with USACE risk registers and cost and schedule risk analysis. He has addressed safety assurance review (SAR) aspects on several USACE projects, including the (b)(6)

(b)(6)

(b)(6) is particularly skilled in the analysis and evaluation of uncertainty and risk and in the reliability of complex infrastructure systems (b)(6)

(b)(6)

(b)(6) initiated development of a geotechnical analysis of levee-system



slope stability as part of risk and uncertainty consideration of length effects in levee system reliability. In addition, (b)(6) investigated the use of statistical analysis to characterize the probability of undiscovered geologic and geotechnical details affecting levee stability and reviewed and commented on USACE's draft Engineer Technical Letter (ETL) 1110 2-570, Certification of Levee Systems for the National Flood Insurance Program, with a focus on geotechnical risk and uncertainty considerations.

(b)(6)

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***BATTELLE***

**It can be done**



**From:** [redacted]  
**To:** [redacted] (b)(6)  
**Cc:**  
**Subject:** FW: [Non-DoD Source] Reply to your July 6, 2018 letter  
**Date:** Monday, July 16, 2018 8:01:03 AM  
**Attachments:** [2018-07-15 reply BG Diana Holland.pdf](#)  
[2018-02-26 Corps Sand Dredging History.pdf](#)

---

[redacted] not relevant

Do either of you have the Holland brief you can send to (b)(6)?

---

**From:** [redacted] (b)(6)  
**Date:** July 16, 2018 at 7:49:22 AM CDT  
**To:** [redacted] (b)(6)  
**Cc:** [redacted] (b)(6)

[redacted] (b)(6)

**Subject:** FW: [Non-DoD Source] Reply to your July 6, 2018 letter

(b)(6) pls send me the latest placemat we used to brief BG Holland when you visited two weeks ago. I will pass to (b)(6) and (b)(6) ..my recommendation is they share it with HQ along with an offer for us to conduct a VTC to explain sediment transport and our dredge material disposal plans.

(b)(6)

[redacted] (b)(6)

-----Original Message-----

**From:** Joly, Sebastien P COL USARMY CESAM (US)  
**Sent:** Monday, July 16, 2018 7:31 AM

**To:** [redacted] (b)(6)  
[redacted] (b)(6)  
[redacted] (b)(6)

**Cc:** [redacted] (b)(6)  
[redacted] (b)(6)

**Subject:** FW: [Non-DoD Source] Reply to your July 6, 2018 letter

(b)(6) As mentioned in the previous email.

(b)(6) - not sure who is best postured to reply to BG Holland's request for the science briefing for the Chief below. Please provide me the status and way ahead to reply to BG Holland by the end of the day.

Thanks.

-spj

-----Original Message-----

From: Holland, Diana M BG USARMY CESAD (US)

Sent: Monday, July 16, 2018 6:24 AM

To: Joly, Sebastien P COL USARMY CESAM (US) <Sebastien.P.Joly@usace.army.mil> (b)(6)

(b)(6)

Subject: Fwd: [Non-DoD Source] Reply to your July 6, 2018 letter

All,

This reminded me to check on the status of providing the Chief with a “science” briefing on this project. Will also need to highlight what aspects she believes Corps employees are untruthful.

Thanks

---

From: (b)(6)  
Date: July 16, 2018 at 12:18:14 AM EDT  
To: Diana M. Holland BG <Diana.m.holland2.mil@mail.mil>  
Cc: (b)(6)  
Subject: [Non-DoD Source] Reply to your July 6, 2018 letter

Dear Brigadier General Diana Holland,

Thank you for replying to my email of June 27, 2018.

I have attached my reply to your July 6, 2018 letter and the Corps Sand Dredging History for your information.

I very much look forward to you sending me information about the sand coming to Dauphin Island.

Since you have only been the commander of the South Atlantic Division for only a year, I will send you all of my emails of the facts about the Corps causing the erosion to Dauphin Island. I feel after you read them, you will understand why the first thing I told Col. DeLapp was -- the Mobile District employees were not telling him the truth about Dauphin Island.

Sincerely,

(b)(6)

(b)(6)

July 15, 2018

Diana M. Holland  
Brigadier General, U.S. Army Commanding  
Department of The Army  
U.S. Army Corps of Engineers, South Atlantic Division  
60 Forsyth Street SW, Room 10M15  
Atlanta, Ga 30303-8801

Dear General Holland,

I am in receipt of your letter of July 6, 2018 that was a response to my letter to LTG Todd T. Semonite, Commander of the U.S. Army Corps of Engineers dated June 27, 2018. In your letter, you offered your assurance that “the Mobile District will address the cumulative effects of the Mobile Harbor over the years”. I find this contradictory to the evidence, since Mr. Justin McDonald of the Mobile District on several occasions, including the recent public meeting held February 22<sup>nd</sup> stated unequivocally that the Mobile District will only address the incremental impact of the maintenance dredging of the Mobile Ship channel as it exists today in its weakened state, which is a result of a loss of over 24 million cubic yards of sand from the littoral system since about 1980.

For the first time, and at the same public meeting, the Corps Mobile District admitted that 50% of the sands dredged from the Outer Bar Channel and placed in the so-called Sand Island Beneficial Use Area (SIBUA) remain within that site instead of being moved by currents to Dauphin Island as the Corps has claimed occurred for the last two decades. Furthermore, the Mobile District has no monitoring system to know where the sand that moves out of the SIBUA per an article that appeared in the magazine ClimateWire: Friday, July 18, 2014, “Pat Robbins, a spokesman for the Army Corps of Engineers district office in Mobile, said the agency does in fact place dredged sand in a “beneficial use area” south and east of Dauphin Island, where it can migrate through currents to sand-starved beaches. **But the Army Corps has no formal monitoring program to ensure that the sand is reaching its intended targets.** Asked whether Dauphin Island was being aided by the Army Corps' dredge operation, Robbins said, “Parts of it are, parts of it aren't. That's just typical of barrier islands.”

General Holland, maybe you could answer the question about how much of the 7 million cubic yards of sand that has moved out of SIBUA has made it to the **entire shoreline** of Dauphin Island. If you cannot answer the question, that means, since 1999, around 14 million cubic yards of naturally provided sands have been prevented from reaching and nourishing Dauphin Island. That represents a significant cumulative loss of beach quality sands, which is contributing to the sand-starved nature of Dauphin Island and its observed erosion – **an impact that is made worse each time the Outer Bar Channel is dredged.** And, this does not include the dredged sands that were historically dumped into the open Gulf prior to 1999 when the Corps began use of the SIBUA.



Despite the Corps' acknowledgement that the Mobile Harbor project has created a sand deficit; the Corps have not stated what it will do to mitigate the erosion problem.

In May 2017, Col. DeLapp state to me in two different letters:

“I also wish to convey that the USACE is actively investigating a strategy to modify our current dredging and placement practices that would beneficially place the sand dredged from the bar channel in a manner that would direct it to Dauphin Island.”

Even though that was over a year ago, nobody at the Corps will tell me how they are going to modify the maintenance dredging practices that would place sand near Dauphin Island.

You also indicated that the Draft Supplemental Environmental Impact Statement and General Reevaluation Report for the Mobile Harbor will be released in late July and that the Mobile District will conduct an open house, after the documents are available, to give the public additional opportunities to review and understand the findings. A proposed open house is not conducive to a productive discussion with the public and it is important that the Mobile District hold a meeting like that which was held February 22, 2018, in which the Corps presents the facts about the erosion on Dauphin Island and the public has an opportunity for open dialog and discussion with the Corps representatives. After the Corps representatives present their findings etc., the public attending will have an opportunity to benefit from specific conversation and questions. The Corps must not refuse to answer anyone's questions or to cut off discussion, as they did at the February 22<sup>nd</sup> public meeting. There will be no benefit for an open house forum.

I look forward to hearing from you about the Corps knowledge of how much of the sand from SIBUA has reached the shoreline of Dauphin Island and that the Mobile District will have a public meeting allowing for open questions from all and discussions without any time limits.

Sincerely,



(b)(6)

**Mobile Harbor Outer Bar Channel Dredging History (1980-2009)**  
(Source: USACE annual maintenance quantities)

Dredge Date	Gross Quantity Dredged (yd <sup>3</sup> )	Disposal Area Used <sup>1/</sup>
Feb-Dec 1980	1,129,337	ODMDS
Jan-Mar 1981	610,623	ODMDS
Dec 1982-Jan 1983	312,408	ODMDS
Jan-Nov 1984	559,607	ODMDS
Aug-Oct 1985	1,386,536	ODMDS
Jan-Feb 1987	656,089	Nearshore Feeder Berm
Feb 1989-May 1990	<sup>2/</sup> 6,755,352	ODMDS
Aug-Sep 1992	466,607	ODMDS
Nov-Dec 1995	621,172	ODMDS
Aug-Dec 1997	710,996	ODMDS
Sep-Oct 1998	1,279,780	ODMDS
Aug-Sep 1999	71,380	ODMDS
	54,600	SIBUA
May-Sep 1999	<sup>3/</sup> 3,061,598	SIBUA
Apr-Jul 2000	758,280	ODMDS
Mar 2002-May 2002	92,820	SIBUA
Jun 2004	230,110	SIBUA
Oct 2004-Nov 2004	1,184,817	SIBUA
Oct 2004-Jan 2005	1,808,765	SIBUA and at Lighthouse
Aug 2005	67,555	SIBUA
Apr-Jun 2006	487,975	SIBUA
Aug 2007	1,083,860	SIBUA
Nov-Dec 2008	585,430	SIBUA
Sept-Nov 2009	942,817	SIBUA
<b>Total Dredged from Outer Bar Channel</b>	<b>24,918,514</b>	For 30 years 1980-2016
<b>Total Placed in Ocean DA</b>	<b>14,672,078</b>	For 30 years 1980-2016
<b>Total Placed at Nearshore Feeder Berm</b>	<b>656,089</b>	For 1987 only
<b>Total Placed in SIBUA or at Lighthouse</b>	<b>9,600,347</b>	For 30 years 1980-2016
<b>Average Annual Maintenance Dredging Volume</b>	<sup>4/</sup> <b>503,000</b>	For 30 years 1980-2016

<sup>1/</sup> ODMDS – EPA approved open water Ocean Dredged Material Disposal Site

SIBUA – Sand Island Beneficial Use Area

<sup>2/</sup> New work deepening from 42 to 47 feet

<sup>3/</sup> New work deepening from 47 to 49 feet.

<sup>4/</sup> Excludes new work deepening volumes in 1989-1990 and 1999

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** Fwd: Mobile Harbor ATR Team  
**Date:** Monday, July 16, 2018 2:21:21 PM

---

(b)(6) please forward attachments to (b)(6)

(b)(6) I'll be back in the office Wednesday if you have any questions.

---

**From:** [REDACTED] (b)(6)  
**Date:** July 16, 2018 at 1:35:27 PM CDT  
**To:** [REDACTED]  
**Cc:** [REDACTED] (b)(6)  
**Subject:** Mobile Harbor ATR Team

Hi (b)(6)

Please see attached. The table has the financial, budget, and org code info for the ATR Team. Please set up labor codes and send me a CEFMS list of the codes when they're ready.

Please take a look and let me know if you have any questions.

Thanks!

[REDACTED] (b)(6)

**From:** [REDACTED]  
**To:** (b)(6)  
**Cc:**  
**Subject:** Public release mobile harbor grr  
**Date:** Monday, July 16, 2018 2:26:29 PM

---

(b)(6) we plan to submit to epa by this Friday which will post the public notice the following Friday, July 27. We will then prioritize iepr, atr , and policy reviews in that order as soon as possible following public release.

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From [REDACTED] (b)(6)  
Date: July 16, 2018 at 2:02:43 PM CDT  
To [REDACTED] (b)(6)  
Subject: Message from [REDACTED] (b)(6)

**From:** [Redacted]  
**To:** [Redacted] (b)(6)  
**Cc:**  
**Subject:** Re: [Non-DoD Source] RE: Public Comment Period - Mobile Harbor GRR  
**Date:** Monday, July 16, 2018 8:33:22 AM

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[Redacted] (b)(6) see question below.

---

**From:** [Redacted] (b)(6)  
**Date:** July 16, 2018 at 8:31:16 AM CDT  
**To:** [Redacted] (b)(6)  
**Subject:** [Non-DoD Source] RE: Public Comment Period - Mobile Harbor GRR

Are we handling the NOA or are you?

[Redacted] (b)(6)

-----Original Message-----

**From:** [Redacted] (b)(6)  
**Sent:** Friday, July 13, 2018 3:42 PM  
**To:** [Redacted] (b)(6)  
[Redacted] (b)(6)  
**Cc:** [Redacted] (b)(6)  
[Redacted] (b)(6)  
**Subject:** Public Comment Period - Mobile Harbor GRR

All,  
Following are the key upcoming dates for the Mobile Harbor GRR:  
19 July 2018 - Post the GRR/SEIS to the EPA site  
27 July 2018 - EPA Post GRR/SEIS to public  
06 Sep 2018 - Public Meeting at Convention Center  
10 Sep 2018 - Public Comment Period Ends

[Redacted] (b)(6)

**From:** (b)(6)  
**To:** (b)(6)  
**Subject:** FW: Mobile Harbor BCR @ 7%  
**Date:** Wednesday, July 18, 2018 4:56:00 PM

---

Just FYI...Based on the current numbers, the BCR is 1.5 at a 7% discount rate for Mobile Harbor.

(b)(6)

-----Original Message-----

**From:** (b)(6)  
**Sent:** Wednesday, July 18, 2018 3:52 PM  
**To:** (b)(6)  
**Cc:** (b)(6)  
**Subject:** RE: Mobile Harbor

The BCR at 7% is 1.5 for 50' channel depth with widener.

(b)(6)



**From:** (b)(6)  
**To:** [Joly, Sebastien P COL USARMY CESAM \(US\)](#)  
**Cc:** (b)(6)  
**Subject:** Latest Mobile Harbor Main Report  
**Date:** Wednesday, July 18, 2018 5:23:00 PM  
**Attachments:** [Mobile Harbor Main Report 07-18-2018.pdf](#)

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COL. Joly,  
Attached is the latest copy of the Mobile Harbor Main Report.



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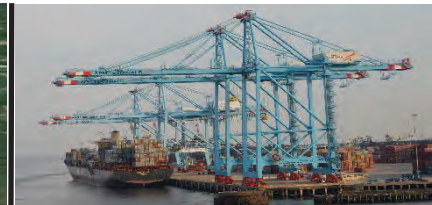
# MOBILE HARBOR, MOBILE, ALABAMA

# DRAFT

## Integrated General Reevaluation Report With Supplemental Environmental Impact Statement

July 2018

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**US Army Corps  
of Engineers**  
Mobile District



**RESPONSIBLE AGENCIES:** The lead agency for the navigation study is the U.S. Army Corps of Engineers (USACE), Mobile District. The Alabama State Port Authority (ASPA) is the non-Federal sponsor (NFS).

**ABSTRACT:** The study area encompasses Mobile Bay, Alabama which is bounded by the Morgan Peninsula to the east and Dauphin Island, a barrier island to the west. Mobile Bay is somewhat triangularly shaped with an area of approximately 413 square miles. At its largest dimensions it is 31 miles long and 24 miles wide. The deepest (about 50 feet (ft)) areas of the bay are located within the Federal navigation channel, which serves Alabama's only port for ocean-going vessels, but the average depth of the bay is 10 ft. The Mobile Bay Watershed is the sixth largest river basin in the U.S.

The study evaluated a range of alternative plans that would improve the safety and efficiency of the existing navigation system. Navigation concerns include three main types of problems: larger size vessels experience transit delays due to existing width of channel; existing channel depths limit vessel cargo capacity; and, existing traffic congestion has increased safety concerns. The Tentatively Selected Plan (TSP) includes the following navigation improvements:

- Deepen the existing Bar, Bay (including the Choctaw Pass Turning Basin), and River Channels (south of station 226+16) by 5 ft to project depths of 52, 50, and 50 ft, respectively, with an additional 2 ft for advanced maintenance plus 2 ft of allowable overdepth for dredging (total depths of 56, 54, and 54 ft, respectively).
- Incorporate minor bend easings at the double bends (at stations 1857+00 and 1775+26) in the Bar Channel approach to the Bay Channel.
- Widen the Bay Channel from 400 ft to 500 ft from the mouth of Mobile Bay northward for 3 nautical miles to provide a two-way traffic area for passing.
- Expand the Choctaw Pass Turning Basin 250 ft to the south (at a depth of 50 ft) to better accommodate safe turning of the design vessel and other large vessels.

Placement areas for the new work material dredged for the proposed navigation improvements are as follows:

- Relic Shell Mined Area
- Sand Island Beneficial Use Area (SIBUA)
- Ocean Dredged Material Disposal Site (ODMDS)

Placement areas for material dredged during maintenance will remain unchanged with the exception of the proposed extensions to the SIBUA and the ODMDS.

The TSP is economically justified with a benefit-to-cost ratio (BCR) of 3.0. The estimated project costs are \$387.8 million.

## **EXECUTIVE SUMMARY**

The results of engineering, economic, environmental, and real estate investigations performed for this General Reevaluation Report (GRR) are being used to determine if the Federal Government should participate in design and construction of potential navigation improvements at Mobile Harbor, Alabama. The ASPA requested the USACE, Mobile District initiate a study to evaluate widening and deepening Mobile Harbor as authorized under Section 201 of the Water Resources Development Act (WRDA) of 1986 (Public Law (PL) 99 – 662, Ninety-ninth Congress, Second Session), which was approved on 17 November 1986, and subsequently amended by Section 302 of the WRDA of 1996.

### **DESCRIPTION OF THE REPORT**

This Draft Integrated General Reevaluation Report With Supplemental Environmental Impact Statement (Draft GRR/SEIS) documents the study process and presents the results of investigations and analyses conducted to evaluate modifications to the existing Federal navigation system to improve its ability to efficiently serve the current and future vessel fleet. It presents: (1) a survey of existing and future conditions; (2) an evaluation of related problems and opportunities; (3) development of potential alternatives; (4) a comparison of costs, benefits, potential adverse impacts, and feasibility of those alternatives; and (5) identification of the TSP.

### **PURPOSE AND NEED**

The cargo transportation industry continues its shift to increased use of standardized containers used for multimodal (marine, rail, and truck) freight transportation systems. Additionally, the marine vessel fleet is trending to larger, deeper-draft vessels, particularly for containerships and dry bulk carriers. The Federal navigation channel serving Mobile Harbor's major terminals is currently constructed to a depth of 45 feet (ft) mean lower low water (MLLW). The existing dimensions of this channel place constraints on deeper-drafting containerships and coal carriers, which result in reduced efficiency and increased costs.

The principal navigation problem is larger vessels are experiencing transportation delays and inefficiencies due to limited channel depth and width. This problem is a result of increasing number and size of vessels entering and departing Mobile Harbor. The existing channel depths and widths limit vessel cargo capability, restrict many vessels to one-way traffic and in some areas limit transit operations to daylight hours only.

### **EXISTING AND AUTHORIZED CHANNEL DIMENSIONS**

Figures 1 thru 8 at the end of this summary provide key information and illustrate the general locations of the most important project features.



The project is currently constructed to a depth of 47 ft x 600 ft wide in the Bar Channel; 45 ft deep x 400 ft wide in the Bay Channel; 45 ft deep x 1,570 ft long x 715 ft wide in the Choctaw Pass Turning Basin; 45 ft deep x 600 ft wide in the Mobile River Channel south of station 226+16 (i.e., the lower 1,850 ft of the River Channel); and 40 ft deep x 600 ft wide in the River Channel above station 226+16.

The fully authorized dimensions per Section 201 of WRDA of 1986, PL 99-662, are 57 ft deep x 700 ft wide in the Bar Channel; 55 ft deep x 550 ft wide in the Bay Channel, except for the upper 3.6 miles which are authorized to 650 ft wide; 40 ft deep x 1,500 square ft in the Choctaw Pass Turning Basin; 55 ft deep x 600 ft wide below station 226+16 in the River Channel; and 40 ft deep x 600 ft wide above station 226+16 in the River Channel. The Choctaw Pass Turning Basin was further evaluated in a 2007 GRR and ultimately authorized and constructed to its current dimensions.

## **ALTERNATIVES AND TSP**

After determination of the problems and needs of the study area the Project Delivery Team (PDT) identified specific measures that could, or in combination with other measures, be used to address the problems. Subsequently, the PDT developed an initial array of alternatives and refined them through a screening process that evaluated their completeness, effectiveness, efficiency, and acceptability in order to maximize overall benefits and minimize costs and adverse impacts. The resulting focused array included a deepening measure with alternative depths ranging from 47 to 50 ft (an additional 2 ft of depth in the Bar Channel), and a widening measure that added 100 ft of width to the Bay Channel for 3 to 5 nautical mile lengths for each deepening alternative.

To determine whether the Federal Government should participate in implementing navigation improvements, the expected returns to the national economy (National Economic Development (NED) benefits) are calculated. Net benefits are calculated by subtracting the total cost to construct and maintain the improvements over a 50-year study period from the total transportation cost savings that would be generated by the proposed improvements over that period. The NED Plan is the alternative that reasonably maximizes net NED benefits while remaining consistent with the Federal objective of protecting the Nation's environment.

Further refinement of the focused array indicated that the 5-nautical mile widener would not be feasible for the depths under consideration; therefore, the PDT eliminated it from further consideration. Based on the project objectives and NFS input, both deepening and widening were to be desired outcomes. The analysis of the alternatives also established potential construction costs. The NFS used the cost data to determine the maximum project cost it could support given the requirement to cost share construction. With this information, the NFS indicated that deepening to 50 ft appeared to be the maximum that it could support. Based on analysis of the final array, the PDT narrowed

the array to an alternative that appeared likely to satisfy the project objectives and be considered for selection as the TSP. That plan is the 50-foot deepening alternative with 100 ft of channel widening for a distance of 3 nautical miles. This alternative has greater net benefits than smaller scale plans (47, 48, and 49 ft), and, considering categorical exemption from the NED Plan per paragraphs 3-2b(10) of Engineering Regulation (ER) 1105-2-100, the PDT analyzed a sufficient number of alternatives to insure that net benefits do not maximize at a scale smaller than the 50-foot plan.

The recommended TSP modifications consist of the following:

- Deepen the existing Bar, Bay (including the Choctaw Pass Turning Basin), and River Channels (south of station 226+16) by 5 ft to project depths of 52, 50, and 50 ft, respectively, with an additional 2 ft for advanced maintenance plus 2 ft of allowable overdepth for dredging (total depths of 56, 54, and 54 ft, respectively).
- Incorporate minor bend easings at the double bends (at stations 1857+00 and 1775+26) in the Bar Channel approach to the Bay Channel.
- Widen the Bay Channel from 400 ft to 500 ft from the mouth of Mobile Bay northward for 3 nautical miles to provide a two-way traffic area for passing.
- Expand the Choctaw Pass Turning Basin 250 ft to the south (at a depth of 50 ft) to better accommodate safe turning of the design vessel and other large vessels.

Placement areas for the new work material dredged for the proposed navigation improvements are as follows:

- Relic Shell Mined Area
- Sand Island Beneficial Use Area (SIBUA) Extension
- Ocean Dredged Material Disposal Site (ODMDS) Expansion

Placement areas for material dredged during maintenance will remain unchanged with the exception of the proposed extensions to the SIBUA and the ODMDS.

## **COSTS AND BENEFITS**

The USACE employed the traditional providers of commodity and fleet projections to study the Mobile Harbor project. Based on existing and future vessel traffic, vessel fleet mix, trade route allocations, and liner services currently associated with the port, the PDT identified two design vessels: (1) a 1,100-foot long, 158-foot beam, 50-foot draft containership; and (2) a 851-foot long, 141-foot beam, 51.6-foot draft bulk carrier. The containership dimensions correspond with the range of vessels comprising Post-Panamax Generation 3 class. The Harborsym economic model was used to calculate benefits. The PDT used the characteristics of the design vessels to develop channel dimension and alignment needs. Refinement of the dimensions and alignment is expected through application of further ship simulation analysis prior to developing final designs.



The projected growth of containerized traffic and coal allocated primarily between the time-modified mix of the two design vessels (without inducing traffic from other ports) has provided average annual net benefits of \$34.5 million for the TSP. The project is economically justified with a BCR of 3.0. The estimated project costs are \$387.8 million. The benefits are achieved by transportation savings through the use of larger ships to transport the projected cargo volumes.

The cost estimate shown in Table 1 for the TSP reflects all project features, including the maintenance costs, real estate costs, and associated costs.

**Table 1. Cost Allocation for the Tentatively Selected Plan**

Description	Total Costs (K)	Implementation of Costs (K)			
		Federal	%	Non-Federal	%
General Navigation Features (GNF)					
Dredging: Deepening including Bend Easing and Turning Basin	\$350,372	\$262,779	75	\$87,593	25
Dredging: 100' Widening 3 Nautical Mile Lane	\$12,773	\$9,580	75	\$3,193	25
Lands Easements Rights of Way and Relocation (LERR)	\$40	\$0	0	\$40	100
Preconstruction, Engineering & Design	\$8,542	\$6,406	75	\$2,136	25
Construction Management	\$4,029	\$3,022	75	\$1,007	25
Subtotal of GNF	\$375,756	\$281,791	75	\$93,969	25
10% of GNF		(\$37,576)	-	\$37,576	-
GNF LERR credit		\$40		(\$40)	
Associated Costs:					
Local Service Facilities: Berthing (ASPA)	\$11,397	\$0	0	\$11,397	100
Aids to Navigations (U.S. Coast Guard)	\$609	\$609	100	\$0	0
Total Estimated Costs:	\$387,762	\$244,860	63	\$142,981	37
<b>Incremental Annual Maintenance Cost (FY18 Price Level)</b>					
Deepening, Bend Easing, Widening, Turning Basin	\$2,358	\$2,358	100	\$0	0

**ENVIRONMENTAL IMPACTS**

Results of the detailed analyses suggest that, overall, no substantial impacts in aquatic resources within the study area are anticipated due to channel modifications. This is likely because the area of greatest potential changes to environmental conditions are already adapted to natural shifts in salinity. Although SLR has the potential to alter aquatic resource habitats within Mobile Bay, additional impacts related to project implementation remain negligible under the 0.5 meter SLR scenario. Modeling of monthly water quality parameters specifically focusing on salinity and dissolved oxygen (DO) indicates that differences between the With-Project and Without-Project conditions show minimal changes and the changes are well within tolerance levels for the aquatic resources. All water quality standards will be adhered to during construction activities to ensure minimal adverse effects.

The USACE has determined that overall affects to essential fish habitat and protected species would be temporary in nature associated with the dredging and placement activities. These determinations are being coordinated with the National Marine Fisheries Service, Habitat Conservation Division according to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801-1882). The USACE has initiated consultation with the U.S. Fish and Wildlife Service under Section 7 coordination of the Endangered Species Act. It is expected that this consultation will be completed prior to the release of the Final GRR/SEIS Report.

Results of the wave climate assessments indicate that implementation of the project would result in negligible changes to the general wave climate. Additionally, the results of the analysis conducted for vessel generated waves shows that there would actually be a reduction in ship generated wave energy when compared between the future With- and Without-Project conditions. This is because fewer vessels will be expected to call on the port in the future with implementation of the TSP, which results in less vessel generated wave energy affecting the study area.

Results and conclusions for sediment transport considerations predicted no discernable impacts to sediment transport throughout the project area and no expected erosion or changes to the position of the Mobile Bay shorelines resulting from implementation of the TSP. The evaluations considered probable effects on shoreline changes within 10 miles east and west of the channel and predicts minimum difference in bed level changes on the ebb tidal shoal that feeds Dauphin Island.

Several sites were evaluated for placement of new work material for the TSP. These included six relic shell mining areas, the ODMDS, and the SIBUA (if new work sand sources are found within the Bar Channel). All of the proposed placement sites were found to be acceptable. Results of modeling indicate that material placed within the Relic Shell Mined Area will remain stable and not be transported outside of the placement area. Furthermore, placement of material may help to restore bay bottoms within this site. The USACE, Mobile District is currently pursuing certification for extensions to the SIBUA and

the ODMDs. Future maintenance dredged material will continue to be placed in the existing approved placement areas and the proposed extensions.

Sediment testing of new work material will be conducted during the design phase. The study assumes that new work material associated with the TSP would be similar to that already tested and should be suitable for placement in the ODMDs. When considering underwater noise associated with construction activities, it is anticipated that the maintenance dredges presently being used in the harbor would also be used for harbor modifications. It has been determined that the noise levels, both air and underwater, for the TSP during the construction period would be comparable to current activities and impacts would be less than significant. Since channel modification activity emissions would not take place along the channel at the same location for a long duration, they are considered temporary resulting in less than significant air quality impacts to the community along the channel.

As a result of construction, there is no anticipated significant change to existing transit methods, routes of goods entering and exiting the harbor, and no changes in surface transportation routes used to and from the harbor. Under the proposed action, direct impacts to harbor traffic and surrounding transportation systems would be minor. Therefore, impacts to transportation as a result of construction activity in the harbor would be minimal. The general absence of significant adverse impacts to human health, environmental health risks, and safety risk indicates the proposed project would not have disproportionately high and adverse impacts to any communities, including environmental justice communities or children.

Phase I level maritime cultural resource surveys (Phase I) have been previously conducted on some portions of the TSP. A new Phase I of the Bay Channel widening and bend easing areas as well as the SIBUA northwest extension was conducted in the Summer of 2018 and USACE is awaiting the results. Phase II evaluations may be necessary, dependent upon the Phase I findings. Section 106 coordination and consultation with the Alabama State Historic Preservation Office (SHPO) and the USACE, Mobile District Tribal Partners will be necessary and completed prior to the Final GRR/SEIS.

## **AREAS OF CONCERN AND UNRESOLVED ISSUES**

Areas of Concern: The public has raised a number of issues through letters, e-mails and public involvement meetings. They include the following:

*Channel dredging disrupts the sediment transport to Dauphin Island.* Impacts of channel dredging on Dauphin Island remains a controversial issue. The modeling results presented in this study indicate minimal differences in morphologic change in the nearshore areas of Dauphin Island and Pelican Island as a result of the channel

modifications. See Section 5.3.3 Sediment Transport and Section 6.1 Cumulative Impacts within the main report and Section 6.3.2, Appendix A for additional information.

*Placement location of Bar Channel material.* The placement location of the material dredged from the Bar Channel, in particular during maintenance operations, is an area of controversy. Dauphin Island residents and members of the public have expressed concerns that the material dredged from the Bar Channel during maintenance is not placed in an area that benefits the island. This study includes an assessment of a proposed extension to the SIBUA. See Section 4.2.2.3 SIBUA for the Bar Channel and Section 5.7 Dredging and Placement Areas within the main report for additional information.

*Placement of new work dredged material within the Relic Shell Mined Area.* The public has expressed concern that the proposed placement of material within the formerly shell mined area could impact fishing. They also have concerns that material placed in the site may drift out of the relic shell mined area onto the living oyster reefs within the bay. This study has found the Relic Shell Mined Area to be a suitable placement site. See Sections 4.2.1 New Work Material Placement Options, 4.2.3 Construction Methodology, 5.4.2 Soils, 5.4.4 Sediment Quality, 5.7 Dredged and Placement Areas, 5.8.7 Essential Fish Habitat, 5.8.9 Benthic Invertebrates, 5.12 Fisheries Resources, 5.17 Cultural and Historic Resources, and 6.1 Cumulative Impacts within the main report for additional information.

*Environmental impacts caused by channel modifications.* The results of the modeling data and environmental impact analysis are another area of controversy. The environmental impact analyses associated with this study indicates minimal impacts of the aquatic resources supported by Mobile Bay and Mobile-Tensaw River Delta areas resulting from predicted changes in water quality. The overall general water quality changes from the modeling efforts are presented in Section 5.5 Water Quality. The water quality changes specific to the aquatic resource impacts are addressed in Sections 5.8.2 Wetlands, 5.8.3 SAV, 5.8.7 Benthic Invertebrates, 5.8.8 Fish, and 5.8.9.3 Oysters. Comments received by Environmental Non-Governmental Organizations expressed desire for the study to address the impacts associated with prolonged drought conditions. The USACE has determined due to the minimal nature of the predicted impacts to these resources, they are not sufficient enough to warrant mitigative measures.

*Shoreline erosion caused by ship wake.* Shoreline erosion and impacts to aquatic resources caused by the ship wake of larger vessels transiting the channel is an area of concern. The ship wake analysis associated with this study indicates a reduction in vessel generated wave energy when compared between the future With- and Without-Project conditions. Additional information can be found in Section 5.3.1 Waves in the main report and Section 6.4, Appendix A.

*Impacts to Environmental Justice (EJ) Communities.* Impacts associated with the growth of the harbor on the air quality, traffic, and safety of the EJ communities adjacent to the harbor remain an area of concern. This study has found that the proposed project would not have disproportionately high and adverse impacts to any communities, including EJ communities or children. See Sections 2.5.12 Air Quality, 2.5.13 Hazardous and Toxic Materials, 2.5.14 Noise, 2.5.19 Socioeconomics, and 2.5.20 Transportation for additional information on the existing conditions. See Sections 5.14 Air Quality, 5.15 Hazardous and Toxic Materials, 5.16 Noise, 5.20 Socioeconomics, 5.21 Transportation, and 5.23 Environmental Justice for additional information on the environmental effects of the TSP.

Issues to be Resolved: The USACE, Mobile District will continue to coordinate the proposed action and the associated impacts identified above as well as any new concerns that are identified during the review period with the USACE, South Atlantic Division and Headquarters, as well as the NFS, state and Federal agencies, stakeholders, and concerned public. Several commitments require additional coordination with resource agencies. They include:

- Further consideration of potential beneficial use of dredged material projects
- Location and analysis of oyster reefs not documented by the Alabama Department of Conservation and Natural Resources, Marine Resources Division
- ODMDS placement area
- Section 106 consultation with Alabama State Historic Preservation Office and the appropriate Native American Tribes for the Area of Potential Effect. Initiation of full formal consultation is dependent upon receipt of the cultural resource survey reports and the EPA/USACE coordination efforts on ODMDS p area expansion.
- Certification of the proposed extensions to the SIBUA and the ODMDS
- Certification of the Project

In addition, there are several Design (Preconstruction Engineering and Design) Phase actions that will be accomplished prior to construction. They include:

- Continued coordination with environmental agencies and the public for beneficial use opportunities with the new work dredged material
- A refined ship simulation analysis to ensure widening measures safely accommodate meeting vessels and to determine if the magnitude of modifications could be reduced in the bend easing and turning basin
- Sediment testing of the new work material prior to placement within the proposed locations
- Additional geotechnical investigation within the navigation channel
- Surveys to confirm that there are no underwater utilities/pipeline crossing obstructions

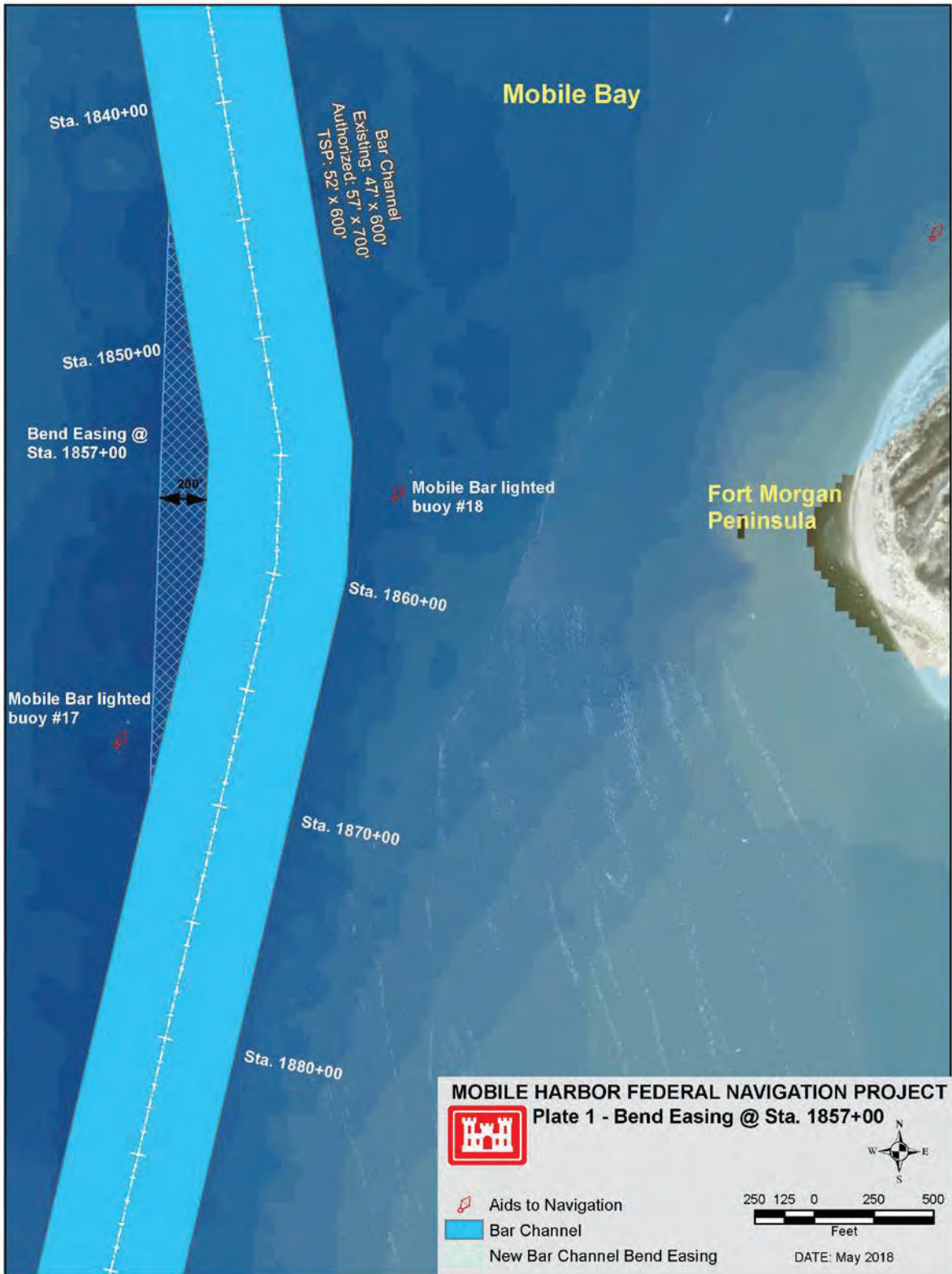
### **AREAS OF RESIDUAL RISK**

Risk and uncertainty exists in the potential fluctuation of the Federal interest rate, changes in vessel operating costs, deviations from vessel or cargo forecasts, and unexpected construction costs. The conservative assumptions used during the study make it more likely that impacts will be lower than those presented in the Draft GRR/SEIS. Additional analysis that will be conducted during design will reduce the likelihood of unexpected increases in construction costs such as discovery of cultural artifacts, pipeline relocations, or contaminated sediments. Any additional beneficial uses of dredged material would be implemented at the option of the USACE and any associated cost differences would likely be paid by a NFS requesting the use of the material. Furthermore, ship simulation may present opportunities to reduce channel modification measures. Decreasing the size of the bend easing and turning basin channel modifications would reduce the quantities and costs.





Figure 1. Tentatively Selected Plan (TSP) for the Mobile Harbor Federal Navigation Project



**Figure 2. Bend Easing in Bar Channel at Station 1857+00**



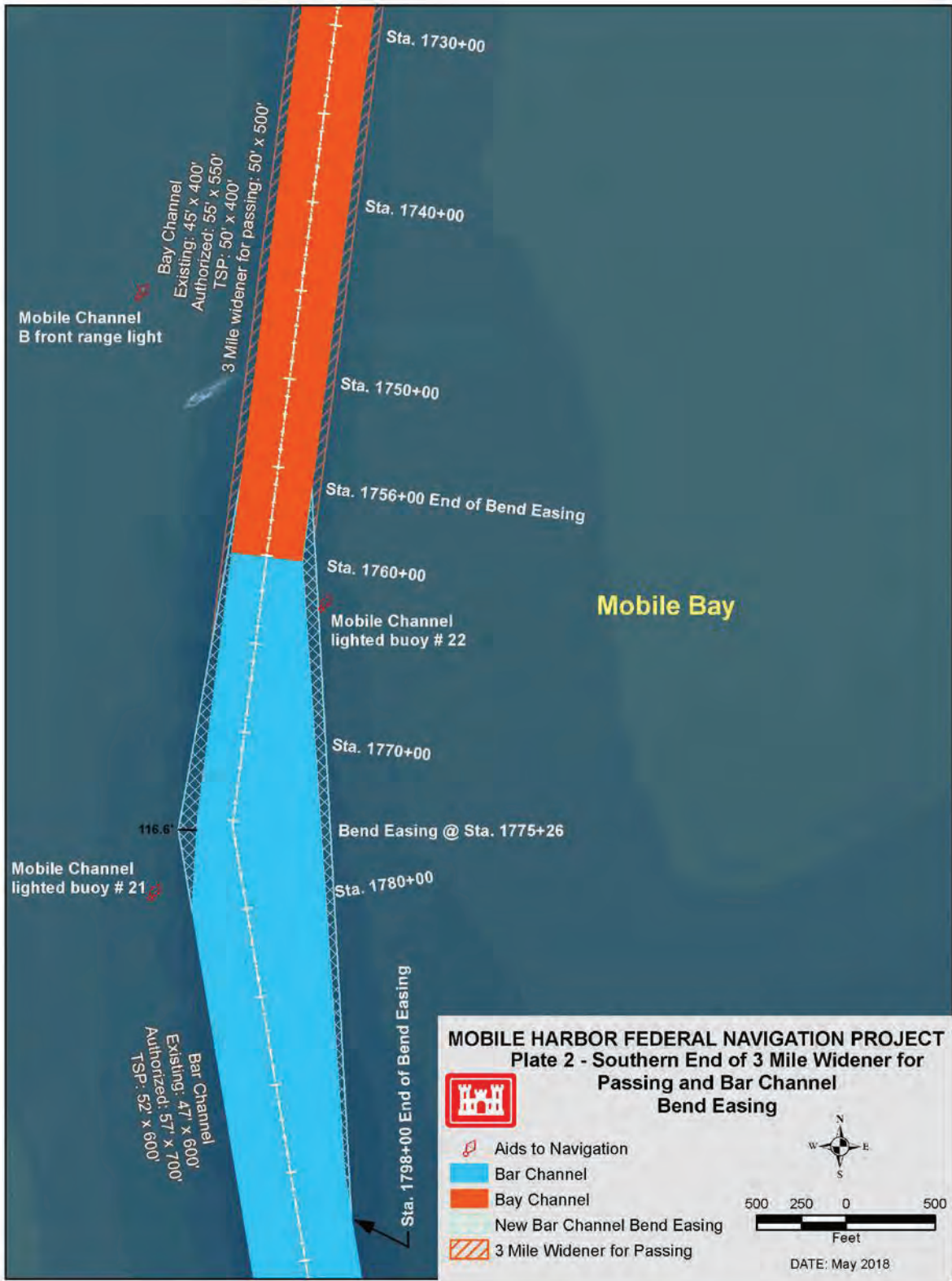


Figure 3. Bend Easing in Bar Channel at Station 1775+26 and Southern End of 3 Mile Channel Widener for Passing in Bay Channel

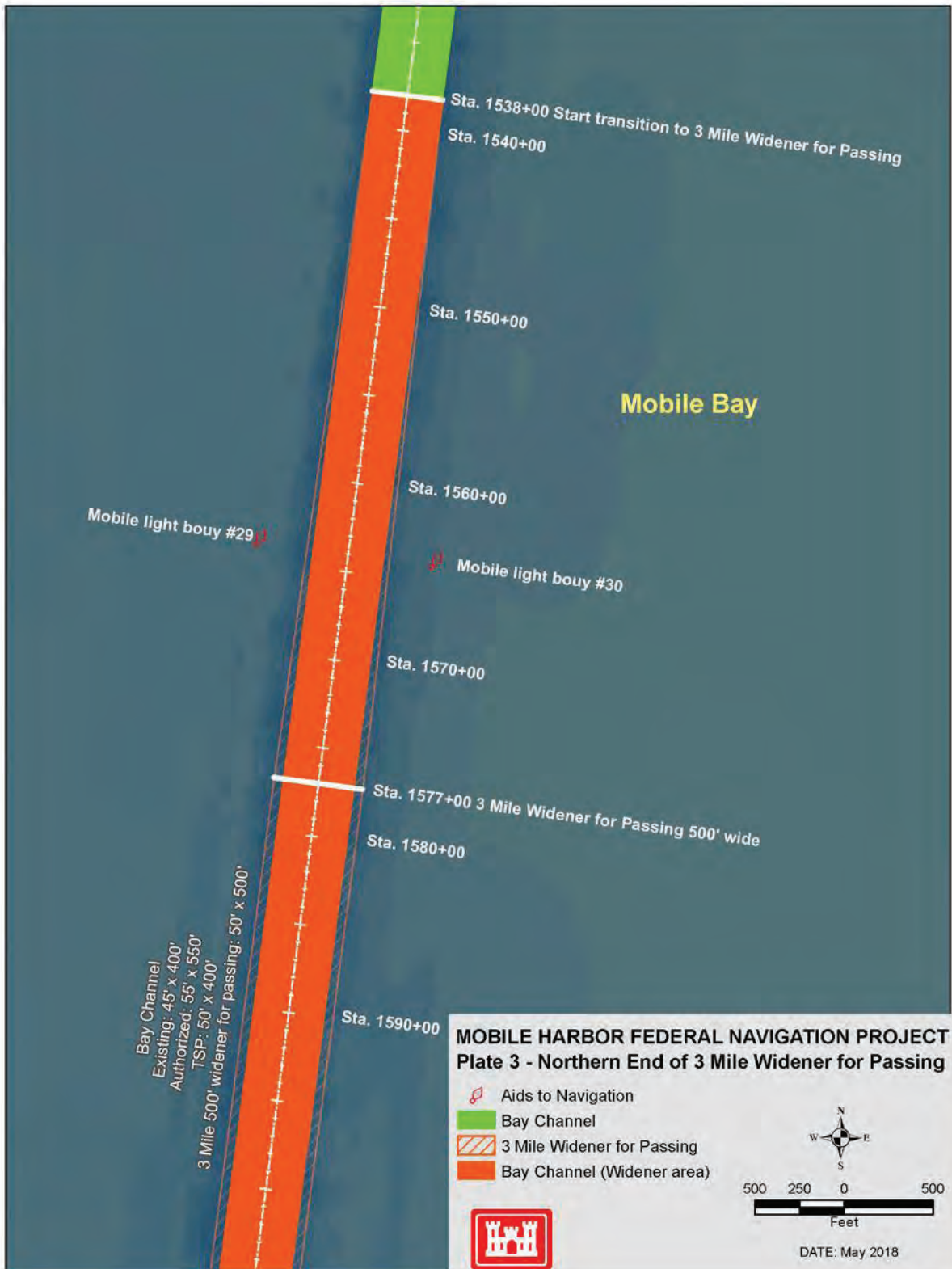


Figure 4. Northern End of 3 Mile Widener for Passing in Bay Channel



Figure 5. Choctaw Pass Turning Basin Expansion



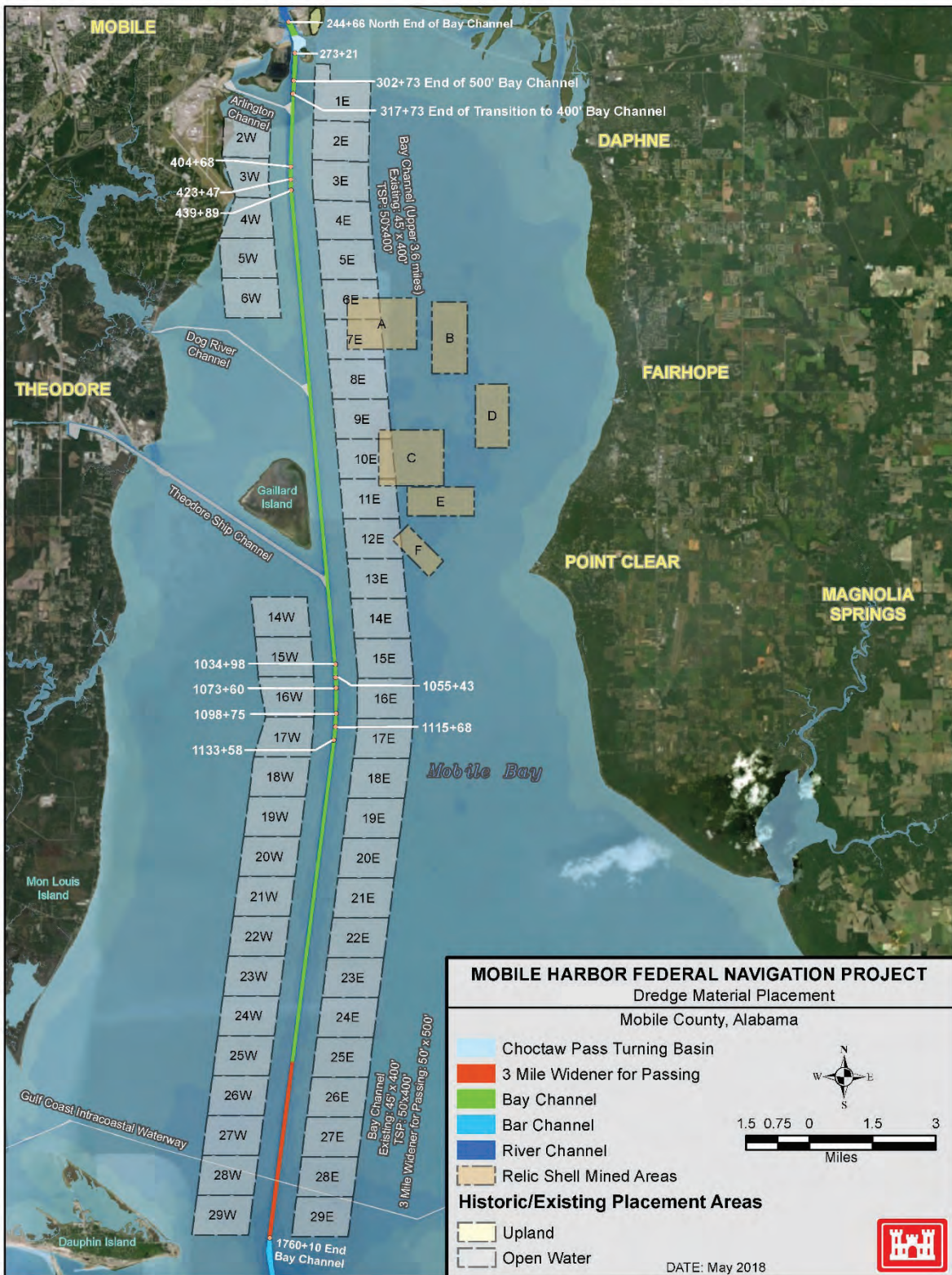


Figure 6. Relic Shell Mined Areas



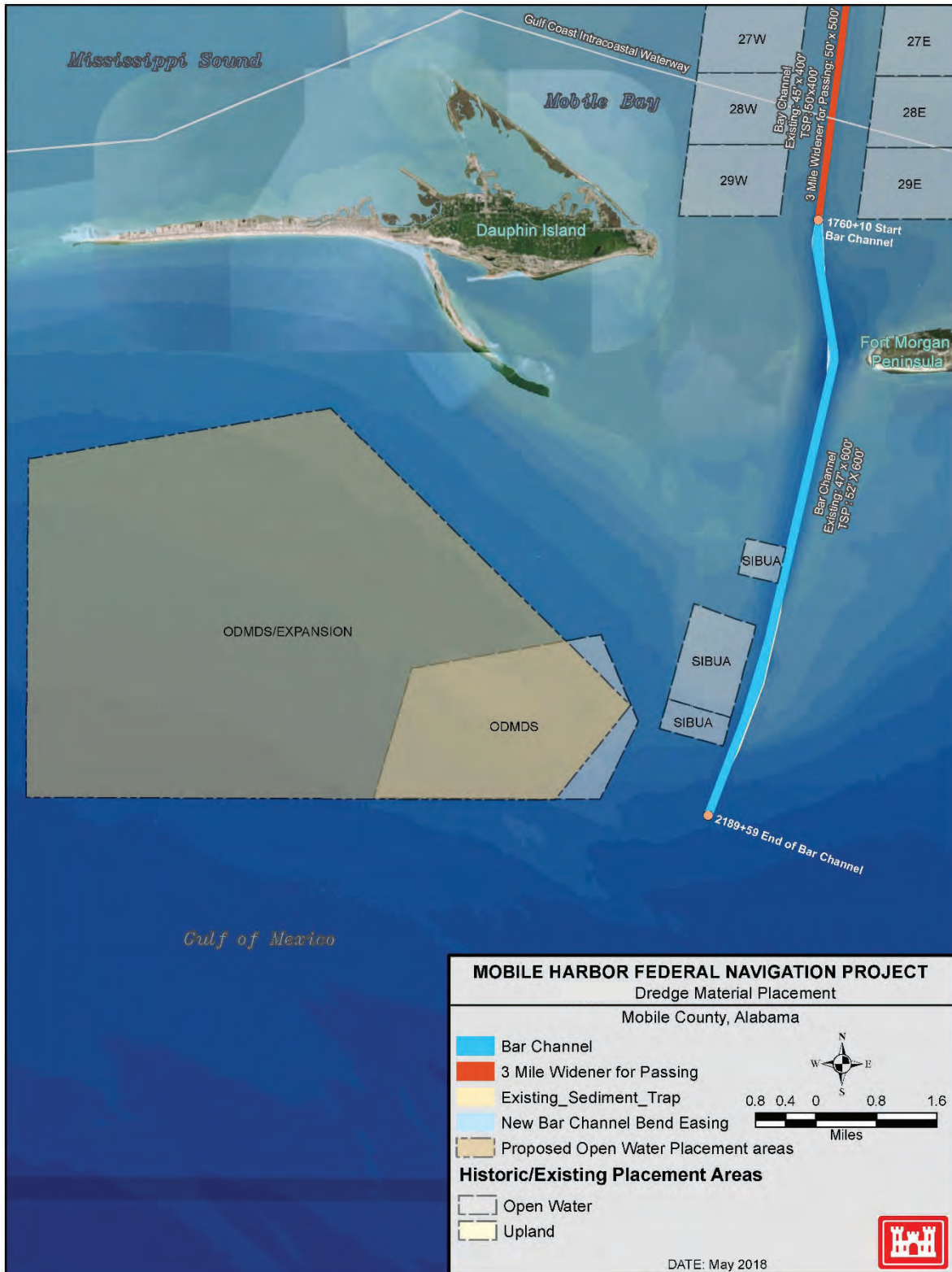


Figure 7. Expanded ODMDS Boundary

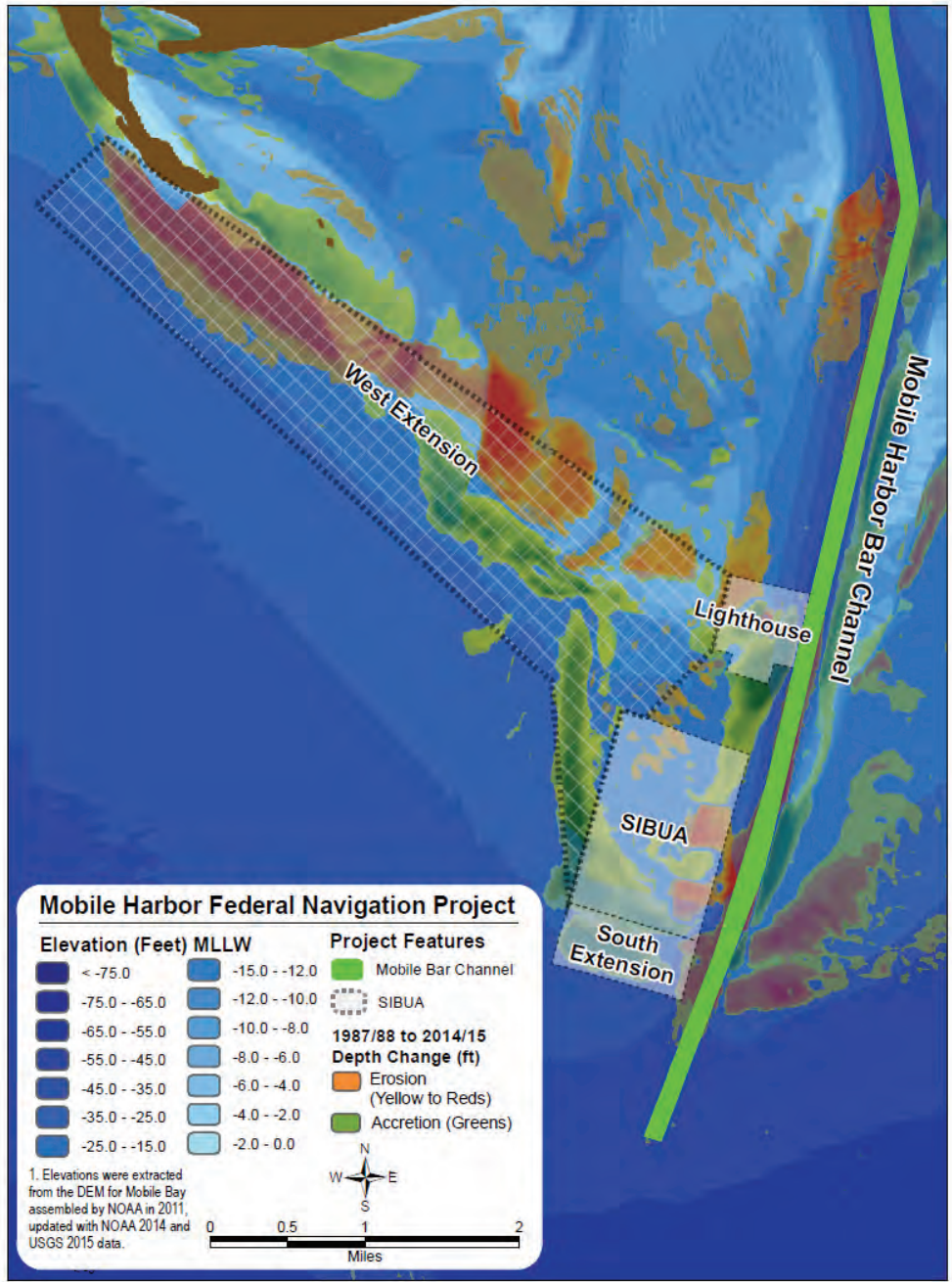


Figure 8. SIBUA Northwest Extension Limits

**Mobile Harbor  
 Mobile, Alabama  
 Integrated General Reevaluation Report  
 With Supplemental Environmental Impact Statement**

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## **APPENDICES**

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**Appendix B – Economics**

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## **SECTION 1.0 PURPOSE AND NEED**

### **1.1. Introduction**

This report documents and presents the results of investigations and analyses conducted by the U.S. Army Corps of Engineers (USACE), Mobile District, to evaluate navigation improvements including widening and deepening of Mobile Harbor, Mobile, Alabama. The harbor project provides access for deep draft vessel traffic to use terminal facilities at the port located along the Mobile River as shown in Figure 1-1 and

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Figure 1-2. The investigations described in this report evaluate the feasibility of options to address navigation concerns and provide navigation improvements.

### **1.1.1. Study Authority**

Improvements to the existing Federal project were most recently reauthorized in Section 201 of the Water Resources Development Act (WRDA) of 1986 (Public Law (PL) 99 – 662, Ninety-ninth Congress, Second Session), which was approved 17 November 1986, and subsequently amended by Section 302 of the WRDA of 1996, to read:

*(a) "AUTHORIZATION OF CONSTRUCTION - The following projects for harbors are authorized to be prosecuted by the Secretary substantially in accordance with the plans and subject to the conditions recommended in the respective reports designated in this subsection:*

*The project for navigation, Mobile Harbor, Alabama: Report of the Chief of Engineers, dated November 18, 1981, at a total cost of \$451,000,000, with an estimated first Federal cost of \$255,000,000 and an estimated first non-Federal cost of \$196,000,000. In disposing of dredged material from such project, the Secretary, after compliance with applicable laws and after opportunity for public review and comment, may consider alternatives to disposal of such material in the Gulf of Mexico, including environmentally acceptable alternatives for beneficial uses of dredged material and environmental restoration."*

The report referenced by this authorization recommended the following improvements to the Federal project: deepening and widening the Bar Channel to 57 feet (ft) deep by 700 ft wide, a distance of about 7.4 miles; deepening and widening the Mobile Bay Channel from the mouth of the bay to south of the Mobile River to 55 ft deep by 550 ft wide, a distance of about 27.0 miles; deepening and widening an additional 4.2 miles of Mobile Bay Channel to 55 ft deep by 650 ft wide; providing a 55-foot deep anchorage area and turning basin in vicinity of Little Sand Island; and, deepening the Mobile River Channel to 55 ft deep to a point about 1 mile below Interstate 10 (I-10) and U.S. Highway 90 tunnels.



### **1.1.2. Study Sponsor:**

The non-Federal sponsor (NFS) is the Alabama State Port Authority (ASPA). On June 12, 2014, the ASPA requested that the USACE undertake additional studies to determine the feasibility of deepening and widening the channel to its full authorized depth and width. Per letter dated October 20, 2014, the Assistant Secretary of the Army for Civil Works (ASA(CW)) approved redirecting General Investigations funds to initiate a General Reevaluation Report (GRR) to evaluate deepening and widening of the channel to its full authorized dimensions.

### **1.2. Study Area/Scope**

Mobile Harbor is located in the southwestern part of Alabama at the confluence of the Mobile River and the head of Mobile Bay. Mobile Harbor is approximately 25 miles north of the bay entrance from the Gulf of Mexico and 170 miles east of New Orleans, Louisiana. The current dimensions of the existing navigation channel are 47 ft deep by 600 ft wide across the Mobile Bar, 45 ft deep by 400 ft wide in the bay, and 45 ft deep by 600 ft wide in the Mobile River to a point about 1 mile below the I-10 tunnel. The channel then becomes 40 ft deep and proceeds north over the I-10 and U.S. Highway 90 tunnels to the Cochrane-Africatown Bridge. The Mobile River, on which ASPA facilities are located, is formed some 45 miles north of the city with the joining of the Alabama and Black Warrior/Tombigbee Rivers. The Mobile River also serves as the gateway to international commerce for the Tennessee/Tombigbee Waterway. In the southern region of Mobile Bay, access can be gained to the Gulf Intracoastal Waterway (GIWW) which stretches from St. Marks, Florida to Brownsville, Texas. The Theodore Ship Canal provides for a 40 ft deep, 400 ft wide channel, branching from the main ship channel in Mobile Bay at a point about 2.8 miles north of Middle Bay Lighthouse and extending northwesterly about 5.3 miles to the west shore of Mobile Bay. Figure 1-1 and



Figure 1-2 show the authorized limits of the Mobile Harbor Federal Navigation Channel.



This feasibility study includes: (1) survey of existing and future conditions; (2) evaluation of related problems and opportunities; (3) development of potential alternatives; (4) evaluation of alternatives; (5) comparison of costs, benefits, adverse impacts, environmental acceptability, and feasibility of those alternatives; and, (6) identification of a Tentatively Selected Plan (TSP). Information for the study came from land and hydrographic surveys, hydrodynamic surveys, available water quality information, socio-economic projections, sediment sampling, and numerous other data collection efforts. The study includes data from previous studies augmented with information from the ASPA, Mobile Harbor Bar Pilots, Waterborne Commerce Statistics Center (WCSC), commercial shippers, Federal, state, and local resource agencies, as well as Geographic Information System (GIS) mapping of significant resources and features. Analyses conducted for this feasibility study include forecasts of waterborne cargo volumes, traffic

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Figure 1-1. Project Map





Figure 1-2. Project Map Waterfront Area

patterns and vessel fleets, and evaluation of the need for navigation system improvements over a 50-year period of analysis. The study considered a range of structural measures within the harbor that could address inefficiencies within the system. The study concentrated on potential changes to water-based transportation system components that are within the scope of the study authority described previously. Throughout this study, the main factors influencing the total cargo throughput of Mobile Harbor revolve around land-based factors such as population growth, industrial and manufacturing changes, and regional maritime shipping trends limited by the capacity of the land-based infrastructure to process it.

The tentative results of the feasibility study are presented in this Draft GRR. Included with this report is a Draft Supplemental Environmental Impact Statement (Draft SEIS). The Draft SEIS is a supplement to the Environmental Impact Statement (EIS) originally prepared for the USACE 1980 Survey Report on Mobile Harbor. The Draft SEIS and the Draft GRR are combined to provide a Draft Integrated GRR with Draft SEIS (Draft GRR/SEIS). The Draft GRR/SEIS documents the study process and presents the tentative results of investigations and analyses conducted to evaluate modifications to the existing Federal navigation system to improve its ability to efficiently serve the current and future vessel fleet.

### **1.3. Problems and Opportunities**

#### **1.3.1. Problems**

The principal navigation problem is larger vessels are experiencing transportation delays and inefficiencies due to limited channel depth and width. This problem is a result of increasing number and size of vessels entering and departing Mobile Harbor. The ASPA's newest two facilities are located at the lower end of the Mobile River (at the upper portion of Mobile Bay) -- the Choctaw Point container terminal and the Pinto Island Terminal. Both facilities have increased the amount of traffic into Mobile Harbor. The existing channel depths limit vessel cargo capability, particularly container vessels calling at the Choctaw Point container terminal and coal carriers calling at the McDuffie Coal Terminal. The existing channel dimensions also restrict many vessels to one-way traffic and in some areas limit transit operations to daylight only. These problems can be summarized by the following statements which were used by the Project Delivery Team (PDT) in developing the planning objectives:

- Larger size vessels experience transit delays due to existing width of channel.
- Existing channel depths limit vessel cargo capacity.
- Existing traffic congestion has increased safety concerns.

### **1.3.2. Opportunities**

Mobile Harbor's ranking as a global trading port is consistently in the top twelve nationally. In 2016, Mobile Harbor handled a total of 58 million tons (mt) of commerce making it the 10th largest port in the U.S. in terms of total tonnage. Shipping trends for Mobile Harbor show adherence to projections for growth in ship size, in all three dimensions, draft, beam, and length. As economies of scale and improved vessel technologies have driven ship sizes larger, the world's port infrastructure must be expanded in channel depths and widths and terminal capacity to accommodate larger ships. The number of ports able to handle larger vessels around the world is growing, and, most importantly, the Panama Canal has expanded lock capacity to handle ships of 25% greater draft (up to 50-foot), 52% greater beam (up to 160-foot wide), and 30% greater length (up to 1,250-foot long). Ships have been under construction for several years to take advantage of the increased canal capacity realized with the 2016 opening of the new Panama Canal locks.

There is opportunity to bring the forecasted volume of goods into the harbor on fewer ships and reducing delays resulting in transportation cost savings. Particularly important is the great increase in the deployment of those vessels, which is occurring now and expected to continue with the Panama Canal expansion project completed in 2016. These larger vessels, commonly referred to in the shipping industry as the "Super Post-Panamax" vessels, are expected to comprise greater percentages of vessel fleet composition over the next several decades. Containers

The McDuffie coal shipments are currently utilizing Cape/Post-Panamax size vessels. At the current channel depth, some vessels cannot fully utilize vessel capacity. Coal shippers forecast that availability of deeper draft vessels along with the expanded Panama Canal will increase the U.S. coal competitiveness in Asia.

In addition to the economic opportunities afforded by a larger channel, there also exists safety and potential environmental opportunities. Hazards of traffic moving in and out of Mobile Harbor as well as navigation features of the channel would be improved by a larger channel. There is also potential for beneficial use of sediment material that would be obtained from the channel dredging.

The opportunities noted above can be summarized by the following statements which, in addition to the problem statements, were used by the PDT to develop the planning objectives:

- Eliminate or reduce navigational restrictions and inefficiencies (*i.e.*, channel width and depth limitations).
- Beneficially use dredged material for the protection, restoration, and creation of environmental resources.
- Improve navigational safety.



#### **1.4. Purpose: Objectives and Constraints**

The National or Federal objective of water and related land resources planning is to contribute to National Economic Development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders (EO), and other Federal planning requirements.

##### **1.4.1. Study Objectives**

To achieve the goal of the Federal objective noted above, water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to study planning objectives and, consequently, to the Federal objective of this study. Specific study planning objectives for the feasibility study for Mobile Harbor were:

- Reduce vessel congestion.
- Improve the efficiency of operations for containerships, bulk, and other cargo vessels within Mobile Harbor.
- Accommodate current and anticipated growth in containerized and bulk cargo vessel traffic.
- Provide navigation improvements to improve vessel transit safety.

##### **1.4.2. Constraints**

The formulation of alternatives to address study objectives is limited by planning constraints. Constraints are statements of effects that the alternative plans should avoid. Constraints are designed to avoid undesirable changes between future With- and Without-Project conditions. Constraints could include resources, legal, or policy constraints. Factors considered for this project included the history of and interest in shoreline erosion, the area's rich natural and cultural resources and biodiversity, as well as the need for adequate dredged material placement capacity. Based on these factors, the PDT developed the constraints, shown below, considered applicable to this study that could possibly limit the planning process and therefore should be avoided.

- Avoid or minimize negative impacts on coastal and sediment transport processes.
- Avoid or minimize shoreline erosion.
- Avoid or minimize negative impacts to:
  - Protected Species.
  - Submerged Aquatic Vegetation (SAV).
  - Essential Fish Habitat (EFH).
  - Existing Natural Resources (marshes, wetlands, and bay bottoms).
  - Water Quality.
  - Cultural resources.



- Adjacent Communities.
- Must have adequate Dredged Material Placement Area Capacity.
- Dredged material for the Ocean Dredge Material Disposal Site (ODMDS) and open water placement must meet suitability criteria.

## 1.5. Prior Reports and Studies

The USACE has been involved with the navigation channel at Mobile Harbor since 1826. Subsequently, the navigation channel has been progressively deepened from a depth of 10 ft to its current dimensions. There have been numerous studies and Congressional Authorizations leading up to this current investigation. An abbreviated list of reports on Mobile Harbor in the last 40 years is provided below.

- U.S. Army Corps of Engineers. (1975). *Final Environmental Impact Statement, Mobile Harbor (Maintenance Dredging) Mobile County, Alabama*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (1977). *Special Report, Mobile Harbor, Alabama, Theodore Ship Channel (approved as General Design Memorandum-Phase I)*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (1977). *Theodore Ship Channel & Barge Channel Extension, Mobile Harbor, Alabama, Phase II, General Design Memorandum, Design Memorandum No. 1*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (1978). *Draft Feasibility Report for Beach Erosion Control and Hurricane Protection, Mobile County, Alabama (Including Dauphin Island)*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (1980). *Survey Report, Mobile Harbor, Alabama*, Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (1981). *A Report of the Chief of Engineers, Department of the Army, Mobile Harbor, Alabama*, Mobile: U.S. Army Corps of Engineers, Office of the Chief of Engineers.
- U.S. Environmental Protection Agency. (1982). *Environmental Impact Statement (EIS) for the Pensacola, FL., Mobile, AL., and Gulfport, MS. Dredged Material Disposal Site Designation (Including Appendix A)*. Washington: U.S. Environmental Protection Agency.
- U.S. Army Corps of Engineers. (1984). *Draft Supplemental Environmental Impact Statement, Mobile Harbor, Alabama, Channel Improvements, Offshore Dredged Material Disposal*. Mobile: U.S. Army Corps of Engineers, Mobile District.
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- Department of the Army, Assistant Secretary of the Army (Civil Works). (1986). *A Report of the Chief of Engineers, Department of the Army, on Mobile Harbor, Alabama, Together with Other Pertinent Reports 99th Congress, 2d Session, House Document 99-241*. Washington: U.S. Government Printing Office.

- U.S. Army Corps of Engineers. (1986). *General Design Memorandum, Mobile Harbor Deepening, Alabama, Design Memorandum No. 1, Appendix H, Design Analysis*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (1991). *Mobile Harbor Deepening, Design Supplement No. 1, General Design Memorandum, Turning Basin Basin Development Plan*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (1995). *Mobile Harbor Deepening, Design Supplement No. 2, General Design Memorandum, Turning Basin Basin Development Plan*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (1997). *Limited Reevaluation Report, Mobile Harbor Project Extension*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (2000). *Mobile Harbor 2100-foot Project Extension, Limited Reevaluation Report*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (2004). *Final Environmental Impact Statement for Choctaw Point Terminal Project, Mobile, Alabama*. Mobile: U.S. Army Corps of Engineers, Mobile District.
- U.S. Army Corps of Engineers. (2007). *Mobile Harbor Turning Basin, General Reevaluation Report*. Mobile: U.S. Army Corps of Engineers, Mobile District.

## **1.6. Report Organization**

This report serves as the USACE draft decision document for the TSP. recommended navigation improvements and has been integrated with the DSEIS. The DSEIS is prepared pursuant to NEPA. The remainder of the report is organized as follows:

### **REPORT**

- Section 2.0:** Current and Future Conditions
- Section 3.0:** Plan Formulation
- Section 4.0:** TSP
- Section 5.0:** Environmental Effects
- Section 6.0:** Environmental Compliance
- Section 7.0:** Recommendation

### **APPENDICES**

- Appendix A - Engineering**
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- Appendix C – Environmental**
- Appendix D – Real Estate**
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## **SECTION 2.0 CURRENT AND FUTURE CONDITIONS**

### **2.1. General Setting**

Mobile Harbor is comprised of both public and private port facilities located in Mobile, Alabama. Figure 1-1 illustrates the study area. Due to the nature of the cargo, vessel types and sailing drafts, Mobile Harbor, for economic analysis purposes only, can be segmented into three areas: Upper Harbor; Lower Harbor; and, Theodore Industrial Park. The Upper Harbor serves public and private terminals. The Lower Harbor serves the public terminals of the ASPA: Pinto Steel; McDuffie Coal; Intermodal Container Terminal; and, the Mobile Cruise Terminal. The Theodore Industrial Park serves publicly- and privately-owned and operated facilities.

### **2.2. Port Facilities**

#### **2.2.1. Facilities and Infrastructure**

Mobile Harbor consists of facilities to handle both foreign and domestic cargo. The main imports are heavy lift and oversized cargo, containers, coal, aluminum, iron, steel, copper, lumber, wood pulp, plywood, fence posts, veneers, toll and cut paper, cement and chemicals. Main exports are heavy lift and oversized cargo, containers, coal, lumber, plywood, wood pulp, laminate, flooring, roll and cut paper, iron, steel, frozen poultry, soybeans and chemicals. The largest facility operator at Mobile Harbor is the ASPA. The ASPA has a total of 41 berths and its facilities include the main complex, McDuffie Island, Choctaw Point and other sites. According to Martin Associates (2017), Mobile Harbor's vessel and cargo activity generates approximately 153,278 direct and indirect jobs, \$568 million annually in direct and indirect tax impact, and a total economic impact annually of more than \$25 billion in Alabama.

##### **2.2.1.1. Upper Harbor Terminals**

**ASPA Main Docks Complex** extends approximately 2.2 miles along the west bank of the Mobile River and is bordered by the Terminal Railway tracks to the west, Three Mile Creek to the north, and the I-10 tunnel to the south. The navigation channel in this area is 40 ft deep. The 570-acre terminal includes approximately 2.4 million square ft of warehouse space and a 22-acre Bulk Handling Plant at the north end. The Terminal Railway, which is owned by the ASPA, interchanges with five Class 1 Railroads. The complex has immediate access to I-65 and I-10. The primary commodities handled within the main dock complex are forest products, soybeans, iron and steel products, aluminum,

and roll on/roll off (ro-ro) cargoes. The facility is capable of handling 75,000 Twenty-foot Equivalent Units (TEUs)<sup>1</sup>.

**Blakeley Island Terminals** Blakeley Island Terminals are comprised of both public and private terminals located on the eastern shore of the Mobile River across from the northern end of the ASPA Docks. These terminals handle general cargo, equipment, crude oil, asphalt and fuel oil, dry bulk commodities and shipbuilding.

The Water Resources Reform and Development Act of 2014 designated the Port of Mobile as an energy transfer port, which are ports of strategic significance to the national energy security interest of the United States. There are six private petroleum/petroleum products terminals at various locations along the west and east banks of the Upper Harbor.

**Vehicle Processing Ro-Ro Facility** is a new facility that will allow vehicles to be driven on and off ships at Mobile. The ASPA is partnering with a joint venture out of South America to build and operate the facility. The new processing and logistics terminal will be built at the location of a former bulk material handling facility utilizing approximately 57 acres.

#### **2.2.1.2. Lower Harbor Terminals**

The Lower Harbor terminals are located south of the I-10 and U.S. Highway 90 tunnels (Wallace and Bankhead tunnels, respectively). The facilities located on this segment of the navigation channel are the Alabama Cruise Terminal, McDuffie Coal Terminal, Pinto Island Terminal and APM Terminals Mobile.

**Alabama Cruise Terminal** offers a two-story, 66,000 square foot terminal located adjacent to I-10, 6 miles from I-65 and in proximity of Mobile's Downtown tourism, entertainment and business districts. Carnival Cruise Lines began passenger service at the Port of Mobile in 2004. Carnival launched its Fantasy Class service at the Port of Mobile in November 2009. In 2011, Carnival canceled its Mobile service for commercial reasons, but resumed the Fantasy class service in November of 2016.

**APM Terminals Mobile** (an independent division within the A.P. Moller-Maersk Group) is located at Choctaw Point near the mouth of the Mobile River and opened in 2008. Subsequent investment in the container terminal has extended annual throughput capacity to 750,000 TEUs when land and rail are considered. Ongoing expansion of the terminal and a dock extension will deliver an annual throughput capacity of 950,000 TEUs by year-end 2019, when land and rail are considered. The container intermodal investment at Choctaw Point has sufficient land available to support further expansion.

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<sup>1</sup> A Twenty-foot Equivalent Unit is a unit of cargo capacity often used to describe the capacity of containerhips and container terminals. It is based on the volume of a 20-foot long intermodal container.

At full build out, the marine and rail terminal could accommodate an estimated annual throughput capacity of 2 million TEUs. The inland trade region includes the southeast, in particular, Georgia, Birmingham, Alabama and Knoxville/Memphis Tennessee, but extends as far as Chicago, Illinois. The terminal improves capability in the U.S. Gulf for reaching Midwest markets as well as Alabama and neighboring states. The 115-acre terminal has a 45 foot channel and 2,000 feet of deep water berth to handle Post Panamax vessels. In 2016, the ASPA completed construction of a \$32-million 80-acre rail terminal that permits direct and fluid transfer of containers between vessels and rail cars. APM Terminals also contributed an additional \$50 million toward surface improvements, equipment and technology. The dock has a depth of 45 feet MLLW and is equipped with two Post Panamax ship-to-shore (STS) cranes capable of a 19-row reach. In addition, two super Post Panamax cranes that span 22-rows of containers were delivered in June 2017.

The terminal has nine shipping lines that customers can utilize in Mobile. The regions served are North Europe, Asia and Gulf of Mexico. Two additional services are expected by 2019. In 2018, a South America to Gulf service is expected and in 2019, a West Coast South America to Gulf of Mexico service is expected.

In 2016, it was announced that Walmart will be building an import distribution center (IDC) in Mobile County, Alabama. The IDC will be approximately 2,500,000 square ft on 400 acres of land in Irvington, Alabama. The IDC will be Walmart's sixth import facility in the U.S. The purpose of the IDC is to receive containers from Asia to distribute the products to Walmart stores across the southeast. The containers will come through APM Terminals located approximately 15 miles from the IDC site. The Walmart IDC will be a hub for the southeast region of the U.S. serving around 800 stores and several regional distribution centers in Alabama, Mississippi and other areas to the north. The IDC was opened in May 2018. The capacity of the IDC is around 160,000 TEUs annually.

**McDuffie Coal Terminal** is the 3rd largest export terminal in the nation serving primarily an export metallurgical coal market. McDuffie is capable of handling both import and export coal volumes with a total annual throughput of approximately 23 million tons<sup>2</sup>. McDuffie services waterborne and rail coal shipments and is equipped with three ship berths capable of receiving 45-ft. draft vessels. These ship berths are equipped with three Post-Panamax unloaders and two loaders. Supporting equipment at the facility includes stacker/reclaimers, barge loading/unloading stations, rail loading/unloading stations, conveyance systems and three loop tracks supporting four storage yards.

**Pinto Island Terminal** located near the mouth of the Mobile River, is capable of handling annually in excess of five mt of semi-finished steel slabs. The 20-acre terminal provides 1,000 ft of deep-water dock dredged to a depth of 45 ft, as well as an automated barge

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<sup>2</sup> All reference to commodity shipments in "tons" refer to "short tons" of 2,000 pounds.



loading system position between the ship berth and the shoreline. The terminal is equipped with three Post Panamax ship-to-shore gantry cranes that are able to unload steel from ships to waiting barges or to the terminal storage yard possessing 150,000 metric tons of storage capacity.

### **2.2.1.3. Theodore Industrial Park**

Access to the Theodore Industrial Park from the Mobile Harbor Federal Navigation Channel is available through the Theodore Ship Channel. The Federal channel was constructed by the USACE in 1981 and provides water access for an industrial complex at a former military ammunition depot. In the bay, the Theodore Ship Channel is 5.9 miles in length with a 40-foot depth and a 400-foot width. At the western shoreline of Mobile Bay the channel becomes a landcut with a length of 1.9 miles, a depth of 40 ft, and a width of 300 ft. The Theodore Industrial Park is situated on a site that comprises 4,000 acres. The primary commodities and industries handled through the port terminals of this complex are cement, aggregates, chemicals, over-dimensional cargoes. It also supports offshore oil and gas production and installation projects, including subsea umbilicals, rigid spooled pipe and risers.

## **2.3. Economic Conditions**

Mobile Harbor serves the economy by moving millions of tons of cargo including both domestic and foreign cargo. The cargo is imported and exported in various types of ships including bulk carriers, containerships, general cargo, ro-ro and tankers. While domestic cargo is roughly half of the tonnage received or shipped through Mobile Harbor, this analysis focuses on the movement of foreign tonnage.

Figure 2-1 shows the general trend of domestic versus foreign tonnage over the time period of 2007 through 2014. Although domestic and foreign tonnage have been fairly balanced, foreign tonnage has exceeded domestic tonnage for all years in this timeframe except 2009

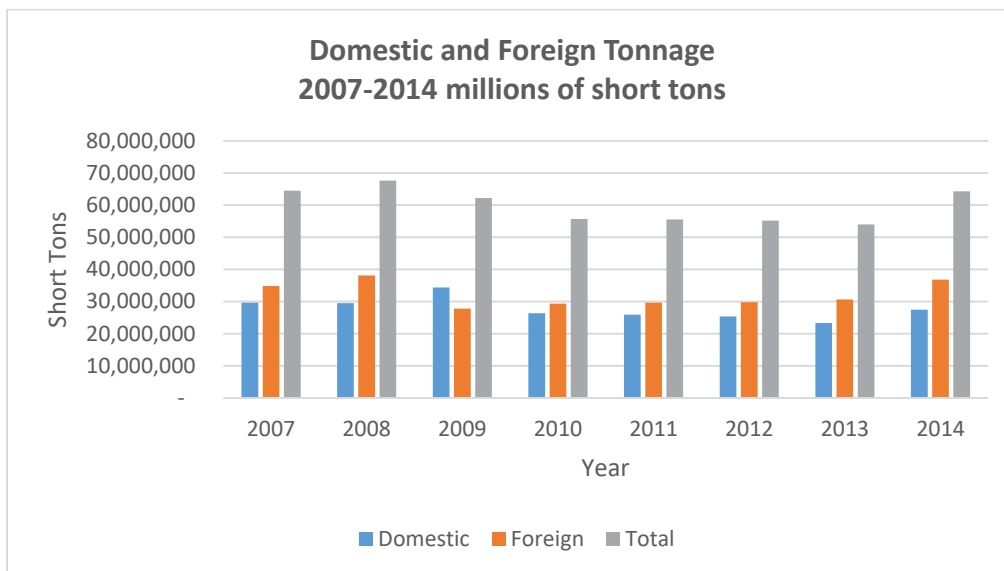
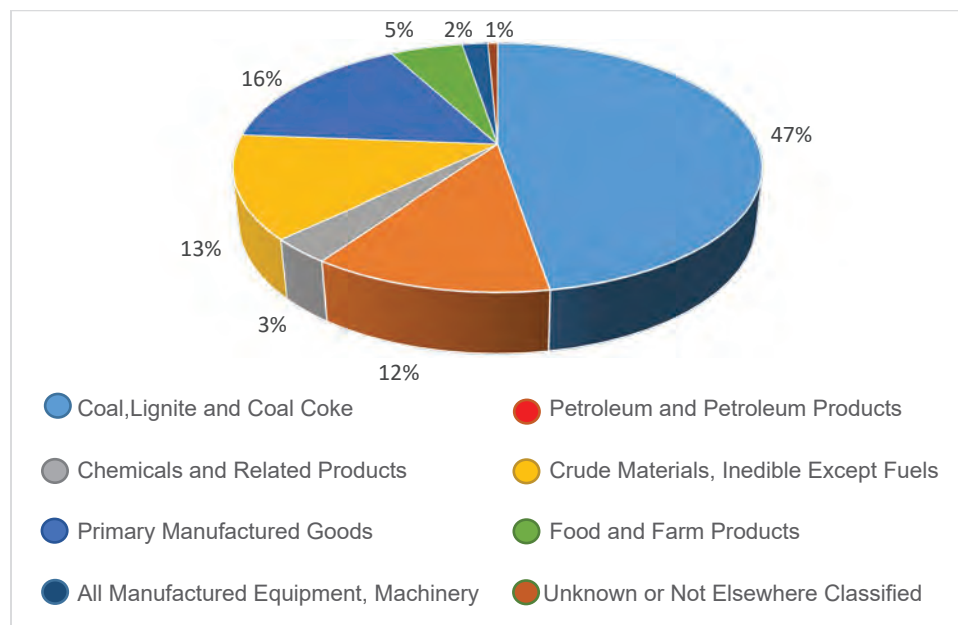


Figure 2-1. Domestic and Foreign Tonnage

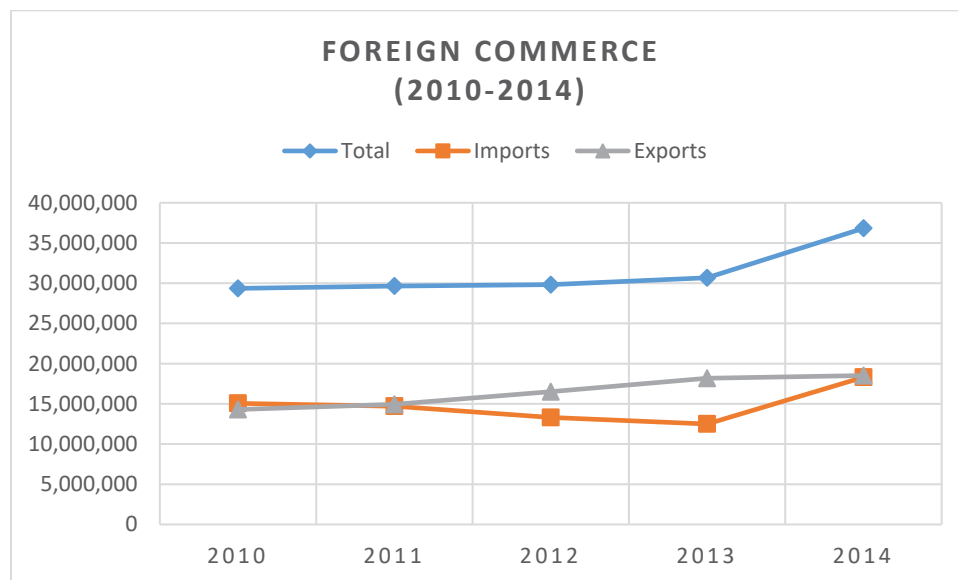
### 2.3.1. Foreign Commodity Shipments

For detailed analysis, the data set is limited to the most recent five years of data available at this time (2010 – 2014). Based on this data set, foreign shipments averaged 31.2 million short tons. Coal shipments have varied over the period, but remains the largest commodity with 47% of total foreign commerce. Primary manufactured goods came in second at 16% of the overall distribution and then crude materials, which averaged 13% of the total. Petroleum products accounted for 12% of total shipments and the remaining commodity categories accounted for 5% or less of total commerce. Figure 2-2 shows the commodity distribution from 2010 to 2014.



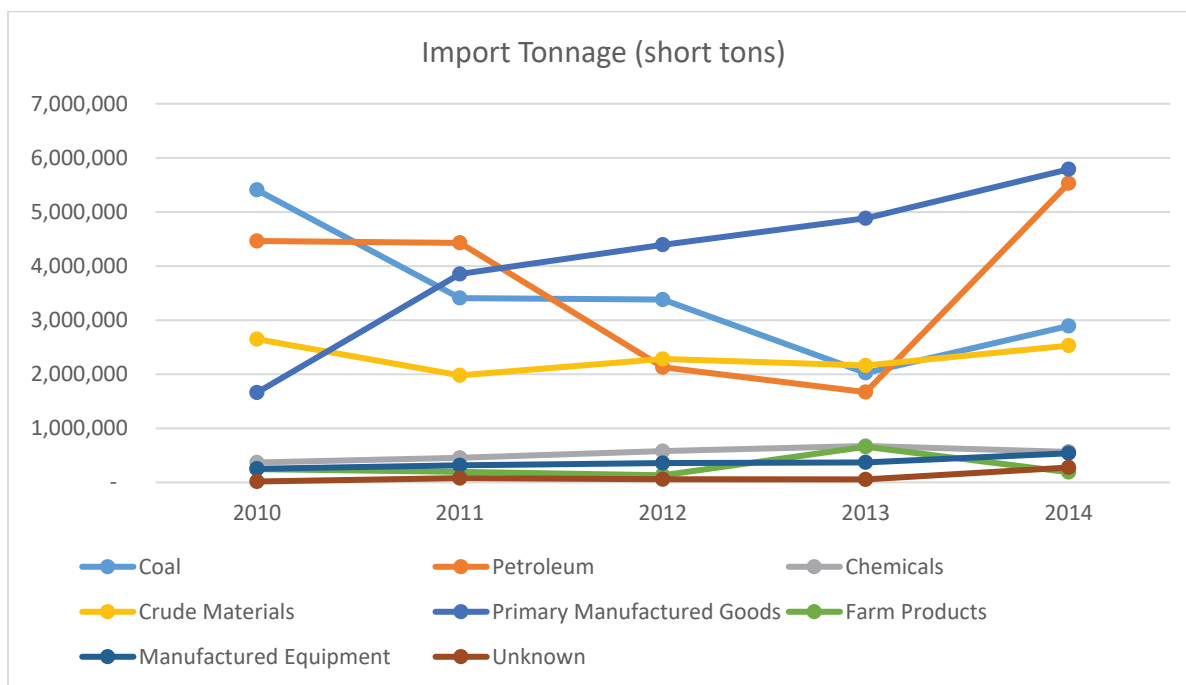
**Figure 2-2. Mobile Harbor Commodity Distribution**

Within foreign commodity shipments, imports account for approximately 47% while exports account for 53% of the foreign trade at Mobile during the time period 2010 – 2014. Figure 2-3 shows total foreign commerce and imports and exports.



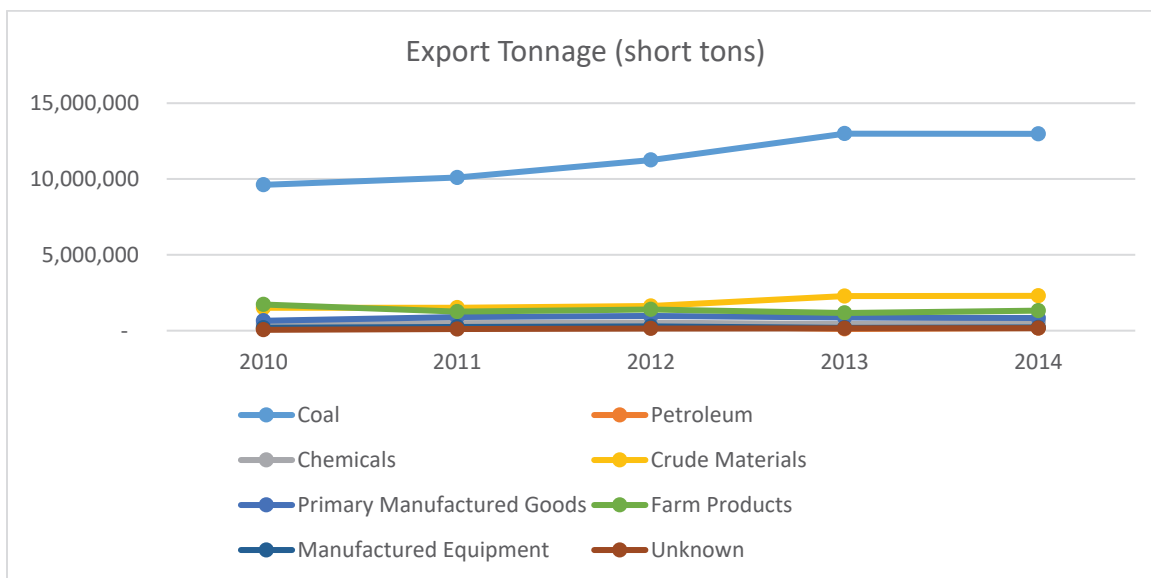
**Figure 2-3. Foreign Commerce 2010-2014**

Figure 2-4 shows foreign imports by commodity type from 2010 through 2014. As illustrated, the volume of coal has fluctuated, primary manufactured goods increased, and petroleum imports significantly increased from 2013 to 2014. The increase in petroleum products was due to the construction of a pipeline from a dock at Mobile Harbor to Pascagoula, MS to transport crude oil. Other commodities did not experience significant changes.



**Figure 2-4. Historical Imports by Commodity Type (short tons)**

Figure 2-5 shows foreign export short tons from 2010 through 2014 by commodity type. Coal has historically been the largest commodity exported.



**Figure 2-5. Historical Exports by Commodity Type**

### 2.3.2. Cargo Imports

For detailed analysis, the data set is limited in years due to projections being based on latest years of data available at the time of analysis, 2010 to 2014. As discussed in

Section 2.1, one criteria of the segmentation of the harbor for the economic analysis was nature of the cargo. Since carrying capacity of a vessel is in metric tons, the remainder of the analysis will use metric tons<sup>3</sup>. Figure 2-6 displays the historical imports by channel segment moving through Mobile Harbor from 2011 to 2014. As shown, containerized cargo and steel imports increase each year. Imported coal has decreased from 2011 to 2013, then increased in 2014.

The Upper Harbor cargo varied by year and the overall Theodore tonnage continues to increase each year. The non-containerized import volumes include coal, steel, manufactured equipment machinery and products, food and farm products, fertilizers, crude materials and petroleum products that move through the Mobile Harbor.

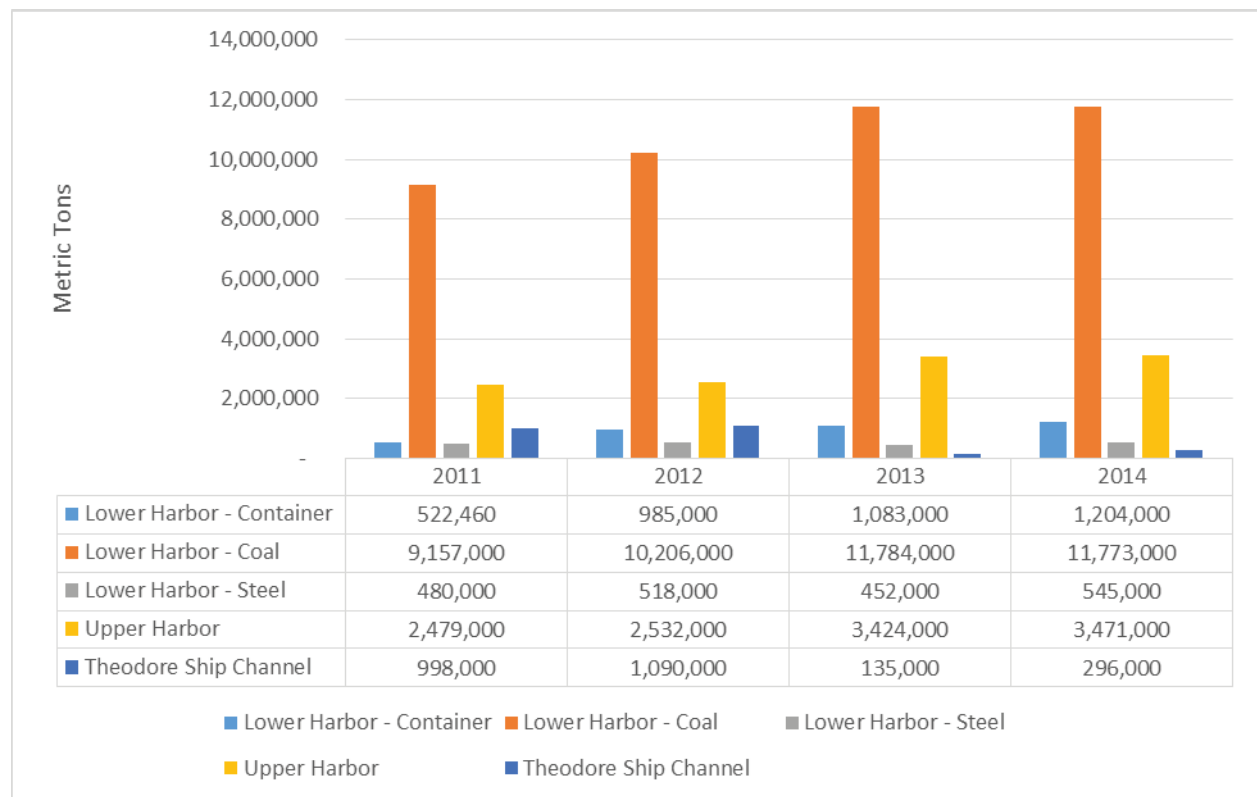
### 2.3.3. Cargo Exports

Figure 2-7 shows historical exports moving through Mobile Harbor from 2011 to 2014. Containerized cargo and coal exports increase each year, and steel exports vary by year. The Upper Harbor cargo and Lower Harbor Container cargo has also increased.



**Figure 2-6. Cargo Historical Imports**

<sup>3</sup> A short ton equals 2,000 pounds; a metric ton weighs 2,204 pounds.



**Figure 2-7. Cargo Historical Exports**

### 2.3.4. Containerized Cargo

As of 2016, nine shipping lines were calling at APM Terminals at Mobile Harbor. Table 2-1 shows the operator, vessel TEU capacity and trade area. Routes include services to the Far East, Europe and transshipments in the Caribbean.

#### 2.3.4.1. Container Facility and Capabilities

In 2015, 186,619 loaded TEUs were handled through Mobile Harbor. Imports accounted for 82,379 TEUs and exports account for 104,240 TEUs. Imports and exports varied, but exports were higher overall in terms of TEUs. Figure 2-8 shows import and export loaded TEUs from 2008 to 2015.

#### 2.3.4.2. Containerized Imports

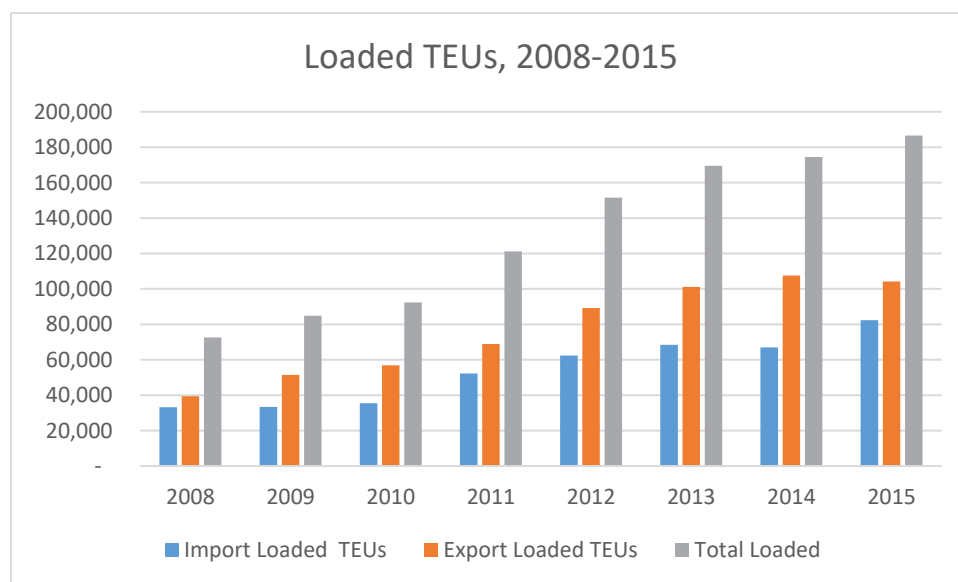
Figure 2-9 illustrates historical containerized imports that moved through Mobile Harbor by trade lane. As shown, in the time period 2012 to 2015 containerized imports continued to increase. Trade with Asia dominates containerized cargo for imports, followed by transatlantic trade and then Caribbean/Gulf trade. Top import commodities include auto parts, general consumer goods and hard woods. From Europe, tile floor, auto parts and



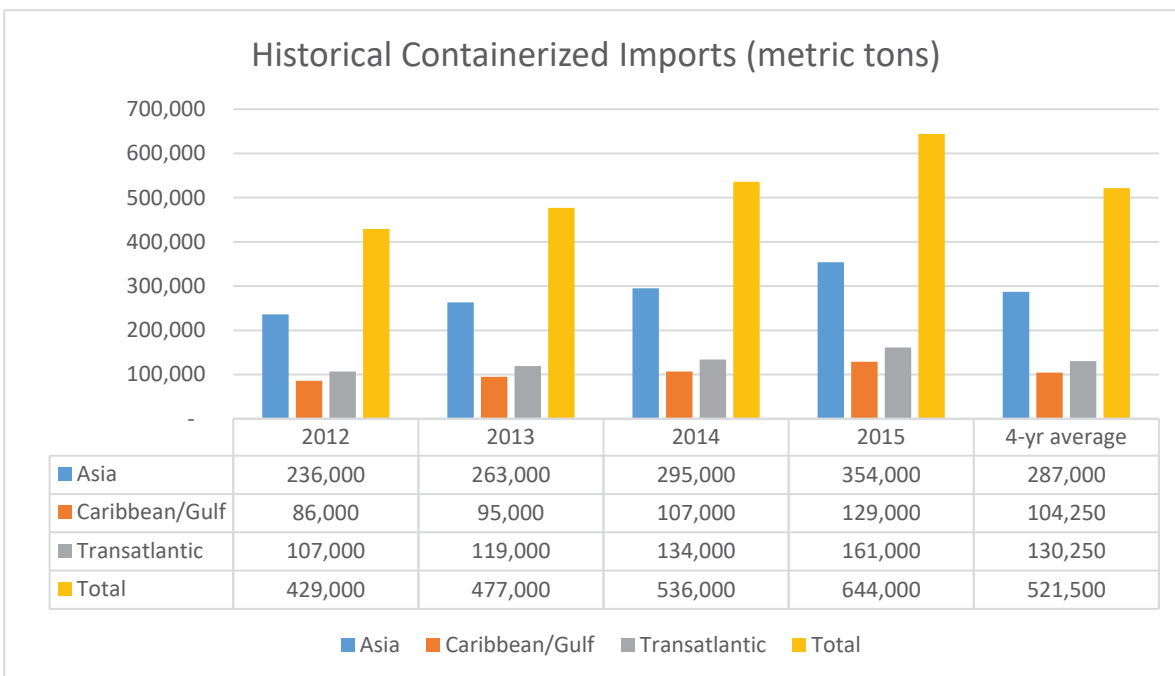
general consumer goods are imported. The Caribbean is a transshipment hub for Latin America, Mediterranean and West Africa. From these regions produce, textiles and raw materials are imported. Average imports from all the world regions were estimated to total 522 thousand metric tons. The average trade volume from 2012 to 2015 represents the baseline from which commerce was forecasted.

**Table 2-1. Mobile Container Terminal Services**

Operator	Service	Vessel TEUs	Routes	Trade Areas
Maersk & MSC	TA-3	6,000-7,000	Europe/ Transatlantic	North Europe • Charleston • Freeport • Central America • New Orleans • Mobile
MSC	Lone Star Express	4,000-5,000	Far East	Asia • <i>Panama Canal</i> • Houston • Mobile • Miami • Freeport
CMA CGM & Evergreen	PEX3	5,000	Far East	China • <i>Panama Canal</i> • Houston • Mobile • Miami • Jacksonville • South Africa • Singapore
Maersk	TP-18	4,000-5,000	Far East	Houston • Mobile • Miami • <i>Panama Canal</i> • East Asia
COSCO/CS	GME	4,250	Far East	China • <i>Panama Canal</i> • Houston • Mobile
ZIM	CGX	2,700-3,400	Caribbean/Gulf	Caribbean • Mobile • New Orleans • Houston



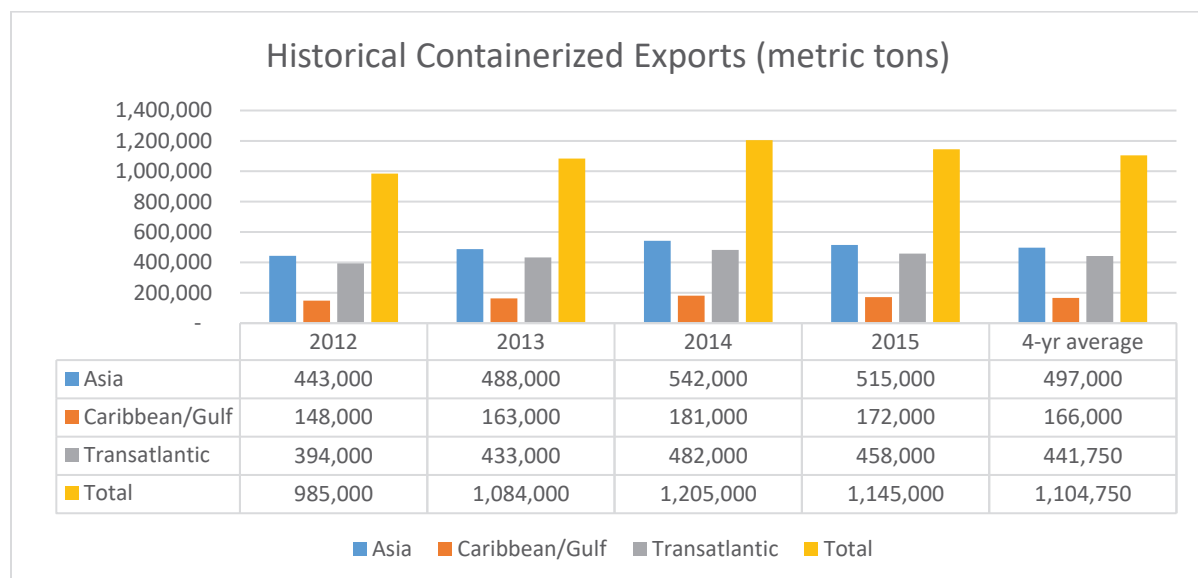
**Figure 2-8. Loaded TEUs**



**Figure 2-9. Historical Containerized Imports by Trade Lane**

### 2.3.4.3. Containerized Exports

Figure 2-10 illustrates historical containerized exports that moved through Mobile Harbor by trade lane. As shown, in the time period 2012 to 2015 containerized exports continued to increase. Trade with Asia also leads containerized cargo for exports, followed by transatlantic trade and then Caribbean/Gulf trade. Top export commodities include



**Figure 2-10. Historical Containerized Exports by Trade Lane**

forestry products, petrochemicals and frozen poultry. To Europe, forestry products, petrochemicals and peanuts are exported. The Caribbean is a transshipment hub for Latin America, Mediterranean and West Africa. Vehicles, frozen poultry, cotton and raw materials are exported to these regions. Average exports from all the world regions were estimated to total 1.1 million metric tons. The average trade volume from 2012 to 2015 represents the baseline from which commerce was forecasted.

### 2.3.5. TEU Weight by Container

Data from 2012 to 2015 for inbound and outbound containership calls were analyzed in detail to determine the TEU weight by route group. The metric tons imported or exported were divided by the number of TEUs imported or exported to determine an average weight per TEU for import and export and by route group. Results are shown in Table 2-2. The assumed two-ton tare weight for all boxes was not included in this total.

**Table 2-2. Tons per TEU by Route**

Route Group Description	TEU Weight Import	TEU Weight Export
Far East	8.2	11.5
Caribbean/Gulf	5.5	12.2
Transatlantic	11.8	12.4

### 2.3.6. Lower Harbor Dry Bulk Services

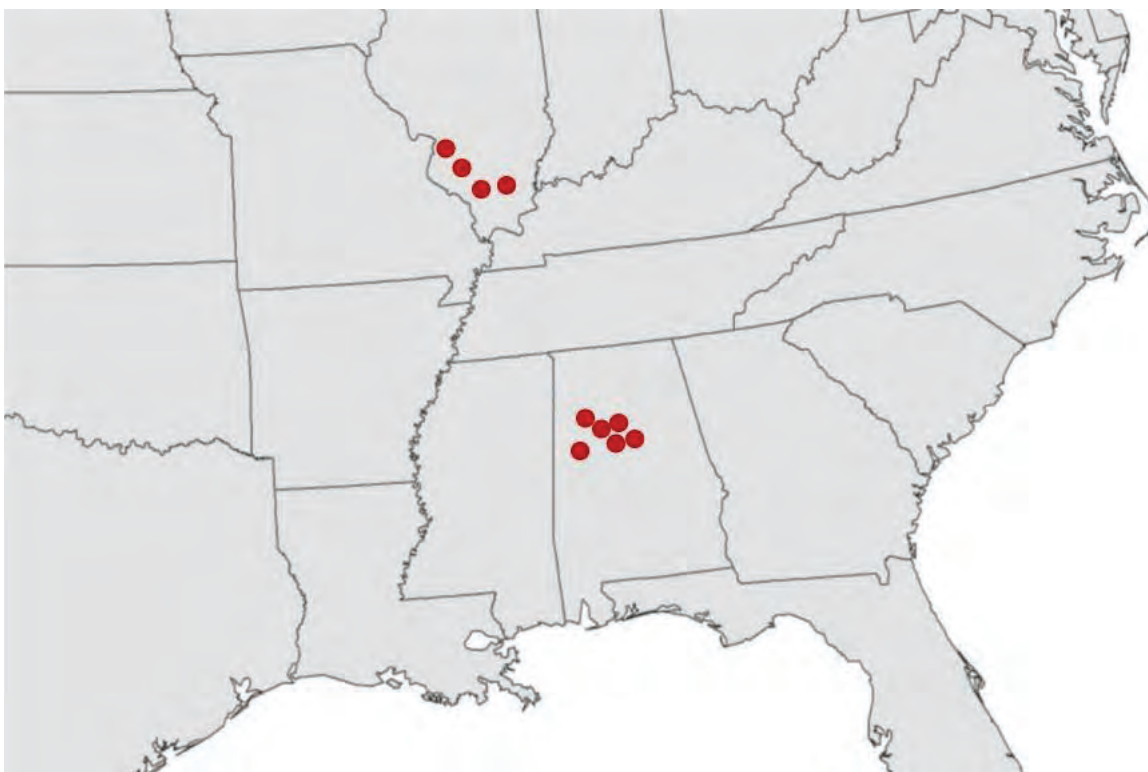
#### 2.3.6.1. Coal

Mobile serves Alabama and Illinois Basin coal production. Imported thermal coal has declined due to companies using an alternate fuel source to cost-effectively reduce greenhouse gas emissions. However, coal will still be used in the fuel mix at plants that utilize new clean coal technologies, and will continue to be imported through Mobile. Metallurgical grade coal is still being mined in Alabama for export. Figure 2-11 shows the coal hinterland.

Itinerary data from the WSCS indicates bulk coal traffic is considered on a pendulum routes (back-and-forth to-and-from Mobile). These vessels primarily follow routes between Mobile and the following regions:

- Europe
- Africa
- Asia
- South America

The study assigned future vessel call route groups based on historical route groups by vessel class.



**Figure 2-11. Coal Hinterland**

### **2.3.6.2. Iron, Steel and Non-Ferrous Metals**

Mobile serves the southeast U.S. iron, steel and non-ferrous metals market. Mobile has emerged as the second largest steel port in the U.S. Pinto Island Terminal primarily serves AM/NS (a joint venture between ArcelorMittal and Nippon Steel & Sumitomo Metal Corporation), a steel processing plant located in Calvert, Alabama. Although vessels that call this terminal draft 45 ft, personnel at AM/NS stated given the quantity and demand of steel shipped, no larger or deeper channel is needed. Therefore, the quantity of tonnage and vessels utilizing the terminal are held constant.

### **2.3.7. Relative Trade Volume and Trends Baseline Forecast**

#### **2.3.7.1. Commodity Forecast**

Estimates of Mobile Harbor's future commerce for the period of analysis are linked to the port's hinterland and the extent to which it shares commodity flows with other ports. An essential step when evaluating navigation improvements is to analyze the types and volumes of cargo moving through the port. Trends in cargo history can offer insights into a port's long-term trade forecasts and thus the estimated cargo volume upon which future vessel calls are based. Under future With- and future Without-Project conditions, the same volume of cargo is assumed to move through Mobile Harbor. However, a

deepening project will allow shippers to load vessels more efficiently or take advantage of larger vessels. This efficiency translates to savings and is the main driver of NED. Mobile Harbor's share of the commodity projections remain the same as existing condition. Cargo projections ultimately drive vessel fleet projections in terms of the numbers and sizes of vessels for without- and with-project conditions.

The methodology to determine the forecast of import and export tonnage involved three steps. First, the baseline was established. The baseline is an average of historical data. Second, the rates of change for each commodity were established using sources such as the U.S. Department of Energy (DOE), the U. S. Department of Agriculture (USDA) and an effort using IHS Global Insight (GI). Third, the rates of change were applied to the baseline to determine total import and export trade for Mobile Harbor.

It should also be noted that each trade route contains unique characteristics such as cargo volume, cargo weight, ports of call, vessel types, mix of vessels, etc. and therefore, are evaluated separately before being combined as part of the NED analysis. Two of the three trade routes will benefit from channel modification at Mobile Harbor. However, the non-benefitting routes were still carried forward in the evaluation as the number of future calls will contribute to harbor congestion and will influence other benefit categories.

#### **2.3.7.2. Baseline**

Empirical data and historical trends were established to serve as a baseline for the commodity forecast. To minimize the impact of potential variances in trade volumes on long-term forecast, four years of data were employed to establish the baseline for the commodity forecast. Empirical data from either 2011 to 2014 or 2012 to 2015 were used to develop a baseline.

Using the data shown in Sections 2.3.3 and 2.3.4, the averages of imports and exports are used to develop the baseline for the commodity forecast as shown in Table 2-3.

#### **2.3.7.3. Growth Rates**

The long-term trade forecast for Mobile Harbor used forecast data from the DOE, the USDA, IHS GI and regression. The forecast applied the rates of change from these sources for each commodity's baseline. This methodology is consistent with the approach used to perform long-term commodity forecast for other USACE deep-draft analyses.

**Table 2-3. Baseline Tonnage (metric tons)**

Commodity Type	Baseline Period (years)	Import Baseline Tonnage	Export Baseline Tonnage
Containerized (total)	2012-2015	522,000	1,104,800
• Asia	2012-2015	287,000	497,000
• Caribbean/Gulf	2012-2015	104,000	166,000
• Transatlantic	2012-2015	130,000	441,800
Coal	2011-2014	2,428,000	10,730,000
Steel	2011-2014	3,119,000	499,000
Mobile River Terminals	2011-2014	6,460,000	2,977,000
Theodore Ship Channel	2011-2014	413,000	630,000

#### 2.3.7.3.1. DOE Forecast

The forecast used the Annual Energy Outlook 2016 (AEO) growth rates for forecasting petroleum and petroleum products and coal at Mobile Harbor. The AEO uses the National Energy Modeling System, an integrated model that aims to capture various interaction of economic changes and energy supply, demand, and prices. The AEO provides multiple forecast cases based on different scenarios through 2050. This forecast used the “reference” case, which assumes trend improvement in known technologies, along with a view of economic and demographic trends reflecting the current central view of leading economic forecasters and demographers.

#### 2.3.7.3.2. USDA Forecast

The forecast used growth rates from the USDA’s Long-term Projections Report AEO-2016-1 to develop forecasts for food and farm products. The USDA uses specific assumptions about macroeconomic conditions, policy, weather, and international developments, with no domestic or external shocks to global agricultural markets to compile a forecast through 2025 by major commodity. The projections are one representative scenario for the agricultural sector for the next decade and reflect a composite of model results and judgment-based analyses. The reference case, used for this study, reflects relatively sluggish economic growth in developing countries, a strong dollar, and low oil prices in the near term, with stronger developing country growth, a somewhat weaker dollar, and rising oil prices in the long-term.<sup>4</sup> The USDA’s Long-Term Projections Report summarizes future food and farm trade as follows:

<sup>4</sup> [https://www.ers.usda.gov/webdocs/publications/37809/56729\\_oce-2016-1.pdf?v=42508](https://www.ers.usda.gov/webdocs/publications/37809/56729_oce-2016-1.pdf?v=42508)



*Steady world economic growth is projected over the next decade, despite a near-term slowdown in many developing countries. Projected global demand for agricultural products will rise, but at a slower rate than in the past decade. At the same time, world agricultural production is projected to increase more rapidly than world population, enabling a small increase in global per capita use of most agricultural products. Growth in world agricultural trade is projected to continue, albeit at a slower rate than in recent years. Together, these trends result in continued declines in the projected prices of agricultural commodities over the short-term and the persistence of low prices throughout the projection period.<sup>4</sup>*

#### **2.3.7.3.3. IHS GI Trade Forecast**

The GI's trade forecast informed the growth rates for containers. The model is based on the IHS World Trade Service (WTS) model. Conceptually, the WTS real value trade model uses a three-level process. Figure 2-12 provides a schematic of the WTS forecasting process. This multi-stage forecasting uses a combination of bottom-up and top-down approaches. GI combines both approaches to increase forecast accuracy.

Level I forecasts a country's imports of a commodity individually, without any exporter-level detail. The forecast at this stage is a bottom-up approach, which reflects heterogeneous behaviors of countries importing goods in each commodity group.

Level II forecasts a country's imports of a commodity from an exporting country under the assumption that the country's aggregated imports of the commodity from all the exporting countries is controlled by this country's imports of the commodity forecasted at Level I. The second stage forecast can be described as a top-down controlled approach and conforms to the WTS demand-driven approach to trade. The IHS World Industry Service (WIS) and IHS other sectoral forecasts are utilized at this level to address the competitiveness and supply capacity of an exporting country. The WIS provides both historical and forecasted industry data by Standard Industrial Classification category across 78 countries.

Level III forecasts and makes adjustments to individual commodity flows between importing and exporting countries given the most updated monthly and quarterly trade statistics collected from a variety of national and international sources, including the U.S. Census Bureau and Eurostat, to capture the most recent trade developments during the current year. At this stage, GI also takes into account the most up-to-date high-frequency macro data. After the adjustments, the forecasting procedures produce final globally consistent commodity-level trade forecasts between 106 countries/regions for 201 commodity categories.

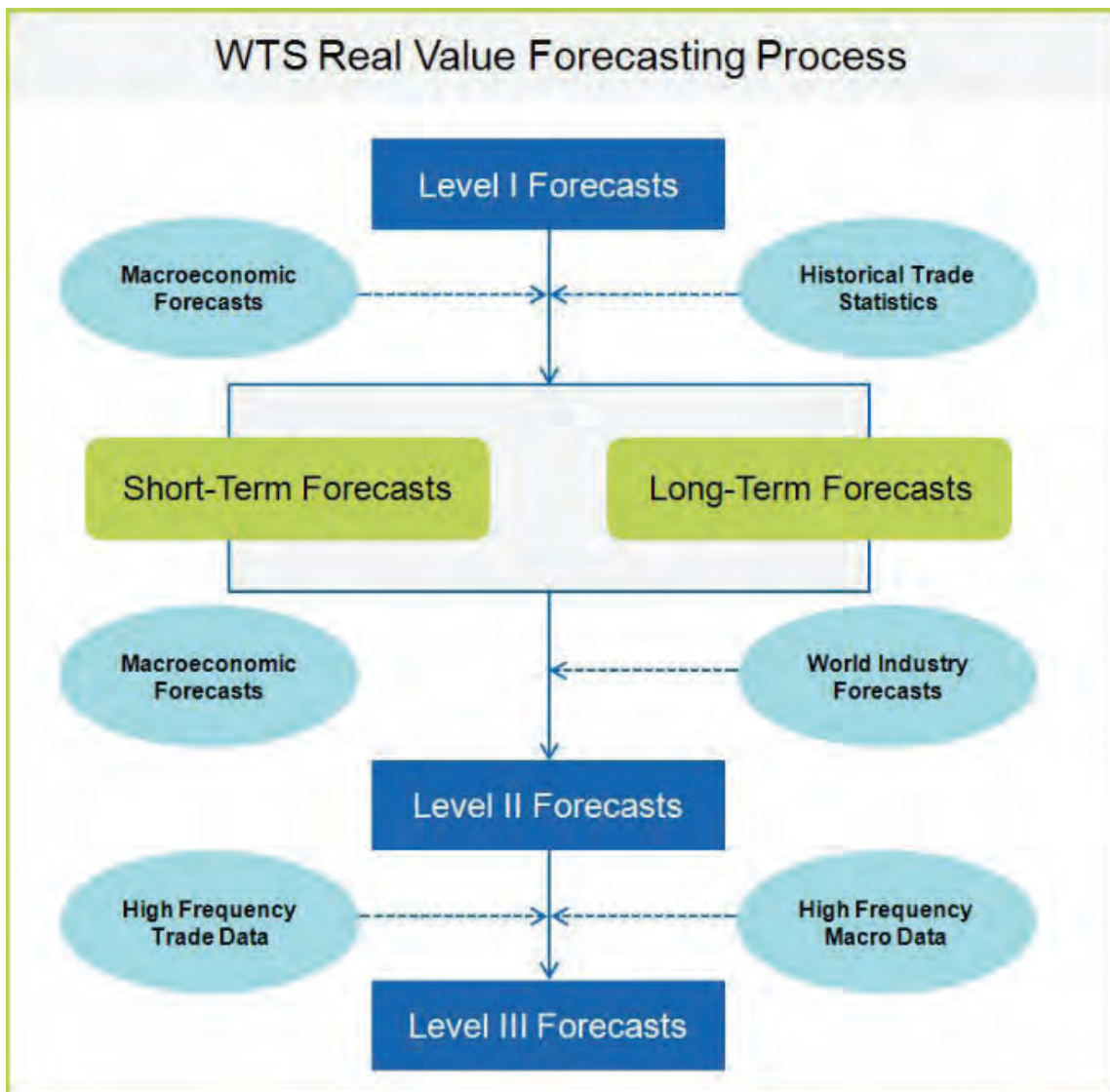


Figure 2-12. WTS Forecasting Process

#### 2.3.7.4. Commodity Grouping for Growth Rates

The following section outlines the growth rates by commodity for Mobile Harbor. The forecast applies these growth rates to the baseline tonnage presented in Table 2-3 to develop a final forecast by commodity, organized by import and export. Table 2-4 lists the major commodities in the study area and the data source used to forecast.

**Table 2-4. Commodity Sources**

Commodity Name	Forecast Source*
Containers	IHS Global Insight
Coal	AEO
Manufactured Equipment, Machinery and Products	Regression
Grain	USDA
Crude Petroleum	AEO
Petroleum Products	AEO
Iron Ore and Scrap	Regression
Other Agricultural Products	USDA
Other Chemicals and Related Products	Regression
Primary Iron and Steel	Regression
Metal Products	Regression
Primary Wood Products; Veneer; Plywood	Regression
Slag	Regression
Sulphur (Dry), Clay & Salt	Regression
Processed grain and animal feed	USDA
Building Cement & Concrete; Lime; Glass	Regression
Grain	USDA
Fertilizers	Regression
Fish	USDA
Forest Products Wood and Chips	Regression
Non-Ferrous Ores and Scrap	Regression
Oilseeds (Soybean, Flaxseed and Others)	USDA
Other Non-Metal Minerals	Regression
Paper & Allied Products	Regression
Pulp and Waste Paper	Regression
Soil Sand	Regression
Vegetable Products	USDA

\*AEO=Annual Energy Outlook; GI=Global Insight; USDA=U.S. Dept. of Agriculture

#### **2.3.7.4.1. Import Growth Rates**

Table 2-5 provides the import rate of change used for the commodity as calculated from the DOE's AEO, the USDA's Long-Term Projections Report and GI's WTS. A compound average growth rate (CAGR) was applied for the Upper Harbor commodities, as shown in the last column of Table 2-5. The forecasts were held constant after 2035.

#### **2.3.7.4.2. Export Growth Rates**

Table 2-6 provides the export rate of change used for the commodity as calculated from the DOE's AEO, the USDA's Long-Term Projections Report and GI's WTS. The CAGR was applied to Upper Harbor export commodities as shown in the last column of Table 2-6. The forecasts were held constant after 2035.

#### **2.3.7.5. Forecasts**

Using the baseline, the growth rates determined in the preceding section were applied to forecast total import and export tonnage for Mobile Harbor over the study period. The forecast applied these growth rates at a disaggregated level before summarizing commodity totals by commodity group. The following sections summarize the forecast by import and export.

##### **2.3.7.5.1. Imports**

The forecast uses the rates of change in the preceding section to forecast from the baseline. The following tables summarize the commodity forecast.

##### **2.3.7.5.2. Containerized Import Trade**

The respective world region import rates of change were applied to the baseline to estimate the Mobile Harbor long-term import forecast. For purposes of this analysis, the forecast is held constant after year 2035. Port capacity is not expected to be reached until after 2035. Table 2-7 shows the container import trade forecast. Table 2-8 shows the laden TEU's import forecast.

Table 2-5. Import Rates of Change

Commodity	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Containers - Asia	6%	6%	6%	7%	7%	7%	7%	6%	6%	6%	6%	5%	5%	5%	5%	4%	4%	4%	3%	4%
Containers - Caribbean	3%	3%	4%	4%	4%	4%	4%	4%	4%	4%	3%	3%	3%	3%	3%	3%	3%	3%	2%	3%
Container - Transatlantic	3%	3%	3%	3%	3%	4%	3%	3%	4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Coal	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Manufactured	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Grain	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Crude Petroleum	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Petroleum Products	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Iron Ore and Scrap	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Other Agricultural Products	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%
Other Chemicals	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Primary Iron and Steel	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Metal Products	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Primary wood products	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Slag	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Sulphur clay and salt	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Lime Cement and glass	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fertilizer	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Forest Products Wood and Chips	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%
Non-Ferrous Ores and Scrap	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Oilseeds	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Other Non-Metal Minerals	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%	-4%
Paper Products	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Pulp and Waste Paper	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%	-5%
Soil Sand	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%	-7%
Unknown NEC	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Vegetable Products	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%



Table 2-6. Export Rates of Change

Commodity	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Containers - Asia	6%	6%	6%	6%	7%	7%	7%	7%	7%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Containers - Caribbean	5%	5%	5%	5%	4%	4%	4%	4%	4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Container - Transatlantic	3%	3%	3%	3%	3%	3%	4%	3%	3%	4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Coal	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Manufactured	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Grain	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Petroleum Products	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Iron Ore and Scrap	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Other Chemicals	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Primary Iron and Steel	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Metal Products	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Primary wood products	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Sulphur clay and salt	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Lime Cement and glass	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Fertilizer	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%
Fish	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Forest Products Wood and Chips	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Non-Ferrous Ores and Scrap	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Oilseeds	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Other Non-Metal Minerals	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Paper Products	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Pulp and Waste Paper	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Soil Sand	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Unknown NEC	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Vegetable Products	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%



**Table 2-7. Container Import Trade Forecast**

<b>Container Imports Trade Forecast (metric tons)</b>			
<b>Region</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>
Far East	1,500,000	1,645,000	1,781,000
Caribbean/Gulf	145,000	170,000	194,000
Transatlantic/Europe	176,000	206,000	235,000

**Table 2-8. Laden TEU Imports**

<b>Laden TEU Imports</b>			
<b>Region</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>
Far East	183,700	201,500	218,000
Caribbean/Gulf	26,300	30,900	35,300
Transatlantic/Europe	14,900	17,400	19,900
Total	224,900	249,800	273,200

#### **2.3.7.5.3. Coal**

Thermal coal is imported through Mobile Harbor. Although imported coal has declined, in the near term it is expected that some will be needed to accommodate power plants in the southeast. Import coal volumes through Mobile Harbor originates from coal mines in Columbia. These mines produce a high grade, low ash and low Sulphur thermal coal desired by the U.S. power generation market. Although a shift from coal is occurring for environmental and cost-effective reasons, coal will still be utilized in its fuel mix at plants that utilize new clean coal technologies. Therefore, coal imports were held constant at 2,428,000 metric tons.

#### **2.3.7.5.4. Upper Harbor**

The Upper Harbor terminals import a variety of commodities. As previously mentioned, dock tonnages were combined based on type of commodity and associated vessel type. Table 2-9 displays the Upper Harbor docks forecasted tonnage.

**Table 2-9. Upper Harbor Forecasted Import Tonnage**

Commodity	2025	2030	2035
General and Dry Bulk Cargo	6,806,000	8,266,300	10,355,300
Chemicals	262,300	290,000	320,000
Petroleum	6,112,000	6,107,000	6,104,000

#### 2.3.7.5.5. Theodore Industrial Park

The Theodore Ship Channel handles multiple commodities as well. For reporting purposes the commodities were aggregated into two categories; general and dry bulk cargo and chemicals based on vessel types. Table 2-10 shows the forecasted commodity tonnage.

**Table 2-10. Theodore Industrial Park Forecasted Import Tonnage**

Commodity	2025	2030	2035
Chemicals	503,000	707,000	1,005,000
General and Bulk Cargo	281,000	338,000	430,000

#### 2.3.7.6. Exports

The export forecast uses the rates of change in Table 2-6 to forecast from the baseline tonnage. The following tables summarize the export commodity forecast.

##### 2.3.7.6.1. Containerized Export Trade

The respective world region route export rates of change were applied to the baseline to estimate the Mobile Harbor long-term export forecast. For purposes of this analysis, the forecast is held constant after year 2035. Port capacity is not expected to be reached until after 2035.

**Table 2-11. Container Export Tonnage**

Container Exports (metric tons)			
Route	2025	2030	2035
Far East	1,924,000	2,206,000	2,568,000
Caribbean/Gulf	237,000	277,000	320,000
Transatlantic/Europe	593,000	697,000	799,000
<b>Total</b>	<b>2,754,000</b>	<b>3,180,000</b>	<b>3,687,000</b>

**Table 2-12. Laden TEU Exports**

Laden TEU Exports			
Route	2025	2030	2035
Far East	167,100	191,600	223,100
Caribbean/Gulf	19,400	22,700	26,200
Transatlantic/Europe	48,000	56,400	64,700
<b>Total</b>	<b>234,500</b>	<b>270,800</b>	<b>314,000</b>

**2.3.7.6.2. Coal Exports**

Mobile exports metallurgical coal for the steel markets. Table 2-13 shows the forecasted tonnage for exported coal.

**Table 2-13. Coal Export Forecast**

Commodity	2025	2030	2035
Coal	9,971,300	10,642,900	12,469,000

**2.3.7.6.3. Upper Harbor Exports**

The Upper Harbor handles an assortment of commodities. Table 2-14 displays the combined Upper Harbor docks and their associated forecast tonnage.

**Table 2-14. Upper Harbor Export Tonnage**

Commodity	2025 Export	2030 Export	2035 Export
General and Dry Bulk Cargo	5,836,000	6,689,000	7,813,000
Chemicals	30,000	36,000	43,000

**2.3.7.6.4. Theodore Industrial Park Exports**

The Theodore Industrial Park commodity export aggregated totals are shown in Table 2-15.

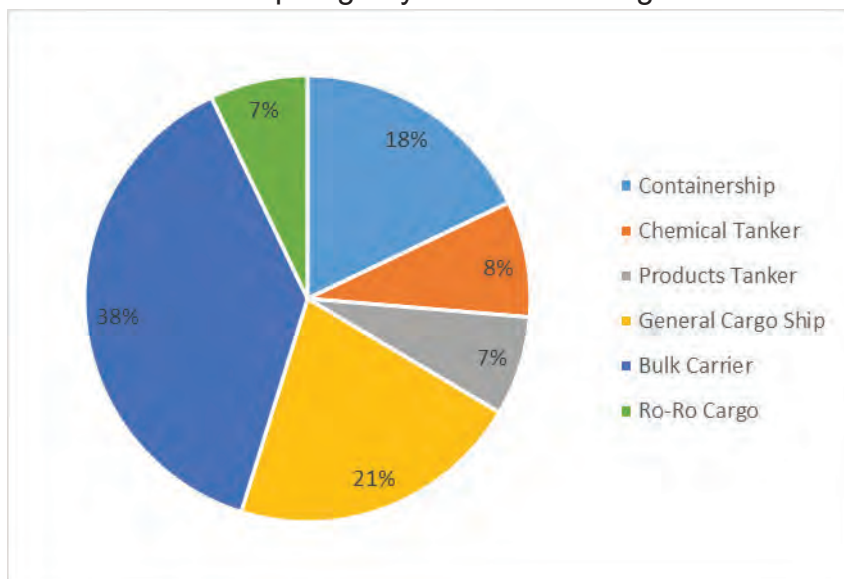
**Table 2-15. Theodore Industrial Park Export Tonnage**

Commodity	2025	2030	2035
Chemicals	225,000	267,000	317,000
General and Dry Bulk Cargo	507,000	674,000	906,000

### 2.3.8. Existing Fleet - Characteristics

Both long-term and short-term data was acquired from the WCSC and the Mobile Harbor Pilot's logs to determine vessel characteristics of the fleet calling at Mobile Harbor.

An analysis of the existing fleet data revealed six typical vessels calling at Mobile Harbor in 2014: Bulk Carriers; Containerships; General Cargo; Chemical Tankers; Oil Tankers; and, ro-ro cargo vessels. For the most part, these vessels are representative of historical vessels calling at Mobile Harbor. Other vessel types that call are research/survey, offshore supply vessels and vessels needing repairs. In 2016, the Carnival Cruise ship began year-round sailing from Mobile. Figure 2-13



shows the distribution of the vessel types in 2014. As shown, bulk carriers make up the largest vessel type calling at Mobile Harbor with general cargo vessels and containerships vessels close behind.

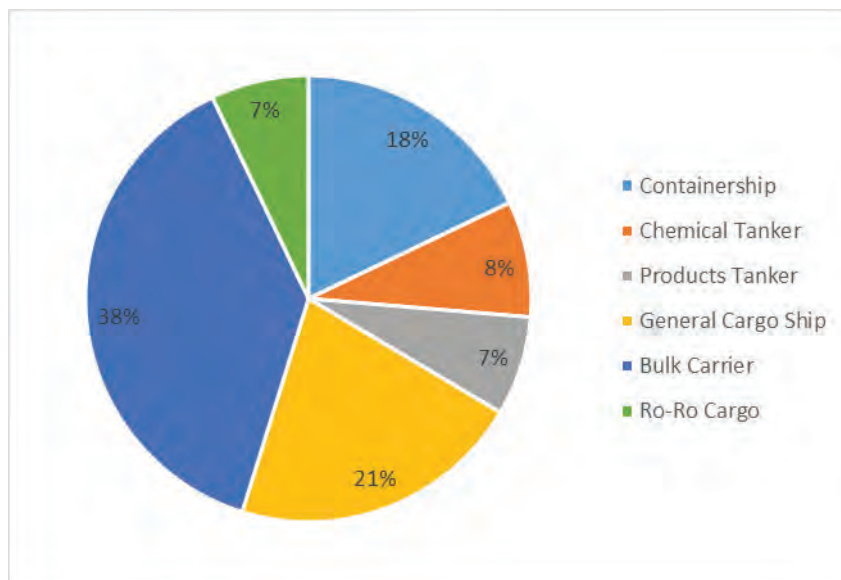


Figure 2-13. Vessel Type Distribution

### 2.3.8.1. Containership Fleet

From 2011 to 2015, the containership fleet calling at Mobile Harbor consisted of Sub-Panamax (22%), Panamax (61%), and Post-Panamax (17%). Figure 2-14 provides an overview of containerships calls at APM Terminals.

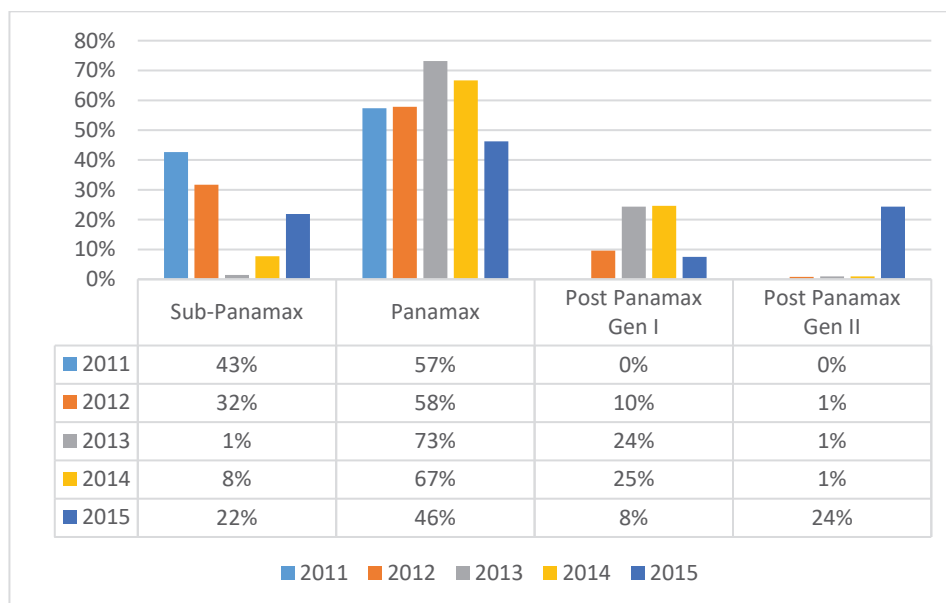


Figure 2-14. Containership Calls

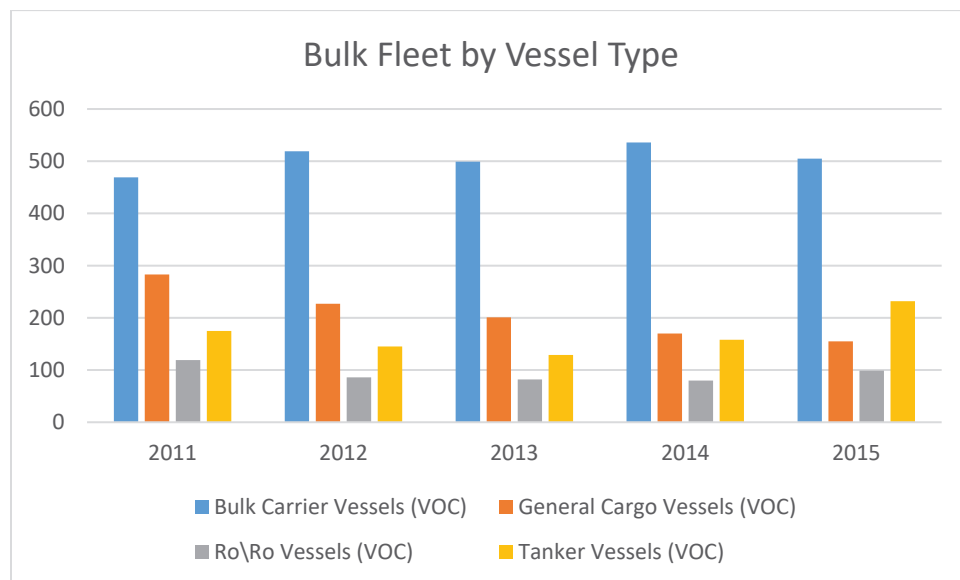
The largest containership by deadweight tonnage to call at Mobile Harbor was the MSC Judith in 2014. Table 2-16 shows characteristics of the largest containership vessels to call in this time frame.

**Table 2-16. Largest Mobile Harbor Containership Characteristics**

Vessel Name	Beam	Draft	LOA	DWT	TEU Capacity
MSC JUDITH	141.3	47.5	1,065	105,082	8,089
MSC TEXAS	141.3	47.5	1,096	101,898	8,238

### 2.3.8.2. Bulk Fleet

The bulk fleet includes bulk carriers, chemical tankers, general cargo vessels, ro-ro vessels and tankers. Figure 2-15 provides an overview of total foreign calls by vessel type. Bulk Carriers are the largest and most frequent type of bulk vessel. They carry steel and coal to the Lower Harbor and a variety of other commodities to the Upper Harbor. Tankers declined from 2011 to 2013, but rebounded in 2014 most likely based on the information in Section 2.3.1.



**Figure 2-15. Bulk Fleet by Vessel Type**

### 2.3.9. Existing Sailing Operations, Design Drafts Future Vessel Fleet Characteristics

#### 2.3.9.1. Shipping Operations



The Mobile Harbor Bar Pilots have safety guidelines which they follow for safe operation in the channel. The guidelines that are pertinent for this analysis are as follows: traffic is limited to one-way when a vessel whose beam exceeds 115 ft is transiting the channel, the maximum combined draft of two meeting vessels shall not exceed 85 ft, any two vessels with a combined length overall (LOA) of 1,650 ft or greater will not be allowed to meet in the channel if the combined draft is greater than 75 ft, and the maximum combined length of any two vessels that will be allowed to meet in the channel is 1,775 ft, regardless of draft.

#### **2.3.9.2. Underkeel Clearance**

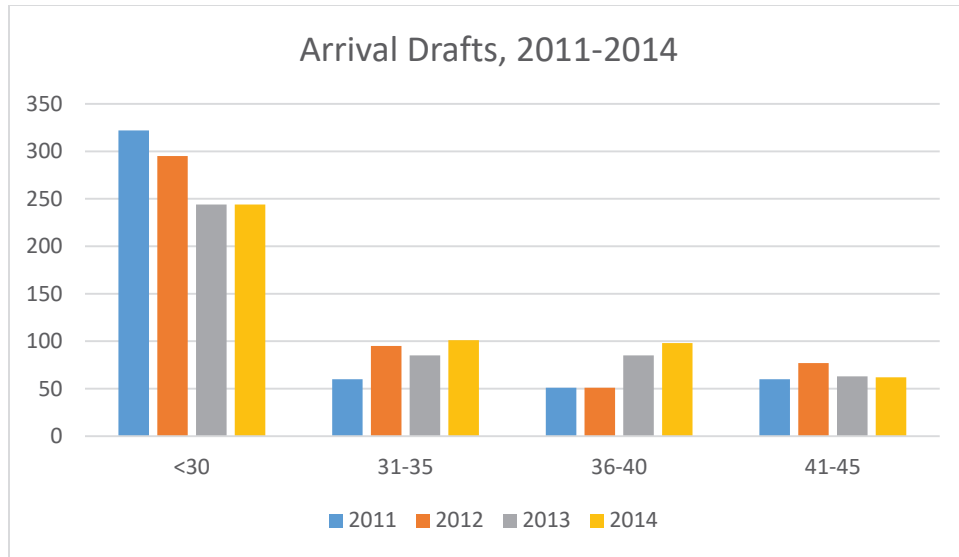
Underkeel clearance (UKC) is the minimum clearance available between the deepest point on a ship and the design channel bottom to avoid damage to ship hull, propellers, and rudders from bottom irregularities and debris. The measure of UKC for economic studies is applied according to planning guidance. According to this guidance, UKC is evaluated based on actual vessel operator and pilot practices within a harbor and subject to present conditions, with adjustment as appropriate or practical for With-Project conditions. The practices for UKC were determined through interviews with pilots and vessel operators and analysis of actual past and present practices. It is assumed that the UKC used in the existing condition will be in use with a deepened channel. For Mobile Harbor, clearance required varies by vessel type. The bulk carrier sailing drafts are frequently up to 45 ft. Containerships typically have sailing drafts of 41 ft, however, few have sailing drafts of 42 to 44 ft. Docks that tankers and general cargo vessels call are upriver where the channel converts to 40 ft deep. Sailing drafts for tankers and general cargo vessels are up to 40 ft deep.

#### **2.3.9.3. Tidal Range**

The tides in Mobile Bay are chiefly diurnal, occurring once daily. Under ordinary conditions, mean tidal range is 1.2 ft at the lower end and 1.6 ft at the upper end; extreme tidal range is 3.4 ft at the lower end and 3.6 ft at the upper end. Northern winds during the winter months may lower the water surface of the bay by as much as 1.5 ft below mean low water; hurricanes have been known to raise the level by as much as 11.5 ft. According to interviews with the Mobile Harbor Bar Pilots and review of their ship logs, vessels currently calling at Mobile Harbor do not depend on the tide to transit the channel.

#### **2.3.9.4. Sailing Practices**

Figure 2-16 and Figure 2-17 show the vessel frequency and sailing drafts for bulk carriers and containerships between 2011 and 2014. These two vessel types are only shown because the other vessels are carrying cargo upriver where the channel transitions to 40 ft deep, therefore, potential deepening of the channel will not provide a benefit to those commodities and resultant vessels.



**Figure 2-16. Arrival Drafts of Bulk Carriers and Containerships**

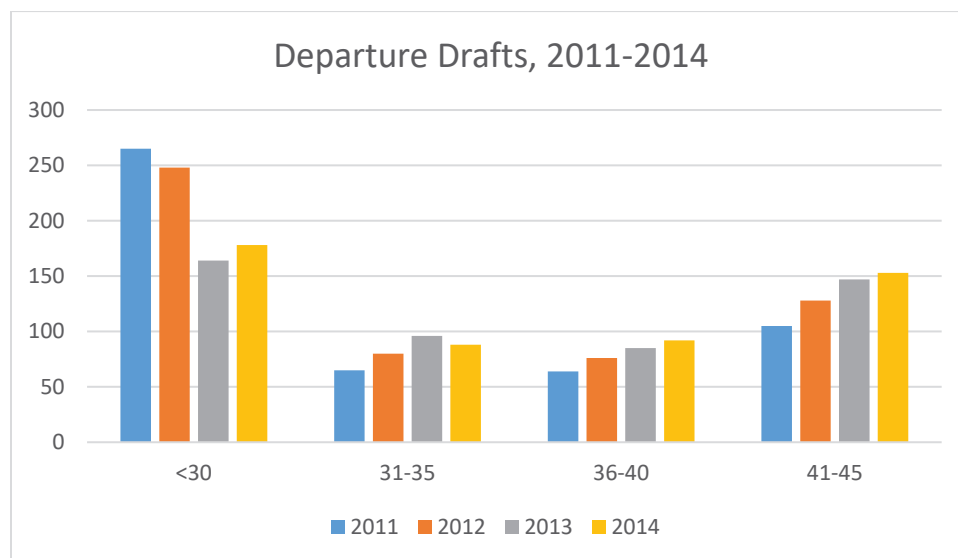


Figure 2-17. Departure Drafts of Bulk Carriers and Containerships

#### 2.3.9.5. Design Vessel

Generally, waterway improvements should be designed for optimization across the entire forecasted fleet. In this case, it would include service by several forms or types of vessels. Where vessel designs are relatively mature (tankers and dry bulk carriers), the task is straightforward. However, fully cellular containership designs are evolving. On a world fleet basis, containership designs continue to change with respect to size and cargo carrying capacity and have not reached a limiting threshold.

The design vessels are defined per USACE guidance from Engineer Manual (EM) 1110-2-1613 stating:

*"...the design ship or ships are selected on the basis of economic studies of the types and sizes of the ship fleet expected to use the proposed navigation channel over the project life..."* The design ship is defined by EM 1110-2-1613 as *"...the largest ship of the major commodity movers expected to use the project improvements on a frequent and continuing basis..."*

Two design vessels were used for this study, a containership and a bulk carrier. Attachments B-1 and B-2, Appendix B describe how the design vessels were selected. Table 2-17 displays the design vessels characteristics.

**Table 2-17. Design Vessel Characteristics**

Vessel Type	DWT	Beam (ft)	LOA (ft)	Design Draft (ft)	TEU
Containership	119,000	158	1,100	50.8	10,100
Bulk Carrier	120,000	141.2	851.5	51.6	NA

### **2.3.9.6. Panama Canal Expansion**

In June 2016, the Panama Canal expansion was completed and opened a new set of locks with chambers of 1,400 ft long, 180 ft wide, and 60 ft deep, creating a third lane of traffic. The lock expansion provides the capacity to accommodate vessels up to 1,200 ft long, 161 ft wide and 50 ft deep. This amounts to containerships with cargo volumes up to 120,000 deadweight tonnage (DWT) and 13,000 TEU. The Panama Canal’s expansion paves the way for larger ships to be deployed to the U.S. Gulf Coast and East Coast from Asia, Oceania, and West Coast of South America. Previously, the Panama Canal restricted container traffic shipments to vessels drafting less than 39.5 ft. This essentially prevented any Far East/Gulf Coast/East Coast U.S. shipments from taking advantage of the economies of scale of loading larger ships to deeper sailing drafts.

In the first seven months of Fiscal Year (FY) 2017 (October 2017 – April 2017), over 1,000 vessels of the new Panamax dimensions transited the new locks. Tonnage through the Panama Canal increased by 22% in the first seven months of FY 2017 over FY 2016.

## **2.4. Navigation Features**

### **2.4.1. Navigation History**

The navigation channel dredging in Mobile Bay and Mobile River began in 1826 with enactment of the River and Harbor Act of 1826. During the period 1826 to 1857, a channel 10 ft deep was dredged through the shoals in Mobile Bay up to the City of Mobile. Subsequently, further modifications to the channel were authorized and the original Federal project was enlarged by the addition of the Arlington, Garrows Bend, and Hollinger’s Island Channels within the bay, and a channel into Chickasaw Creek from the Mobile River. Section 104 of the River and Harbor Act of 1954 authorized a 40-foot depth channel with a 400-foot width in Mobile Bay to the mouth of the Mobile River and a 40-foot deep channel in the Mobile River to the Cochrane-Africatown Bridge with the width varying from 400 to 775 ft. The Senate Public Works Committee on 16 July 1970 and the House Public Works Committee on 15 December 1970, under the provisions of Section 201 of the 1965 Flood Control Act, authorized a 40-foot deep by 400-foot wide channel,

branching from the main ship channel and extending through a land cut to the Theodore Industrial Park. The Theodore Ship Channel was reauthorized in the WRDA of 1976.

Further improvements to the existing Federal project were initially authorized in the 1985 Energy and Water Resources Appropriation Act, PL 99-88, Ninety-ninth Congress, First Session). The improvements were reauthorized in Section 201 of the WRDA of 1986 (PL 99 – 662, Ninety-ninth Congress, Second Session), which was approved 17 November 1986, and subsequently amended by Section 302 of the WRDA of 1996. The report referenced by this authorization recommended the following improvements to the Federal project: deepening and widening the Bar Channel to 57 ft deep by 700 ft wide; deepening and widening the main ship channel to 55 ft deep by 550 ft wide in Mobile Bay, except for the upper 3.6 miles which require a width of 650 ft; deepening the Mobile River Channel to 55 ft to a point about 1 mile below the I-10 highway tunnels; and, constructing turning and anchorage basins near the upper end of the main ship channel.

The Mobile River, on which the ASPA facilities are located, is formed some 45 miles north of the city with the joining of the Alabama and Black Warrior/Tombigbee Rivers. The Mobile River also serves as the gateway to international commerce for the Tennessee/Tombigbee Waterway.

## **2.4.2. Existing Navigation Configuration and Dimensions**

A visualization of the overall Mobile Harbor Federal Navigation Project, including the existing and authorized dimensions, is shown in Figure 1-1. Further descriptions of the various Mobile Harbor Federal Navigation Channel segments evaluated as part of this study are provided in the following paragraphs. The study did not evaluate modifications to the upper approximately 4.3 miles of the River Channel (i.e., north of station 226+16) because that portion of the channel is already constructed to its fully authorized dimensions.

### **2.4.2.1. Bar Channel**

The Bar Channel is currently 47 ft deep by 600 ft wide for a length of approximately 8.1 miles across the Mobile Outer Bar, from the Gulf of Mexico through the double channel bends in Mobile Pass to the southern extents of the Bay Channel. Construction to the current depth was completed in 1990. The channel stationing for the Bar Channel is 1760+10 to 2189+59. This channel segment includes three bends and a sediment trap feature. The bends (and associated widenings) are located at stations 1775+43, 1854+69, and 2089+54 and the sediment trap (47 ft deep by 100 ft wide resulting in a channel width of 700 ft) is located from station 2029+60 to 2149+60. The Bar Channel alignment and stationing are shown in Figure 2-18 along with the locations of the Sand Island Beneficial Use Area (SIBUA) and the ODMDS. The SIBUA is currently used for placement of material dredged as part of routine maintenance of the Bar Channel (predominately sandy





Figure 2-18. Bar Channel Alignment and Stationing



material). The ODMDS has been used historically for the placement of material dredged from the Bay Channel (predominately fine grained silts and clays).

#### **2.4.2.2. Bay Channel**

The Bay Channel is currently 45 ft deep by 400 ft wide for a length of approximately 28.7 miles from the northern end of the Bar Channel through Mobile Bay to the mouth of Mobile River. Construction to the current depth was completed in 1990. The channel stationing for the Bay Channel is 244+66 to 1760+10. This channel segment includes a turning basin feature (i.e., the Choctaw Pass Turning Basin as described in the following paragraph) and three bends (and associated wideners). The turning basin is located between stations 244+66 and 273+21 and the bends (and associated wideners) are located at stations 423+47, 1055+43, and 1115+68. The Bay Channel alignment and stationing are shown in Figure 2-19 along with the locations of the open water dredged material placement areas in Mobile Bay. These areas (1E – 29E, 2W – 6W, and 14W – 29W) are used for placement of material dredged as part of routine maintenance of the Bay Channel (predominately fine grained silts and clays).

#### **2.4.2.3. Choctaw Pass Turning Basin**

The Choctaw Pass Turning Basin is currently 45 ft deep by approximately 1,570 ft long (including the 400-foot width of the existing Bay Channel) by 715 ft wide. Additionally, it contains a 100-foot widener/transition section about 3,500 ft in length along the eastern edge of the existing Bay Channel immediately south of the basin to improve basin access, reduce the basin size needed for turning, and increased vessel maneuverability. The authorized dimensions of the turning basin, per Section 201 of the WRDA of 1986, PL 99-662, were 40 ft deep by 1,500 square ft, located opposite to the McDuffie Coal Terminal; however, it was not constructed with the other project improvements during the late 1980s/early 1990s at the request of the NFS. A GRR was later prepared (in May 2007), per the NFS request, to re-evaluate the turning basin. The 2007 GRR recommended the turning basin be moved north to Choctaw Pass and deepened to 45 ft to match the adjacent channel dimensions. Construction to the recommended dimensions was completed in 2011. The turning basin is located between stations 244+66 and 273+21 and the widener/transition along the eastern edge of the existing Bay Channel is located between stations 273+21 and 317+73. The turning basin alignment and stationing are shown in Figure 2-20.



Figure 2-19. Bay Channel Alignment and Stationing





Figure 2-20. Choctaw Pass Turning Basin Alignment and Stationing

#### **2.4.2.4. River Channel**

The River Channel is currently 40 ft deep by 600 ft wide for a length of approximately 4.3 miles from the Cochrane-Africatown Bridge at the northern end of the harbor, over the Bankhead and Wallace Tunnels, to an area just upstream of the APM Terminals near the southern extents of the harbor. The channel then transitions to 45 ft deep by 600 ft wide for a length of approximately 1,850 ft, terminating at the northern end of the Bay Channel and Choctaw Pass Turning Basin. The upper (i.e., northern) approximately 4.3 miles of the channel, including the turning basins contained within this section, are currently constructed to the authorized dimensions due to depth and width limitations from the two tunnels that run underneath and the surrounding harbor infrastructure; therefore, modifications to this portion of the channel were not evaluated as part of this study. Construction of the lower 1,850 ft to the 45-foot depth was completed in 2008. The channel stationing for the upper (i.e., 40-foot deep) portion of the River Channel is 0+00 (at the Cochrane-Africatown Bridge) to 226+16 and the stationing for the lower (45-foot deep) portion is 226+16 to 244+66. The River Channel alignment and stationing are shown in Figure 2-21 along with the upland dredged material placement sites at Blakeley and Pinto Islands. These sites are used for the dredged material placement of fine-grained material dredged as part of the routine maintenance of the River Channel.

#### **2.4.3. Maintenance Dredging**

##### **2.4.3.1. Maintenance Dredge Material Quantities**

Approximately 5.9 million cubic yards (mcy) of sediment are dredged annually as part of the routine maintenance of the Mobile Harbor Federal Navigation Project. Descriptions of the historic maintenance dredging rates and volumes by channel segment are provided in the following paragraphs.

##### **2.4.3.1.1. River Channel**

A summary of dredge history for the River Channel is provided in Table 2-18. River Channel Dredged Volumes 1961-2016 and the cumulative maintenance dredge volumes are shown in *Source: Modified from Resource Management Group, Inc., 2010 with records to 2016* Figure 2-22. The historic rates are projected to continue for the future Without-Project condition.

The figure of cumulative maintenance dredge volumes shows fairly consistent rates through time with rates averaging approximately 1.3 mcy per year since the 1960s, with the exception being a short period between 2009 and 2012. The reason for the increase in dredge rate in this time period is unclear but may be associated with the incorporation of some new work dredge volumes into maintenance dredge volume estimates, temporarily altered sediment transport patterns in the channel after completion of channel extensions and/or high river flows events, which occurred during this time period.



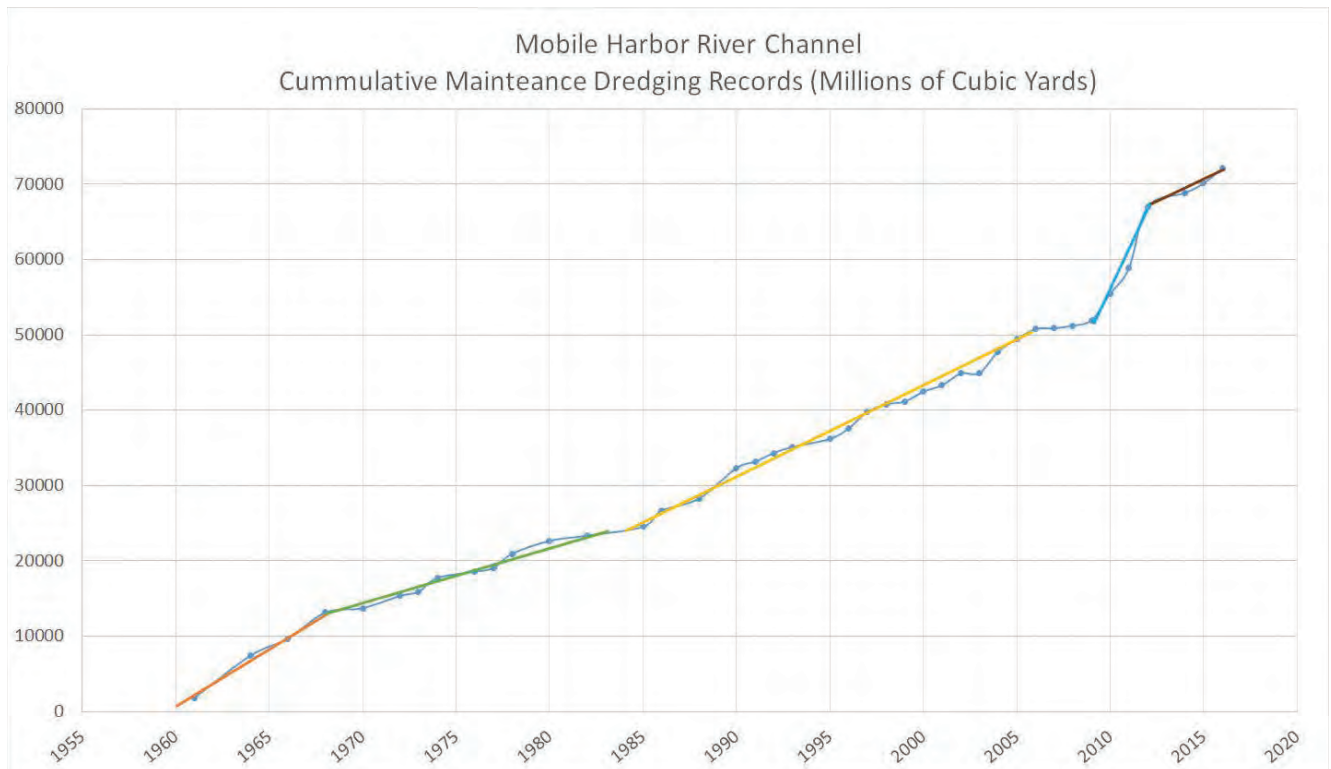


Figure 2-21. River Channel Alignment and Stationing

**Table 2-18. River Channel Dredged Volumes 1961-2016**

Dates	Maintenance Dredging (cubic yards (cy))	Maintenance Dredging (cubic yards per year (cy/yr))
1961-1970	15,809,904	1,057,754
1971-1980	9,519,787	1,231,870
1981-1990	11,086,834	1,167,886
1991-2000	10,510,970	1,081,540
2001-2010	9,733,857	1,481,238
2011-2016	13,331,146	2,666,229
1961-2016	72,179,400	1,312,353

Source Modified from Resource Management Group, Inc., 2010 with records to 2016



Source: Modified from Resource Management Group, Inc., 2010 with records to 2016

**Figure 2-22. River Channel Cumulative Maintenance Dredged Volumes (1961– 2016)**



### 2.4.3.1.2. Bay Channel

A summary of the dredge history for the Bay Channel is provided in Table 2-19 and the cumulative maintenance dredge volumes are displayed in *Source: Modified from Byrnes, et. al., 2012 with dredge records to 2016*

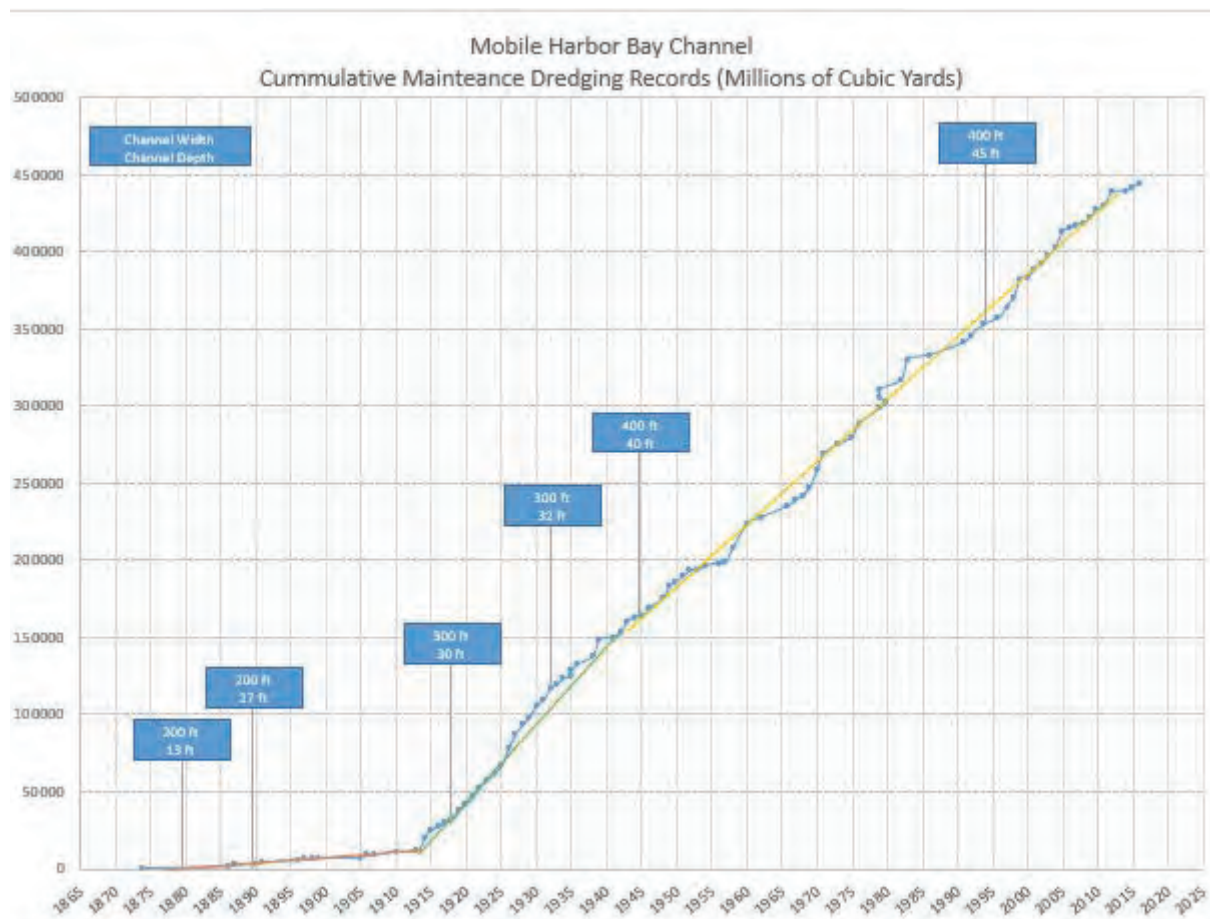
Figure 2-23. The historic rates are expected to continue for the future Without-Project condition.

The figure of cumulative maintenance dredge volumes) shows varying dredge rates through time, with rates averaging approximately 4 mcy per year since the Bay Channel was deepened to a depth of 45 ft MLLW in 1988 to 1990. Of relevance is the fairly consistent dredge rate since 1964 despite increases in channel dimensions during the time period and changes in dredge material placement practices inside the bay.

**Table 2-19. Summary of Dredging History for the Mobile Bay Channel (1870-2016)**

Channel Dimensions (ft)	New Work Dredging Dates	New Work (cy)	Maintenance Dredging Dates	Maintenance (cy)
13 x 200	Sept 20, 1870 to Sept 1876	1,217,869	Sept 1876 to June 30, 1885	0
17 x 200	Feb 19, 1881 to June 30, 1885	4,724,704	June 30, 1885 to Oct 3, 1895	3,236,420 (315,441 (cy/yr)
23 x 280	Oct 1888 to Oct 3, 1895	20,428,577	Oct 3, 1895 to 12-Jul-09	5,717,644 (415,225 cy/yr)
23 x 100	June 26, 1899 to 12-Jul-09	17,673,578	July 12, 1909 to 15-Aug-13	2,264,298 (557,709 cy/yr)
27 x 200	Jan 6, 1911 to 15-Aug-13	14,231,311	Aug 15, 1913 to 25-Jul-26	66,700,043 (5,150,582 cy/yr)
30 x 300	Sept 10, 1918 to July 25, 1926	14,712,024	July 25, 1926 to 19-July-33	38,607,404 (5,531,147 cy/yr)
32 x 300	1932 to July 19, 1933	7,291,046	July 19, 1933 to 10-Nov-64	106,628,266 (3,405,566 cy/yr)
40 x 400	27-Jan-56 to Nov 10, 1964	54,106,804	10-Nov-64 to July 3, 1989	108,945,745 4,419,706
45 x 400	24-Oct-87 to July 3, 1989		July 3, 1989 to 3-Oct-16	109,911,136 (4,070,783 cy/yr)

Source: Modified from Byrnes, et. al., 2012 with dredge records to 2016



Source: Modified from Byrnes, et. al., 2012 with dredge records to 2016

**Figure 2-23. Bay Channel Cumulative Maintenance Dredged Volumes (1904 – 2015)**

### 2.4.3.1.3. Bar Channel

A summary of dredging history is provided in Table 2-20 and the cumulative maintenance dredge volumes are shown in Source: Modified from Byrnes, et. al., 2008 Figure 2-24. The historic rates are expected to continue for the future Without-Project condition.

The figure of cumulative maintenance dredge volumes (Source: Modified from Byrnes, et. al., 2008

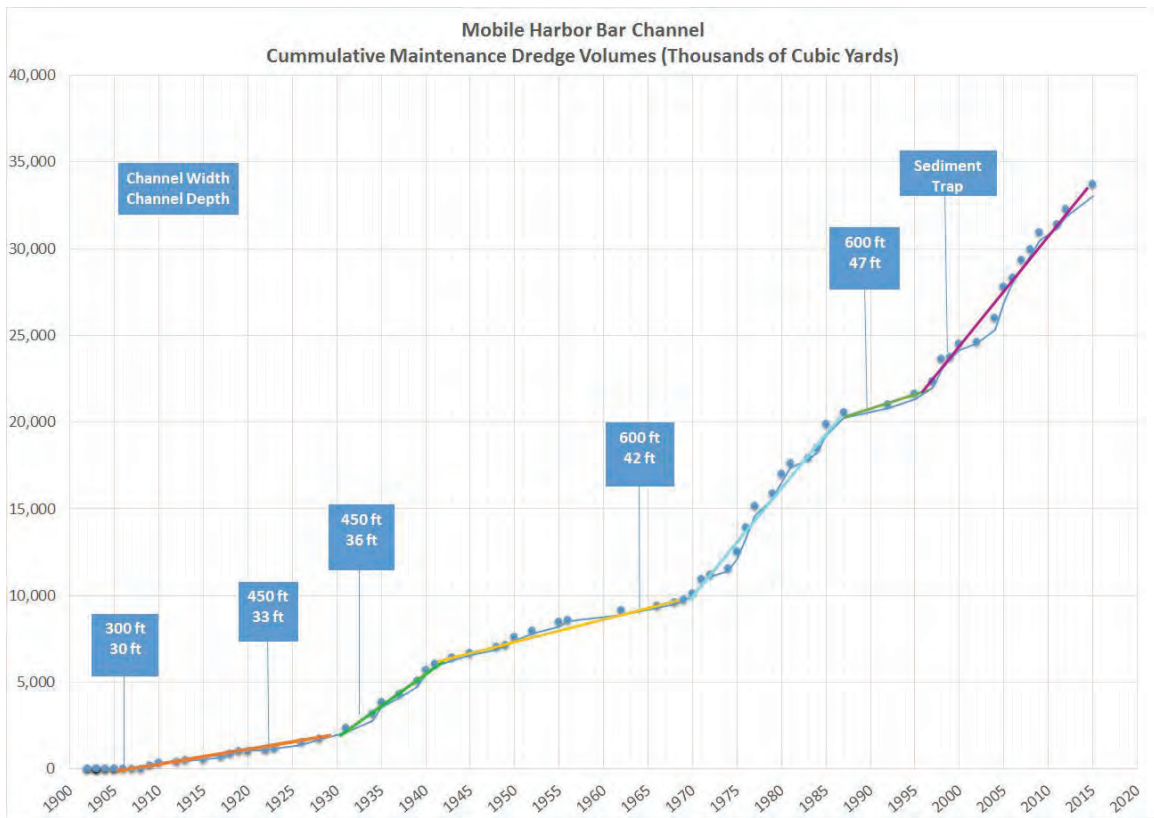
Figure 2-24) shows varying dredge rates through time, with rates averaging approximately 525,000 cubic yards/year since the Bar Channel was deepened to a depth of 47 ft MLLW in 1990. Since 1995, an increase in dredging rate to roughly 624,000 cy/yr

is observed in the data. Of relevance to this later time period are the number of tropical storm events with significant water level response that impacted the area. This time period includes 7 of the top 10 hurricanes that produced the highest water levels recorded at the National Oceanic Atmospheric Administration (NOAA)'s long-term Dauphin Island Station 8735180.

**Table 2-20. Summary of Dredging History for the Bar Channel (1904 – 2015)**

Date (Authorized Dimensions)	New Work (cy)	Maintenance Dredging (cy)
May 1904 to October 1913 (30 ft deep, 300 ft wide)	787,304	529,727 (58,900 cy/yr)
October 1913 to June 1924 (33 ft deep, 450 ft wide)	1,078,426	651,236 (59,200 cy/yr)
June 1924 to August 1934 (36 ft deep, 450 ft wide)	685,171	2,012,611 (201,300 cy/yr)
August 1934 to July 1965 (42 ft deep, 600 ft wide)	3,510,878	5,944,787 (191,800 cy/yr)
July 1965 to April 1990 (47 ft deep, 600 ft wide)	6,755,352	11,422,278 (456,900 cy/yr)
April 1990 to September 1999 (47 ft deep, 600 ft wide)	3,061,598	4,562,767 (356,00 cy/yr)
September 1999 to 2015 (47 ft deep, 600 ft wide, sediment trap)	0	9,951,641 (664,000 cy/yr)

Source: Modified from Byrnes, et. al., 2008 with dredge records to 2015



Source: Modified from Byrnes, et. al., 2008

**Figure 2-24. Bar Channel Cumulative Maintenance Dredge Volumes (1904 – 2015)**

## 2.4.4. Maintenance Dredged Material Placement

Dredged material placement as part of maintenance operations for the future Without-Project conditions will continue to be placed in a combination of upland sites adjacent to the River Channel; open water placement sites within the bay; the SIBUA on the ebb tidal shoal, including a proposed northwestward expansion of the site; and the ODMDS in both the current limits and a future expansion area. The locations of the current placement areas as described above are shown in Figure 2-18, Figure 2-19, and Figure 2-21. Estimates of available capacity at each of these sites are contained in Table 2-21 through Table 2-24.

### 2.4.4.1. Upland Dredged Material Placement Sites, River Channel

Material dredged as part of the routine maintenance of the River Channel (primarily fine-grained sediments) is and will continue in the future Without-Project condition to be placed in the upland dredged material placement sites located east of the River Channel, as shown in Figure 2-21. Existing capacity estimates for these sites are shown within Table 2-21. Upland Dredged Material Placement Site Capacities

**Table 2-21. Upland Dredged Material Placement Site Capacities**

Location	Area (Acres) <sup>1</sup>	Projected Maximum Dike Elevation (ft) <sup>1</sup>	Total Idealized Volumetric Capacity (CY) <sup>1,2</sup>
North Blakeley	69	50	3,172,000
Mud Lake 6	70	46	3,388,000
Mud Lake 7	129	46	8,562,000
South Blakeley	196	65	12,087,000
North Pinto	48	47	3,434,000
<b>Totals</b>	<b>512</b>		<b>30,644,000</b>
1Taken from Table 7 of Resource Management Group, Inc., 2010 updated with USACE dredge material placement records through 2016. 2Idealized volumetric Capacity includes interior capacity plus the volume to build projected			

Source: Modified from Resource Management Group, Inc., 2010.

### 2.4.4.2. Open Water Dredged Material Placement Sites, Bay Channel

Material dredged as part of the routine maintenance of the Bay Channel (primarily fine-grained sediments) is and will continue in the future Without-Project condition to be placed in the open water placement areas adjacent to the channel, as shown in Figure 2-18 and Figure 2-19. Existing capacity estimates for these sites are shown within Table 2-22. Open Water Dredged Material Placement Site Capacity

**Table 2-22. Open Water Dredged Material Placement Site Capacity**

Open Water Placement Sites	Area (Acres)	Volume Capacity (CY) <sup>1</sup>
Placement Sites 1 - 29	21,560	140,974,000
Note: 1) No estimate of sediment transport from the sites were incorporated into the capacity estimates.		

### 2.4.4.3. SIBUA for the Bar Channel

Material dredged as part of the routine maintenance of the Bar Channel (primarily sandy sediments) is and will continue in the future Without-Project condition to be placed in the SIBUA. Existing capacity estimates for these sites are shown within Table 2-23.

In an effort to ensure adequate placement capacity for future maintenance dredging of the Bar Channel, the USACE, Mobile District is currently pursuing modifications to extend the SIBUA beyond its existing boundaries.<sup>5</sup> The site will be expanded to the northwest, following the shoal and pathway of sediment transport towards Dauphin Island. Further discussion regarding expansion of SIBUA can be found in Section 4.2.

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<sup>5</sup> In 2000, the Dauphin Island Property Owners' Association filed a lawsuit in the United States Court of Federal Claims styled Dauphin Island Property Owners' Association, et al. vs. United States, No. 00-115-L (Fed. Cl.). The suit alleged, among other things, that the United States dredging practices had caused significant shoreline erosion of Plaintiffs' property on Dauphin Island, Alabama. A settlement was reached between the parties, and confirmed by the court, that required the Corps to continue to conduct its maintenance dredging practices to deposit material dredged from the Bar Channel in the SIBUA and/or the Feeder Berm Disposal Area, with exceptions in only certain specified circumstances.



**Table 2-23. Sand Island Beneficial Use Site Capacity**

	2018 Volume (CY) Below -15' MLLW	2018 Volume (CY) Below -20' MLLW	2018 Volume (CY) Below -25' MLLW
SIBUA	7,487,906	2,202,690	644,437
SIBUA South Extension	4,679,635	2,891,301	1,415,534
SIBUA Lighthouse <sup>(3)</sup>	1,320,708	682,208	309,517
SIBUA Northwest Extension	9,294,614	6,241,179	1,014,424
<b>Total 2018 Capacity</b>	<b>22,783,000</b>	<b>12,017,000</b>	<b>3,383,912</b>
NOTES:			
(1) Capacity estimates displayed in this table do not account for uncertainty in volumetric change.			
(2) Capacity estimates are rough order of magnitude assuming vertical side slopes. Final volume estimates will account for side slopes of the fill, which would likely result in reduced capacity.			
(3) 2018 survey data did not cover the eastern section of the SIBUA Lighthouse Site therefore volume estimates for this area are based on NOAA 2014 Survey Data			

#### 2.4.4.4. Ocean Dredged Material Disposal Site (ODMDS)

Sediments dredged from the Bar and Bay Channels have been placed historically in the ODMDS. Although material from the Bar Channel is now placed in the SIBUA (since 1999) and some material from the Bay Channel is disposed in the open water sites adjacent to the channel, the ODMDS is still primarily utilized for fine-grained material dredged from the Bay Channel. This practice will continue in the future Without-Project condition. Table 2-24 below contains the capacity for both the existing and proposed ODMDS expansion. The boundaries of the current and proposed ODMDS expansion and the bound are shown in Figure 4-7.

**Table 2-24. ODMDS Capacity**

Ocean Dredged Material Disposal Sites	Area (Acres)	Volume Capacity (CY) <sup>1</sup>
Current ODMDS	4,017	20,000,000
Expanded ODMDS	20,341	260,000,000
<b>Total</b>	<b>24,358</b>	<b>280,000,000</b>
Note: Volume estimates including capacity needs were taken from ongoing environmental coordination documents with the Environmental Protection Agency (EPA).		

## 2.5. Environmental Setting

This section characterizes the affected environment and provides descriptions of existing conditions for environmental and socioeconomic resources in the overall project area which includes Mobile and Baldwin Counties. The information presented here will be used to compare conditions resulting from the implementation of the TSP as described in Section 3.6 to assess potential impacts. A summary of the comparative assessment of

the alternatives and their potential environmental impacts is provided in Section 3.7. More detailed information regarding the potential impact assessments is presented in Section 3.0, Appendix C.

### **2.5.1. Geographic Setting**

Along the Gulf of Mexico, the State of Alabama extends about 56 miles between Perdido Pass and Petit Bois Pass. This shoreline includes about 47 miles of sandy shoreline (Byrnes et al. 2010) in the southern portions of Mobile and Baldwin Counties. The Mobile Bay estuary is a bell-shaped, submerged river valley system approximately 31 miles long between the estuary mouth and the Mobile River and Tensaw River (Mobile-Tensaw River) Delta, and 23 miles wide between Mississippi Sound and Bon Secour Bay (Hummell, 1996). It receives water and sediment from the Mobile-Tensaw River System, the Nation's sixth largest in terms of total drainage area (Isphording and Flowers, 1987). The bay encompasses about 413 square miles of open water (Isphording et al. 1996) and has an average depth of about 9.7 ft at mean high water (Chermock et al. 1974).

The entrance to Mobile Bay, between Mobile Point on the western end of the Morgan Peninsula and Pelican Point on the eastern end of Dauphin Island, is an extensive natural inlet that has been improved by channel dredging activities since 1904, primarily through the outer bar at the seaward extent of the ebb-tidal delta. The entrance is commonly referred to as Mobile Pass or Main Pass and is the primary point of access between Mobile Bay (via the north-south Mobile Harbor Federal Navigation Channel) and the Gulf of Mexico. The entrance is about 3 miles wide. The GIWW intersects the Mobile Harbor Federal Navigation Channel just inside the entrance to the bay. The GIWW connects Mississippi Sound with Mobile Bay via Pass aux Herons on the west, and eventually heads to Perdido Bay via Bon Secour Bay.

Mobile Bay has been recognized as a nationally significant estuary of the U.S. since 1995, with the designation as one of 28 National Estuary Programs established by the Environmental Protection Agency (EPA). The Mobile Bay and the Mobile Tensaw River Delta support a diverse set of fish and wildlife habitats including: bogs, bottomland hardwoods, freshwater and hardwood swamps, freshwater wetlands, maritime forests, pine savanna, SAV, tidal and brackish water marshes and oyster reefs.

The study area encompasses Mobile Bay, Alabama which is bounded by the Morgan Peninsula to the east and Dauphin Island, a barrier island on the west. The deepest (75 ft) areas of the bay are located within the Federal navigation channel. The Mobile Bay Watershed drains water from three-fourths of Alabama as well as portions of Georgia, Tennessee and Mississippi into Mobile Bay. The Mobile-Tensaw River System empties into the northern end of the bay. Several smaller rivers and creeks in Mobile County, on the western side of the bay, and in Baldwin County, on the eastern side, also empty into

the bay, making it an estuary. A feature of all estuaries is a transition zone, where the freshwater from the rivers mixes with the tidally-influenced salt water of the Gulf of Mexico.

Characterizations of baseline aquatic resources in estuarine, transitional, and freshwater environments are important to establish prior to channel modification and potential impacts from saltwater intrusion and other water quality parameters. A key component of the current study is to document potential changes to aquatic resources along the salinity continuum moving upriver and estimates of how far upriver changes may occur after the navigation channel is modified to its new dimensions. Elevated salinities upriver and in adjacent marshes have raised concerns among resource managers because of potential impacts to the marshes and their biological resources. Aquatic resources are a critical part of both estuarine and riverine food webs, providing habitat and forage for economically and ecologically important finfish and shellfish species, which are identified as an important indicator of potential effects, and are routinely monitored as part of environmental assessments.

Studies have been executed through a combination of 1) direct measurements of aquatic resources and 2) modeling approaches to characterize the existing conditions within the project area which contains a variety of natural resources that are comprised of wetlands, SAV, oysters, benthic invertebrates and fish. A discussion of the environmental conditions and existing resources are included below.

**Watershed.** The watershed that supplies Mobile Bay with water and sediment encompasses about 43,200 square miles and has an average discharge through the Mobile-Tensaw River system of about 62,000 cubic ft per second (cfs) (Isphording et al. 1996) as illustrated in Figure 2-25. Two outlets from Mobile Bay provide discharge points for water and sediment: 1) Mobile Pass discharges approximately 85% of the outflow, and 2) Pass aux Herons discharges about 15% of flow into Mississippi Sound (Isphording et al., 1996; Byrnes et al., 2010).

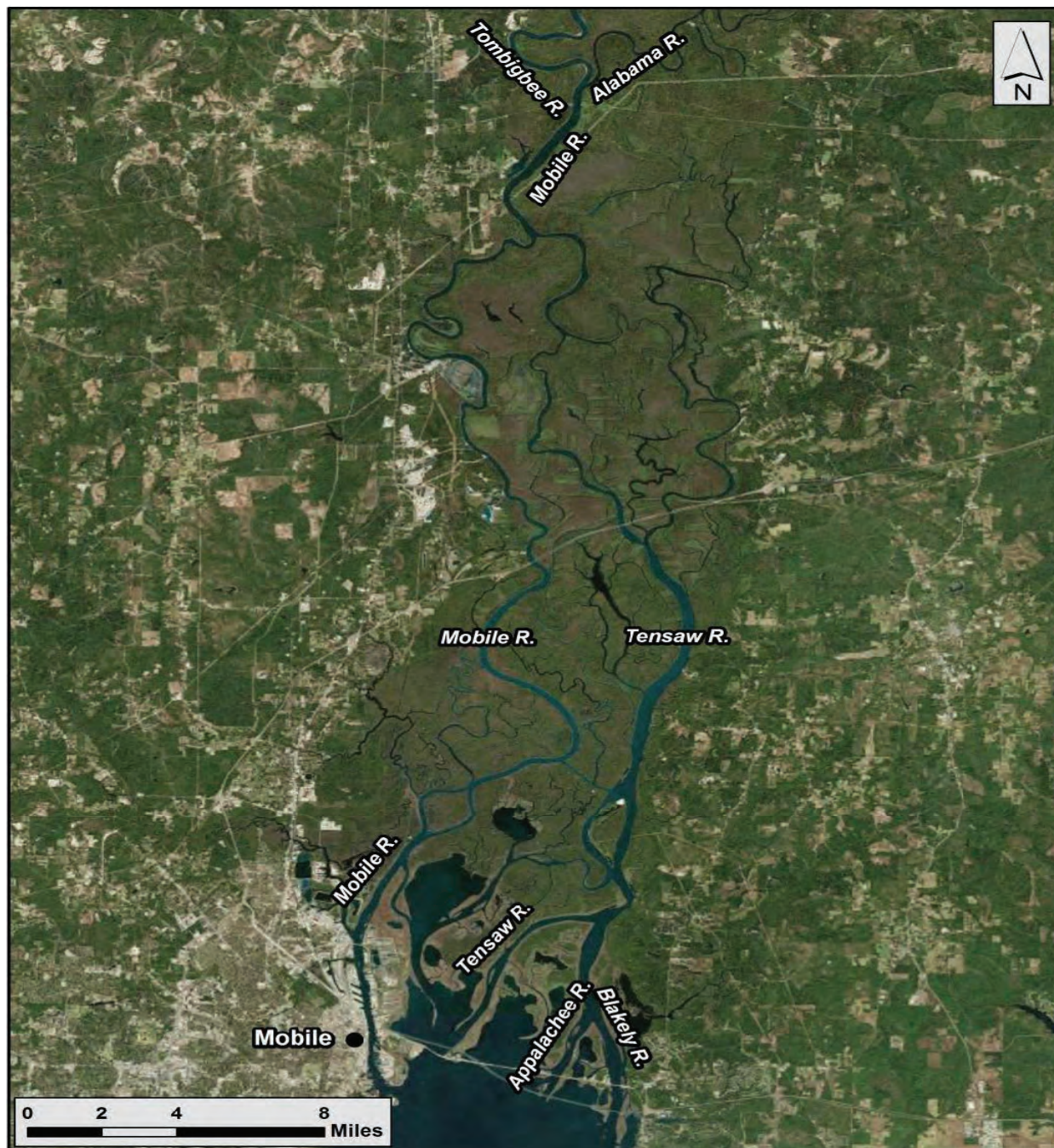
**Mobile-Tensaw River Delta.** The Mobile-Tensaw River system drains several physiographic provinces including parts of the Blue Ridge, Piedmont, Valley and Ridge, Appalachian Plateau, and the Coastal Plain Province (Johnson et al., 2002). Sediment deposited in the Mobile-Tensaw River Delta and transported into Mobile Bay reflects varying lithologies throughout the Mobile Bay Watershed. The Mobile-Tensaw River Delta is the second largest river delta in the U.S., ranging from approximately 6 to 16 miles wide by 45 miles long, and includes an area of approximately 192,000 acres. Ecosystems include approximately 20,000 acres of open water, 10,000 acres of marsh, more than 73,000 acres of swamp, and more than 89,000 acres of bottomland forest (Johnson et al., 2002).



**Figure 2-25. Mobile Bay Watershed Area**

The Mobile Bay Watershed drains through the Alabama and Tombigbee Rivers to the head of the Mobile-Tensaw River Delta where they form the Mobile River as shown in Figure 2-26. Uplands flanking the delta drain approximately 220,000 acres and 280,000 acres on east and west sides, respectively (Isphording et al., 1996). The Mobile River flows about 6 miles south into the delta before separating into the Mobile and Tensaw Rivers. As indicated by the distribution of ecosystems, a majority of the delta swamp contains an extensive growth of trees; however, the southern 25% of the delta is primarily covered with marsh grass. Throughout the delta there are many stream channel diversions and crossings where flat channel slopes result in low flow velocities (Isphording et al., 1996). As such, water travel time from the head of the delta to the head of Mobile Bay is on the order of two days. River and sediment discharge to northern Mobile Bay enters through the Mobile, Tensaw, Apalachee, and Blakeley Rivers as shown in Figure 2-26.





**Figure 2-26. Mobile-Tensaw River Delta between the confluence of the Alabama and Tombigbee Rivers and the northern margin of Mobile Bay (Byrnes et al. 2013)**

**Gulf Beaches.** Dauphin Island is the westernmost beach environment in coastal Alabama. The island is approximately 15 miles long and extends from Mobile Pass, at the Mobile Bay entrance, to Petit Bois Pass, a 4 mile wide tidal inlet separating western Dauphin Island, Alabama and eastern Petit Bois Island, Mississippi. The western two-thirds of Dauphin Island is a low-relief, washover barrier that is subject to overwash by Gulf of Mexico waters during tropical storms and hurricanes (Nummedal et al. 1980;

Byrnes et al. 1991; Hummell, 1996; Morton, 2007). Maximum relief along this portion of the island is about 7 ft relative to mean water level (MWL), except for dune features that may reach 10 ft MWL in elevation. Island width varies between about 800 and 2,600 ft. The eastern end of Dauphin Island has an average elevation near the beach of about 10 ft MWL; however, an extensive interior dune system that reaches an elevation of approximately 45 ft MWL exists north of beach deposits on top of existing Pleistocene coastal deposits (Otvos, 1979; Otvos and Giardino, 2004).

Seaward of the beach along eastern Dauphin Island, an ephemeral, subaerial sand deposit called Pelican Island is associated with the Mobile Pass ebb-tidal delta. This feature is prominent in its impact on shoreline response along eastern Dauphin Island (Byrnes et al. 1999; Parker et al. 1997). The island has continuously changed its shape, size, and location throughout the historical record in response to storms and normal wave and current processes (Hummell, 1996).

Along the eastern Alabama Coast in Baldwin County, the shoreline extends from the eastern margin of Mobile Pass, along the Morgan Peninsula east to Perdido Pass. The Morgan Peninsula forms the southeastern terminus of Mobile Bay and consists of an extensive beach backed by parallel dunes and numerous sub-parallel beach ridges, formed as a result of net longshore sediment transport processes (Bearden and Hummell, 1990; Stone et al. 1992).

### **2.5.2. Climate**

The climate in the project area is subtropical, characterized by warm summers and short, mild winters. The average daily temperature ranges in the summer and winter are 81–91 and 42–63 degrees Fahrenheit (°F) respectively. The average annual rainfall is about 66 inches, and is well distributed throughout the year. Precipitation records indicate July as the wettest month, while October is the driest. The National Climatic Data Center climactic summary for Mobile is shown on Table 2-25.

**Table 2-25. Climactic Summary, Mobile Regional Airport, Alabama**  
(Station No. 015478)

<i>Period of Record: 01/01/1948 to 6/10/2016</i>													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	60.9	64.2	70.6	77.9	84.7	90.0	91.0	90.7	86.8	79.3	69.8	63.0	77.4
Average Min. Temperature (°F)	40.8	43.5	49.6	56.7	64.4	70.7	73.0	72.6	68.5	57.4	48.1	42.9	57.3
Average Total Precipitation (in.)	4.99	5.21	6.50	5.03	5.54	5.30	7.51	6.96	5.99	2.93	4.15	5.43	65.56
Average Total Snow Fall (in.)	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0



*Mobile Harbor, Mobile, Alabama*  
*Integrated General Reevaluation Report with Supplemental Environmental Impact Statement*

**Source: Southeast Regional Climate Center.**

### **2.5.2.1. Winds**

Prevailing winds for the Alabama Coast are produced by two pressure ridges which dominate weather conditions: the Bermuda High, centered over the Bermuda-Azores area of the Atlantic and the Mexican Heat Low centered over Texas during warm months. Prevailing winds are predominately from the east and southeast during spring and summer months, and from the north and north east during fall and winter months. The strongest winds are recorded in February and March with the exception of frontal storms and tropical systems.

Wind data is readily available from the U.S. Air Force's 14<sup>th</sup> Weather Squadron. The nearest location for which the 14<sup>th</sup> publishes data is Brookley Field (a.k.a. "Downtown") Alabama. In many instances, for lack of local long-term records elsewhere, wind data obtained at Brookley Field at Mobile, Alabama has been adapted by the USACE, Mobile District for some coastal and navigation channel investigation design tasks. Wind data here is presented as a graphical representation of the wind regime in the area (Figure 2-27). Wind rose data at this site show that wind speeds rarely exceed 25 knots.

### **2.5.2.2. Tides**

The tidal variation in the Mobile Bay and adjacent waters is diurnal with an average tide cycle of 24.8 hours. The mean tidal range within the bay varies from 1.6 ft at the head of the bay to 1.2 ft at the entrance, which is classified as microtidal. The daily mean water elevation averaged by month increases for half the year and then decreases over a range that is about the same amplitude as the diurnal range. During the fall, winter, and spring months, water levels frequently fall within a range between 0.5 and 1.0-foot below MLLW. This annual cycle level is more regular at Mobile than at most U.S. tidal stations (Hands, et. al 1990). Although the tidal range caused by astronomical forces is relatively small winds, pressure gradients and river discharge can induce larger variations. Strong winds blowing from the north can force water out of the bay and result in current velocities of several knots in the passes. The reverse occurs with winds blowing from the southeast, which forces water shoreward toward the Mobile Tensaw River Delta. A more detailed discussion of the area tides is located in Section 2.4, Appendix A.

### **2.5.2.3. Waves**

In general, wave intensity along coastal Alabama is low to moderate. The common wave direction is out of the southeast. The most common peak wave periods fall between a range of 4 to 5 seconds, with an overall mean wave period of 4.9 seconds. Significant wave heights range from 0 to 16 ft, with the most common wave heights being less than 3 ft. Overall mean significant wave height is 2 ft. A more detailed discussion of area waves is located in Section 2.5, Appendix A.

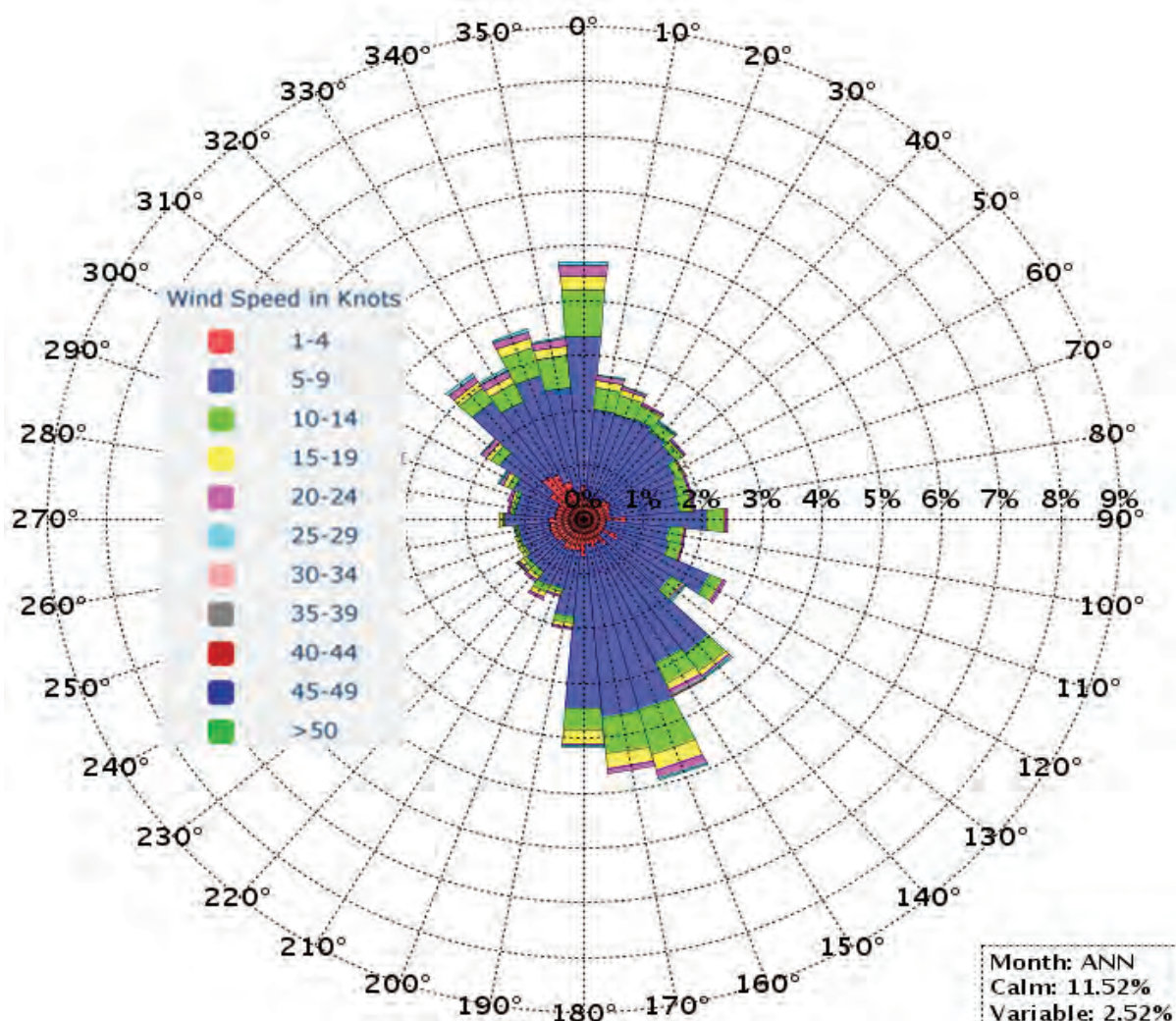


Figure 2-27. Wind Rose, Brookley Field, Mobile, Alabama.

Wind induced waves within the bay are fetch and depth limited. Limited wave data collected at the Middle Bay Lighthouse as part of the Mobile Bay Real-time Continuous Environmental Monitoring in 2013, 2014, and 2016, as well as 2016 aquadopp data collected in the upper bay, indicate average significant wave heights generally less than 1.5 ft with overall mean peak periods less than 4 seconds; however, hurricane and storm conditions, and strong winter cold fronts can produce significant surges and much larger wave conditions within the bay and along the coastline. Zhao and Chen, 2008 report 100-year return period maximum significant wave heights between approximately 8 and 10 ft, with maximum wave heights near the shoreline of approximately 5 ft. The maximum wave

heights with the longest period occur near the bay entrance where they are influenced by Gulf of Mexico swell.

A vessel generated wave energy (VGWE) assessment was conducted to quantify the relative changes in wave energy due to future vessels calling at Mobile Harbor. The investigation included field data collection using a suite of five pressure sensors located north of Gaillard Island. Overall, the field data collected for this study provides the general trends for these types of waves generated from the existing vessel traffic. The Average VGWE represented as the statistically significant wave height,  $H_{m0}$ , for all sites ranged between 0.02 ft to 0.15 ft with the highest values being closer to the Mobile Harbor Federal Navigation Channel, decreasing in height moving further from the channel. More specific information pertaining to vessel draft, speed, and direction of transit is presented in detail in a report prepared by Allen (2018) which is included as Attachment D in Appendix A.

#### **2.5.2.4. Currents**

Tidal circulation and freshwater discharge from the Mobile-Tensaw River system are the two primary factors influencing currents in Mobile Bay under normal meteorological conditions. Strong winds associated with tropical cyclones and winter cold fronts impart significant energy on this shallow-water estuarine system, resulting in substantial changes in flow magnitude and sediment resuspension (Isphording, 1994; Schroeder et al., 1998; Zhao and Chen, 2008; Zhao et al., 2011). Although ebb and flood flow duration are approximately equal throughout the diurnal tidal cycle at Mobile Pass, during flood tide, water entering Mobile Bay is generally deflected east and north with maximum predicted flow velocities in the Bar Channel of about 5 ft/s (Byrnes et al., 2010). Hummell (1990) provides a compilation of average annual surface current distribution for flood and ebb tides based on data from Schroeder (1976) and Smith (1981). He illustrates a greater abundance of flood current arrows east of the ship channel, suggesting that most water entering the bay during flood tide flows along the eastern half of Mobile Pass. According to Chermock et al. (1974), water flowing eastward toward Bon Secour Bay encounters freshwater discharge from the Fish and Bon Secour Rivers creating a flow eddy that is deflected northwestward to rejoin a general northward flow in the central bay during flood tide. In the northern portion of Mobile Bay, flood currents are deflected eastward by fluvial discharge from the Mobile-Tensaw River system, resulting in a south-directed surficial freshwater flow along the western side of the bay (Austin, 1954; Hummell, 1990). During ebb tide, flow to the south generally is uniform. Based on flow measurements, approximately 85% of the water and sediment exiting Mobile Bay leaves through Mobile Pass and the remaining 15% exits through Pass aux Herons (Isphording et al., 1996; Schroeder and Wiseman, 1999; Byrnes et al., 2010).

This shallow estuary tends to be highly stratified due to weak tidal forcing compared with strong freshwater inflow. Except for episodic winds associated with cold fronts and

tropical cyclones, circulation generated by average winds generally does not have enough energy to mix the estuary. However, meteorological conditions often have a significant impact on water level and circulation in the bay. Furthermore, water flow associated with wind wave energy under ambient conditions generally has minimal impact on sediment resuspension/transport within Mobile Bay.

Zhao and Chen (2008) noted that unlike winds and tides, no long-term observations of wind waves exist for Mobile Bay. As such, they used the short-term data of Pendygraft and Gelfenbaum (1994) to develop a wave atlas using the curvilinear, stationary version of the third-generation Simulating WAVes Nearshore (SWAN) wave model (Chen et al., 2007). For a storm with a 100-yr return period, Zhao and Chen (2008) predicted wave heights of between 8.2 and 9.8 ft throughout most of the central portion of Mobile Bay and 4.9 ft or less near the shoreline (wave periods were on the order of 3.5 to 4.5 seconds). Overall, the spatial distribution of significant wave heights is primarily controlled by local water depth. Under non-storm conditions, wave heights within the bay generally are less than 1.6 ft.

#### **2.5.2.5. Temperature**

The coastal area of the Gulf of Mexico has a humid, warm-temperature to sub-tropical climate, with occasional subfreezing temperatures. The water temperature of the Gulf influences winter air temperatures in the Mobile area. Air temperatures usually reach 90 °F or higher about 70 days per year; temperatures in excess of 100 °F occur occasionally (U.S. Navy, 1986).

According to ClimaTemps.com (<http://www.mobile.climatemps.com/temperatures.php>) (2015), the mean annual temperature in Mobile 67.5°F. The warmest month is July with an average temperature of 82.2 °F and the coolest month is January with an average temperature of 49.82°F. The average monthly temperatures for the Mobile, Alabama area is reported by ClimaTemps.com in Table 2-2 in Appendix C.

During the summer months, the Bermuda High generates moisture-laden southerly winds which keep the coast cooler than inland areas. Air temperature on a typical summer day begins in the low 70s and rises rapidly before noon to the high 80s or low 90s until a sea breeze forms and checks further increases. Occasionally, a northerly breeze predominates throughout the day and temperatures rise to the high 90s or exceed 100 °F. In the winter, northerly winds bring cold, continental air masses, yet temperatures typically remain relatively mild with lows in the 40s and highs in the 60s.

#### **2.5.2.6. Rain**

The Mobile area receives an average annual rainfall of 65 inches, among the highest for metropolitan areas in the continental U.S. This rainfall can be accentuated by hurricanes,



tropical storms, and El Niño events. The driest period of the year is typically from August through November (TAI, 1998). Rainfall is somewhat evenly distributed throughout the year with the exception of a slight maximum at the height of the summer thunderstorm season and a slight minimum during the late fall. Average maximum monthly rainfall occurs in July with 7.7 inches and average minimum monthly rainfall in October, with 2.6 inches (U.S. Navy, 1986). Most precipitation originates from convectional frontal or cyclonic air masses. From May through October, thunderstorms occur primarily during the daylight hours. Frontal rainfall and thunderstorms are associated with synoptic processes (cold front intrusions) (U.S. Navy, 1986).

### **2.5.2.7. Sediment Transport**

#### **Riverine.**

Seven major rivers supply water and sediment to the Mobile-Tensaw River system that ultimately empties into the Mobile-Tensaw River Delta and Mobile Bay. Based on the U.S. Geological Survey (USGS) fluvial sediment sampling on the lower Alabama and Tombigbee Rivers, Isphording et al. (1996) estimated an average fluvial sediment load to the delta of about 4.78 mt/yr. About 25% of this sediment deposits as delta fill (1.2 mt/yr), resulting in an average discharge of about 3.58 mt of suspended sediment to the bay each year (Byrnes et al., 2012). Based on long-term deposition trends, Byrnes et al. (2012) estimated that approximately 100,000 cubic yards per year entered the bay from the Tensaw River; 200,000 cubic yards per year was derived from Appalachian River/Chacaloochee Bay area; and 350,000 cubic yards per year associated with transport from the Blakeley River on the east side of the bay. According to historic dredge records detailed in Section 2.4.3.1 of this report, roughly 1.3 mcy/yr is deposited and dredged from the lower Mobile River Channel annually.

#### **Mobile Bay.**

Long-term regional sediment transport patterns within the bay for the period 1917/18 to 1984/2011 are documented in Byrnes et al. (2012) "Sediment Dynamics in Mobile Bay, Alabama: Development of an Operational Sediment Budget." Byrnes et al. (2012) found that the most significant changes occurring during the 42-year interval evaluated were associated with deposition in the northern portion of the bay at the mouth of the Mobile-Tensaw River Delta; deposition in the southern part of the bay resulting from current flow and sediment movement at Mobile Pass, including sand transport into Mobile Bay along the north side of Mobile Point (Morgan Peninsula); and erosion and deposition associated with navigation channel dredging and placement. Elsewhere in the bay, only minor deposition and erosion patterns were identified within a large estuarine system that is net depositional (Byrnes et al., 2012). In all, the study found that deposition in the bay accounts for approximately 72% of sediment input with 28% transported out of the bay through natural transport processes and offshore placement of dredged sediment.



While the rivers dominate sediment input, wind-induced waves and hurricanes have a significant impact on resuspension and redistribution of sediments and shoreline changes in Mobile Bay (e.g. Sapp et al. 1976, van Rijn 1984; Isphording and Imsand 1991; Isphording 1994; Schroeder et al. 1998, Chen et al. 2003, Jung et al. 2004; Zhao et al. 2011, Byrnes et al. 2012). Strong winds associated with tropical cyclones and winter cold fronts impart significant energy on this shallow-water estuarine system, resulting in substantial changes in flow magnitude and sediment resuspension (Isphording, 1994; Schroeder et al., 1998; Zhao and Chen, 2008; Zhao et al., 2011). Chen et al. (2012) found during hurricanes maximum shear stresses are primarily along the nearshore regions of the bay and near the navigation channel, expecting that these events can have a significant impact of sediment re-suspension in those areas. In estimating suspended sediment concentration and sediment dynamics in the Mobile Bay, Zhao et al. (2011) found that wind-induced resuspension lead to high inorganic suspended sediments (ISS) throughout the year and that a rapid fall was primarily from resettling rather than flushing from the bay within eastern side of the bay.

High sediment loads from the river and sediment resuspension both contribute to the 4 mcy of material dredged annually from the Bay Channel per year. Both Byrnes et al. 2012 and Gailani et al. (2014) suggest the contributions from re-suspended sediments to dredging are upwards of 30%. Through field data collection and sediment transport modeling conducted and part of a multi-agency regional sediment management effort evaluating thin layer placement of dredged sediments within Mobile Bay; Gailani et al. (2014) found that this contribution occurred with or without placement of dredge material within the bay and that the majority of the contribution was from the simulated hurricane events.

**Coastal/Ebb Tidal Delta.** The analysis of multi-decadal seafloor change of the western ebb tidal shoal and the nearshore area around Dauphin Island, Alabama during periods of intense and non-intense tropical storms are documented in Flocks, J.G. et. al (2017) “Analysis of Seafloor Change around Dauphin Island, Alabama, 1987–2015.” In addition long-term regional sediment transport patterns evaluated during two distinct time periods; one representing conditions prior to significant construction and maintenance dredging activities to determine natural changes (1847-1848 to 1917-1920) and another representing conditions after significant changes to the outer Bar Channel were made (1917-2002) are documented in Byrnes et al. (2008) “Evaluation of Channel Dredging on Shoreline Response at and Adjacent to Mobile Pass, Alabama.” These studies found that sediment erosion, transport and deposition is controlled by storm wave and current process that produce net littoral transport to the west. Despite differences in time periods and methods of analysis both studies find consistent patterns of erosion and deposition of major features as described in Section 2.9, Appendix A. Flocks et al. (2017) found that geomorphologic features identified in the study respond differently over the stormy and non-stormy time periods, and that these can be quantified through variations in erosion and accretion rates. Byrnes et al. (2008) had similar findings revealing a common link

associated with geomorphic evolution including island breaching and island roll over associated with storms. Both these studies found that despite large volumes of sediment being dredged from the ship channel the ebb-tidal delta retains equilibrium, with areas of the ebb tidal shoal recovering through time from hurricanes.

#### **2.5.2.8. Sea Level Change**

Systematic long-term tide elevation observations suggest that the elevation of oceanic water bodies are gradually rising and this phenomenon is termed “sea level rise” (SLR). The rate of rise is neither constant with time nor uniform over the globe. In addition to elevation of oceanic water bodies, however, is the gradual depression of land surface along the Gulf of Mexico Coast, referred to as “subsidence,” which becomes an additional factor in the relationship between the land’s elevation over time and changing sea levels. Because the Alabama Coast is affected by both subsidence and global SLR (adjusted for local conditions), these factors combine in a single element of “relative” SLR. Relative SLR at a given location is the change in mean sea level at that location with respect to an observer standing on or near the shoreline. Analysis of historical data suggests a relative SLR of approximately 9 inches along the Alabama/Mississippi Coast during the 20th century.

Bays and barrier islands are among the most vulnerable areas to the consequences of climate change. Serious threats to the islands come from the combination of elevated sea levels and intense hurricanes. The Alabama barrier islands consist primarily of low-lying topography with beach-ridge interior cores near the hurricane-prone Gulf of Mexico. As a result, the barrier islands are more susceptible to the effects of storm surge than other areas.

Under low to moderate rates of relative SLR, barrier islands typically do not lose their entire land mass, because eventually they become so low and narrow that surficial processes are dominated by storm overwash (Morton, 2008). Sand eroded from the open-ocean shore in this state would be transported across the barrier island and deposited in the Sound to the north. The western three-fourths of Dauphin Island is a transgressive landform, while Petit Bois, Horn, and Ship Island in Mississippi are dominated by alongshore sediment transport. The predominance of westward alongshore sand transport both at geological and historical time scales indicates that this motion would likely continue in the future, being driven by the prevailing winds, storm waves, and associated currents (Morton, 2008). Byrnes et al. (2012) found that under historical rates of SLR, potential shoreline recession due to SLR accounted for 4–5% of the total island change signal. The remaining signal was driven primarily by the prevailing winds, storm waves, associated currents, and sediment supply.

USACE guidance (ER 1100-2-8162) requires consideration of projected future sea-level changes and impacts in project planning, design, operations, and maintenance. Because future SLR rates are uncertain, planning and design should consider project performance for a range of sea level change rates. Historic rates are used as the lower bound sea level change rate. Predictions of future sea level due to intermediate and high rates of sea level change are to be developed in accordance with USACE guidance by extension of rate Curve 1 and Curve 3 respectively from the National Research Council's 1987 report *Responding to Changes in Sea Level: Engineering Implications*.

Historic rates of sea level change are determined from tide gage records. Long-term tide gage records on the order of 40 years are preferred over shorter term records because the sea level change rate estimate error decreases as the period of record increases. There is one long-term tide gage in the vicinity of Mobile Harbor at Dauphin Island, Alabama; gage number 8735180. SLR rate for this location is shown in Table 2-26.

**Table 2-26. Historic SLR Rates**

Location	Rise in ft/yr	Std. Error of Rise
Dauphin Island, AL	0.0184	0.59
Period of Record	1966-2017	

Predicted rise scenarios for Dauphin Island sites were computed in accordance with current USACE guidance. Projected rise between 2018 and 2100 varies from roughly 1 foot (0.3 meters) for the low current rate curve to 5 feet (1.5 meters) for the high rate curve. Section 2.10.4.2, Appendix A discusses the considerations that led to using a 0.5 meter (m) SLR projection for quantitative assessments. The decision to use the intermediate relative SLR scenario (0.5 m) over the 50 year project horizon for quantitative assessments was twofold: (1) the running average in mean sea level falls between the intermediate and the high level projections in recent years at the Dauphin Island gage; and, (2) concern that any potential relative differences in the future With- and future Without-Project conditions combined with SLR may not be discernable in the models at the highest projected rate.

#### **2.5.2.9. Gulf of Mexico and Mobile Bay Circulation**

**Gulf of Mexico.** The circulation patterns within the eastern Gulf are dominated by the Loop Current. This current enters the Gulf through the Yucatan Straits and moves along the eastern edge of the Yucatan shelf into the eastern Gulf. The distance the current penetrates into the Gulf is dependent upon the season, with the maximum typically occurring during late summer. The current then deflects eastward and southeastward, exiting the Gulf between Cuba and the Florida Keys through the Florida Straits to become

the Gulf Stream (U.S. Navy, 1986). Large penetrations of the Loop Current into the Gulf generally lead to the formation of a ring or residual eddy (U.S. Navy, 1986).

Water circulation within the offshore region consists of two interrelated systems, including the open and in-shore areas. The large-scale circulation in the Gulf is influenced by the Loop Current and associated eddies, winds, waves, freshwater inflows, and the density structure of the water column. The general circulation pattern within the in-shore region is more strongly influenced by the celestial tides, local winds, and freshwater inflows, as well as the open Gulf circulation features that act as a forcing mechanism. The coupling of local winds and tides is the major contributor to near-shore shelf circulation. Typically, sustained winds are the primary force controlling water movements within the near-shore area (USACE, 1985, as referenced in U.S. Navy, 1996).

**Mobile Bay.** Circulation patterns within Mobile Bay are controlled by astronomical tides, winds, and freshwater inflows. During periods of relatively low freshwater inflow, i.e., when inflow is about 12,200 cfs, the “flushing time” of the bay is estimated at between 45 and 54 days (U.S. Navy, 1986). During periods of higher flow, flushing times are substantially less.

The tidal circulation of Mobile Bay was investigated during a period of low river discharge. According to Austin, on flood tide: “The incoming current from the Gulf enters through the main pass. A portion of this water flows up the west side of the bay and part enters the Mississippi Sound through Pas aux Herons. Within about 4 hours, the flow through Pas aux Herons reverses and water enters Mobile Bay from the Sound. Another part of the flooding water mass flows to the east into Bon Secour Bay before turning west to rejoin the generally northward trending flood tide entering the central part of the bay.”

In the northern, upper portion of the bay, the tidal inflow from the south is forced to the east of the bay by the inflow from the Mobile-Tensaw River Delta. The freshwater inflow generally continues on the surface in a southerly direction along the western side of the bay. This flow pattern sets up a generally counter-clockwise circulation within the upper bay (U.S. Navy, 1986).

The project area encompasses 234 acres or approximately 0.1 % of all of Mobile Bay surface area. Within the project area, circulation is controlled by tidal fluctuations and wind-generated currents. The project area is isolated from river flows that contribute to the current patterns in Mobile Bay. Small currents could be established on a local level from flushing resulting from severe storm events that discharge from the Southern Drain and other associated stormwater drainage.

### **2.5.3. Geology, Soils, and Sediments**

#### **2.5.3.1. Geologic Setting.**

The physiographic province for the Mobile Bay area represents the southernmost extent of the Alabama Coastal Plain consisting typically of Miocene, Pliocene, Pleistocene, or younger sediments. The geologic formations of the Alabama Coastal Plain form a wedge of seaward thickening sedimentary deposits.

The oldest geologic unit exposed is the undifferentiated Lower Miocene, which is characteristically composed of clay, sand, and sandy clay that are light-gray, yellowish-gray, yellow, and white in color. This unit is also known as the Mobile Clay in the Mobile-Baldwin County area and is equivalent to the Hattiesburg Clay in neighboring Mississippi and the Pensacola Clay to the east in the Florida Panhandle. Stratigraphically, this unit overlies the Tampa Limestone, which is not exposed in Alabama or western Florida. The Mobile Clay is an obvious marker bed throughout both Mobile and Baldwin Counties. This unit thickens southwestward and is fossiliferous, gray to green in color, glauconitic, and may contain beds of sand lenses. The Upper Miocene Ecor Rouge is composed of sands, clayey sands, and silts.

The next younger unit is the Pliocene Citronelle Formation, composed of characteristically dark-reddish-brown to orange sand and quartz gravel with local clay balls and clay partings. Yellowish-brown iron oxide-cemented sandstone can be used to differentiate the base of the formation from the older Ecor Rouge Formation. The Pleistocene units are alluvial and terrace deposits. These materials are typically composed of white, gray, brownish-red, and orange, fine- to coarse-grained sand that is gravelly in many exposures. Lenticular beds of light-gray, orange, and yellow sandy clay occur locally. Alluvial deposits consist of alluvium, beach, estuarine, swamp, stream, and deltaic deposits and include white, gray, black, orange, and brown, very fine- to coarse-grained sand, clayey sand, sandy clay, and peat. They may include variable amounts of organic material. Gravel may occur locally and is Holocene in age (TAI, 1998).

Mobile Bay is a geologically young estuary, defined as a drowned river valley. The bay has probably held its present outline and shape from the time of its formation several thousand years ago. Tectonic forces are believed responsible for the north-south configuration of the eastern shore with high scarps of late Miocene and Pliocene deposits, and also of the western shore with much lower scarps cut in the late Pleistocene (U.S. Navy, 1986).

Mobile County and Baldwin Counties are in two major land resource areas- the Southern Coastal Plan Resource area, which includes the northern, western and central parts of the counties, and the Gulf Coast Flatwoods Resource area, which includes a narrow strip along the eastern and southern boundaries.

The Southern Coastal Plan area has two general landscapes. The northern part of the area is mainly low hills with narrow to broad, gently sloping ridgetops, moderately-steep side slopes, and many narrow, well-defined drainage-ways. The southern part is mostly



a series of level to gently sloping, low lying ridges that have steeper slopes along drainage-ways. The Gulf Coast Flatwoods area is mainly nearly level, low stream terraces and swamps along the rivers on the east side of Mobile County and broad flats with a few fairly large depressions and a few drainage-ways on the south side of the county. Petis Bois, Dauphin, and other small islands, 5 to 12 miles from the mainland, are included in Mobile County. These islands are part of the barrier islands that encloses Mississippi Sound. Elevation in Mobile County ranges from sea level along the coast to about 340 ft above sea level near Citronelle in the northern part of the county. Drainage in Mobile County in the western third is by the Escatawpa River and Big Creek, which flow in a south-westernly direction into the State of Mississippi. The eastern part of Mobile County is drained mostly by small streams that are part of the Mobile, Tensaw and Middle Rivers drainage system, which flows into Mobile Bay. Drainage in the southern part of Mobile County is by the Dog River, the Fowl River, and small streams that flow into Mobile Bay and into Mississippi Sound.

#### **2.5.3.2. General Soil Setting.**

The sediment of Mobile Bay consists of sand to clays with various mixtures of sand, silt, and clay covering most of the bay bottom. The Mobile Bay sediments are approximately 50% sand and 50% clay as described by the Navy (1986). The northern portion of the bay is comprised of deltaic sands, silty sand, silts and clayey silts carried in by the Mobile River. Sediments of the lower bay are primarily estuarine silty clay and clay. The western shoreline exhibits sands which grade to clayey sand, sandy clays, and clays towards the deeper parts of the bay. Oyster reefs and shell occur in isolated locations in the southern part of Mobile and Bon Secour Bays (USACE 1985). The upper portion of Mobile Harbor is predominantly silt and clay with higher concentrations of sand in the mouth of the Mobile River. The northernmost part of the harbor and Mobile River mouth, which reflects the conditions within the turning basin area is sandier due to the larger grain sizes initially deposited into the estuary by the mouth of the river while the finer silts and clays were deposited in the deeper portions of the harbor area.

**Upland.** The soils in upland areas surrounding the project area are classified as Urban Land soils with LaFitte Muck soils. Urban Land soils consist of extensively built-up areas, with 85 to 100% of a typical area being either covered by structures or disturbed by excavation and filling. Most of these areas are nearly level to sloping. Storm drain systems usually control runoff on paved areas. Small areas of moderately built-up land are also present where structures cover 50 to 85% of the surface, remnants of undisturbed natural soils are present on vacant lots, and the natural soil is covered by fill material (Hickman and Owens, 1980).

LaFitte Muck soils are very poorly drained, nearly level organic soils that occur along the mouths of streams and rivers in tidal marsh areas. The surface of these soils is usually a very dark grayish brown muck about 7 inches thick. The next layer is a very dark brown



muck 15 inches to a depth of approximately 64 inches. The underlying material is a very dark gray silty clay to a depth of approximately 73 inches. Soil permeability is moderately rapid and the available water capacity is high.

**Sediment.** The total annual sediment load entering the Mobile River from the Alabama and Tombigbee Rivers is estimated at 4.76 million metric tons. Including contributions from adjacent water sheds downstream of the confluence of these rivers, a total of 4.85 million metric tons per year is estimated to enter the Mobile-Tensaw River Delta and Mobile Bay system. Approximately 33% of these materials remain in the delta, while 3.26 million metric tons enter the bay. Most of the sediment load is trapped within the bay (on the order of 2.5 million metric tons per year), whereas the remainder (about 16% of the total load entering the delta) is discharged to the Gulf and Mississippi Sound (TAI, 1998).

The sediment that formed the present Mobile-Tensaw River Delta accompanied the late Quaternary rise in sea levels. This sedimentation has resulted in the infilling of a much longer bay that extended initially from the present location of Mobile Bay to Mt. Vernon, Alabama. This infilling is continuing, although at a slower rate. Upland activities that have impacted the sedimentation rate within the estuary include the introduction of large-scale agriculture and the construction of dams along the major streams of the Mobile River system. Other activities, such as filling and dredging operations, tend to redistribute sediments. Resuspension of deposited sediments is a normal occurrence and winds in excess of 12 to 17 mph generate forces that dislodge considerable quantities of deposited sediments within Mobile Bay. Approximately 1.4 million metric tons per year of suspended sediment pass through the bay. These are deposited to the south and west of the tidal inlet (U.S. Navy, 1986).

The Mobile-Tensaw River Delta shoreline has exhibited a net tendency to release accumulated sediments. Erosion occurs primarily along the banks of the major River Channels, whereas accumulation occurs in areas of reduced velocity. The most substantial shoreline alteration within the Mobile Harbor area has resulted from the reclamation of bay bottom during the development of the harbor and adjacent industrial complex and during construction of the U.S. Highways 90/98 causeway (U.S. Navy, 1986).

Sediments near Mobile Bay and adjacent areas were noted as consisting mostly of fine-grained materials. At the mouth of the Mobile River, and in tidally influenced areas, sediments are more coarse-grained with less clay and more sand. Sediments located in the project area are typical of a depositional tidal basin (USACE, 2001).

#### **2.5.3.3. Subsurface Geotechnical Conditions**

As previously mentioned, the material within the depths and horizontal extents of the tentatively selected plan are made up of two types of material: maintenance material and new work material. Maintenance material is composed of material that is deposited in the

channel from rivers upstream, the near shore current, and resuspended sediment from other parts of the bay. New work material is the in-situ soil that is located at depths or horizontal extents (widening) that have not previously been excavated. The nature of the new work soils varies throughout the proposed areas of deepening and widening. Characterization of substrata encountered within the soil test boring investigative depths was based upon visual examination of soil samples, laboratory analysis of select samples representative of existing substrata, and previously established correlations between standard penetration resistance values.

The new work soil in the turning basin is predominantly clean sand (SP) with some pockets of silty sand (SM). Clean and silty sands are present from elevation -39 ft down to the extent of the proposed deepening at elevation -54 ft. Fat clays (CH) and silts (ML) were also sampled in historical borings, intermixed with sand above elevation -39 ft. Borings indicate that most of the clays and silts would have been removed during the construction of the turning basin. The areas that will be expanded horizontally on the north and south side of the turning basin have intermittent layers of silt and clay, though predominantly sand.

Soils in the Bay Channel vary depending on location within the channel. A collection of soil types are present within the Bay Channel from stations 273+21 to approximately 740+00, or just north of Gaillard Island. Historical borings indicate four soil phases in this stretch, which include: 1) very soft and soft clays, silts, and clayey sands; 2) medium to very stiff clays, silts, and clayey sands; 3) medium to very dense coarse grained clean sands and clayey sands; and 4) organic deposits of silt and peat. These soil types occur in irregular layers or lenses. Generally, the soft, plastic clays and silts (CH, MH, and ML) tend to overlay the sands (SM and SP) and stiffer clays (CL). The top of the sand and stiffer clays generally starts between elevation -45 to -53. Vibracore borings taken in 1984 indicate that soils become sandier with depth, and a consistent layer of clean sand (SP) was noticed from elevation -53 to the termination of most borings. The organic silts (ML) and organic peat layers (OH) occur in isolated pockets, mostly sampled on the east side of the channel and within the top 10 ft of the borings.

Soils within the channel from approximately 740+00 to 1760+10 are almost entirely soft, plastic marine clays (CH) and silts (MH and ML). The majority of clays and silts in this stretch have an N value of zero. There is an isolated area of sand in the southern part of this stretch, stretching from approximately 1 mile north of the GIWW down to the Morgan Peninsula. Borings in this area show lenses of clayey and silty sands (SC and SM) between elevations -45 to -51 ft. These sands can be found in small quantities, and are flanked by the marine clays and silts.

Soils in the Bar Channel are intermixed and interbedded. These soils consist of silty sands (SM), poorly graded clean sands (SP), silts (ML), lean sandy clays (CL), clayey sands (SC), and inorganic plastic clays (CH). The coarse grained sandy soils are fairly

dense, and the clays are generally stiffer than those that can be found within the Bay. Most of the soils are greenish in color and contain small clam and oyster shells, shell fragments, and decomposed wood fragments.

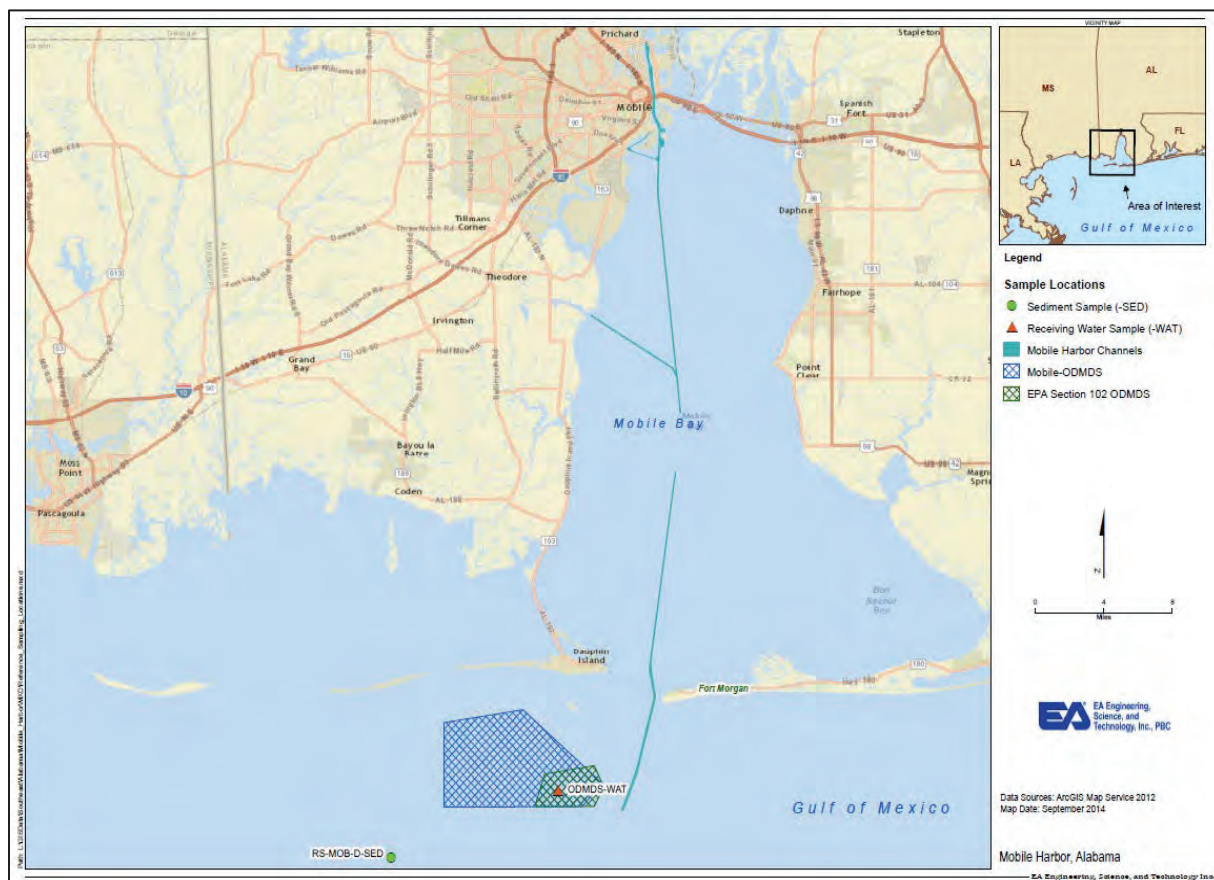
Soils boring have not been taken in the footprint of the passing lane widener. Adjacent borings at these stations, within in the channel, indicate the area is predominantly soft fat clay. Additional borings are scheduled to be sampled in this area later in 2018 to determine material properties.

#### **2.5.3.4. Sediment Quality**

Sediment sampling efforts were conducted for various portions of the Mobile Harbor Federal Navigation Project that included sampling of the Mobile Harbor Turning Basin (MHTB) in 2008, operation and maintenance (O&M) of Mobile Harbor Bay Channel in 2010, and channel widening associated with the Limited Reevaluation Report (LRR) of Lower Bay and Bar Channel dredged materials in 2014. These sampling events form the basis for physical and chemical sediment characterization and material suitability for placement in the Mobile ODMDS (as shown in Figure 2-28) under the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972. In accordance with the MPRSA and the EPA ocean dumping criteria (40 Code of Federal Regulation (CFR) §227), full Tier III testing was performed on bulk sediments, standard and effluent elutriate samples, water column and whole sediment bioassays, and tissue bioaccumulation tests. These tests followed guidance in the: Inland Testing Manual (EPA 1998); Ocean Testing Manual (USACE/EPA 1991); and the Regional Implementation Manual, Requirements and Procedures for Evaluation of the Ocean Disposal of Dredged Material in Southeastern Atlantic and Gulf Coastal Waters (SERIM) (USACE/EPA 2008). A full description of the sediment testing activities referred to above are included in Section 2.3.4, Appendix C.

#### **2.5.4. Water Quality**

A water quality modeling effort was conducted for this study to understand the existing water quality within the waters of Mobile Bay and to quantify the relative changes in the water quality resulting from proposed Mobile Harbor Federal Navigation channel modifications. A 3-D water quality model was applied in concert with the combined wave and current numerical models (CSTORM and CH3D-WES MB). A 3-D model was determined necessary due to the existing deep-draft channels and vertical structure of salinity and temperature within the Bay and adjoining waters.



**Figure 2-28. Mobile ODMDS Location Map**

Using the tidal and river flow boundary condition time series developed by the CH3D-MB model, CEQUAL-ICM was run for the chosen scenarios described in 6.1 GSMB Multi-Block Hydrodynamic Modeling for the period January 1 – December 30, 2010. The output from these scenario runs were analyzed to assess relative differences in DO, salinity, temperature, total suspended solids, nutrients and chlorophyll-*a* (“Chl *a*”). A more detailed discussion on the modeling effort is included in Appendix A.

Six continuous environmental monitoring sites operated by the Dauphin Island Sea Lab and the Mobile National Estuary Program are located within the lower, middle and upper part of Mobile Bay. These sites have been operational over differing time periods with the longest operating monitoring sites being Dauphin Island (2003-2017), Middle Bay (2005-2017) and Meaher Park (2003-2017) stations. In addition, since July 2015, the ADCNR, Marine Resources Division (MRD), have operated five continuous water quality monitoring stations at oyster reef locations within the bay. Data from these sites provide spatial and temporal patterns of change in temperature, salinity and dissolved oxygen within Mobile Bay.

#### 2.5.4.1. Dissolved Oxygen

Nearshore and open Gulf waters are normally at or near oxygen saturation; however, high organic loading, high bacterial activity related to the decomposition of organic material, and restricted circulation due to stratification of the water column during the summer can cause near-bottom waters to be depleted of oxygen. Oxygen depletion results from the combination of these and other physical and biological processes. In the Gulf of Mexico waters, hypoxia (Dissolved Oxygen (DO) < 2 milligrams per liter [mg/L]) is a common occurrence during the late spring and summer months. The EPA estimates that 4% of the bottom waters in the Gulf estuaries have hypoxic conditions or low DO on a continuing basis (EPA, 2001). Hypoxia affects living resources, biological diversity, and the capacity of aquatic systems to support biological populations. When oxygen levels fall below critical values, those organisms capable of swimming (e.g., fish, crabs, and shrimp) evacuate the area and many bottom-dwelling organisms perish under those conditions. Hypoxic conditions are considered to be hazardous for less or non-mobile macrobenthos (e.g., polychaete worms and burrowing amphipods), with prolonged exposure having the potential to result in deterioration of the benthic community.

DO in continental shelf waters is normally high. No hypoxic conditions have been recorded in the Mississippi-Alabama continental shelf area (MMS, 1991). During an investigation of the continental shelf conducted from 1987 through 1989, DO levels in bottom water ranged from 2.93 mg/L to 8.99 mg/L, with the lowest summer level being 4.63 mg/L (MMS, 1991).

Hydrographic and water quality modeling performed by the Engineering Research and Development Center (ERDC) is documented in Appendix A. Evaluation of dissolved oxygen data from the continuous monitoring sites indicate temporal trends correlated to temperature, with the lowest levels occurring during the late summer months when temperatures are highest. The mean monthly dissolved oxygen at the monitoring sites generally fall with the range of 3 to 12 mg/l. Monthly distribution from the 2010 existing condition hydrodynamic and water quality model simulations conducted as part of this study provides the response of dissolved oxygen to hydrological and temperature conditions. Section 2.4.1 of Appendix C shows the distributions for dissolved oxygen at the bottom of the water column for February (high flow/cold) conditions and October (low flow/hot) conditions. As exhibited under existing conditions, the October (low flow/hot) conditions show decreased dissolved oxygen relative to the February (high flow/cold) conditions throughout the bay. The simulated DO concentrations are illustrated in further detail in Section 2.4.1, Appendix C.



#### **2.5.4.2. Nutrients**

Nutrients are a primary concern in both freshwater and marine ecosystems, providing the building blocks of biological production. Mobile Bay and its watershed is a productive estuarine system. Estuaries such as Mobile Bay are naturally nutrient-rich habitats (NEP 2001). In fact, the naturally high nutrient levels in estuaries are one of the reasons these special bodies of water are so productive; however, it is possible to get excessive nutrients, particularly regarding nutrient loads in estuaries. The natural balance of life-giving nutrients can be dramatically upset by man-made contributions from fertilizer runoff (from farms and suburban lawns), urban stormwater runoff, municipal sewage treatment overflows, industrial discharges, and failing septic tanks, among other sources.

The Mobile Bay National Estuary Program (NEP) has reported that with the high rainfall amounts received in coastal Alabama, the Mobile Bay and surrounding communities are particularly susceptible to increased stormwater runoff and decreased water quality in nearby surface waters. This runoff picks up sediments, nutrients, toxins, pathogens, refuse, and other substances usually characterized as *nonpoint source pollutants* and deposits them into local waterways. Nonpoint source pollutants come from scattered or diffuse sources including fertilizers, herbicides, and insecticides from residential areas, agricultural lands, and golf courses; oil, grease, and toxic chemicals from roadways and parking lots; pathogens and nutrients from pet waste, livestock, and faulty septic systems; and organic matter from yard clippings and leaves.

Excess nutrients such as nitrogen and phosphorus loading from coastal watersheds are primarily responsible for eutrophication. Because these nutrients are the primary nutrient forms used by algae, the loading of these forms are the most worrisome. A study in Mobile and Baldwin counties indicated that agricultural and urbanized watersheds were the primary sources of these nutrients (Lehrter, 2006). Ultimately, runoff from these coastal watersheds is delivered to the Bay and water column.

#### **2.5.4.3. Salinity**

Salinity distribution in Mobile Bay and the study area is a result of the interaction of freshwater discharge, tides, currents, winds, circulation, evaporation, and bathymetry (Hummell, 1990); however, the most important factor affecting salinity is the fresh-water discharge from the Mobile-Tensaw River system (USACE, 1946 and Chermock and others, 1974). Investigations to determine the salinity line in the Mobile River and its tributaries (1944 through 1946) found that north of Government Street, salinity was affected only slightly by daily tidal variations. Further investigations found that abnormal tides had little effect on saltwater intrusion in the Mobile River. During the investigations, it was found that saltwater intrusion extended upriver to Mile 21 but only lasted a short period of time. In the USACE 1946 study, salinity concentrations were found to be dependent on river discharge, with displacement of salt in the upper areas of the river



being noticeable when river discharge was less than 10,000 cfs at the head of the Mobile River. In addition, when discharge exceeded 50,000 cfs, the system could be considered fresh from the head to the mouth of the river.

In the north end of the bay, flood-tidal waters continue to influence salinity as they are forced eastward by incoming freshwater from the Mobile-Tensaw River system (U.S. Department of the Navy, 1986; and Hummell, 1990). Lowest salinities average 15 parts per thousand (ppt) in the southern part of Mobile Bay and are typically present sometime between January and May, when river discharge and flooding ordinarily occur (Boone, 1973; Schoroeder and Lysinger, 1979). During floods, surface salinities can be reduced from 20 ppt to nearly 0 ppt in the southernmost part of the bay (USACE, 1979; Department of the Navy, 1986). The highest salinities average 30 ppt in the southern part of Mobile Bay and are typically found sometime between June and November, when low river discharges normally occur (Bonne, 1973; Schoroeder and Lysinger, 1979). Tidal action normally results in a daily north-south shifting of salinity fields, which can range from little or no movement up to 3.7 to 6.2 miles (Schroeder and Lysinger, 1979).

In general average annual bottom salinities are higher than those at the surface (Chermock and others, 1974). During low river discharges, the highly saline lower part and mouth of Mobile Bay approaches vertical homogeneity, whereas during high discharges these areas become stratified (Vittor and Associates, Inc., 1985). Vertical salinity stratification is variable seasonally, becoming more pronounced in late summer and fall (Vittor and Associates, Inc, 1985).

Evaluation of salinity data from the continuous monitoring sites within the bay indicate general spatial patterns of higher salinities within the lower bay with ranges in mean monthly salinities at Dauphin Island of 4 to 30 ppt and lower salinities in the upper bay with ranges in mean monthly salinities at Maher Park of 0 to 14 parts per thousand. All gages show similar temporal trends of highest salinities between July and November, when low river discharges normally occur and lowest salinities January and May, when higher river discharges typically occur.

Monthly distribution, as shown in Section 2.4.3, Appendix C, provides the response to hydrological conditions with the distributions for the mean of depth-averaged salinity for February (wet conditions) and October (dry conditions). Channel has higher salinity than shoals. Dry condition, typically occurring in the fall, allows for more salt intrusion through the navigation channel to Mobile River than the wet conditions during winter conditions.

#### **2.5.4.4. Turbidity and Suspended Solids**

Turbidity, defined as “muddiness created by stirring up sediment or having foreign particles suspended” in the water column (Mobile Bay National Estuary Program (MBNEP), 2008) is usually considered a good measure of water quality and is determined

by measuring the degree to which the water loses its transparency due to the presence of suspended particulates. The more total suspended solids that occur in the water, the less light penetration and the higher the turbidity. The MBNEP (2008) has described the brown water commonly seen in Mobile Bay as being due to its shallow depth and high suspended sediment load (4.85 million metric tons per year) that represents turbidity caused by both natural and anthropogenic factors.

Various parameters influence the turbidity of the water, including increased sediment levels from erosion or construction activities, suspended sediments from the bottom, waste discharge, algae growth, and urban and agricultural runoff. Suspended sediments enter the bay from freshwater sources, but are hydraulically restricted due to the barrier islands and morphologic characteristics of the bay. These restrictions, combined with the bay's shallow depth and mixing from wind, tides, and currents, promote re-suspension of sediments. Stormwater runoff contributes to high turbidity levels by delivering sediments into the water column and providing nutrients which stimulate algae growth. Over-enrichment of nutrients (particularly nitrogen) comes from the use of agricultural and household fertilizers on our fields and lawns as well as waste from animals

The Alabama Department of Environmental Management (ADEM) has a standard for turbidity that is based on the background condition plus 50 nephelometric turbidity units (NTUs) outside a 750-foot mixing zone. Turbidity generated by dredging or placement must not cause substantial visible contrast nor result in an increase of more than 50 NTU above background turbidity levels in state waters.

#### **2.5.4.5. Water Temperature**

The measurements for the water temperature in Point Clear, Alabama are provided by the daily satellite readings provided by the NOAA and can be found at <https://www.seatemperature.org/north-america/united-states/point-clear.htm>. This provides a reasonable representation of the typical water temperatures throughout the Mobile Bay. The NOAA website above gives the range of monthly Mobile Bay water temperatures collected over many years of historical data. The temperatures given are the sea surface temperature (SST) which is most relevant to most users in Mobile Bay. More information can be found in Section 2.4.5, Appendix C.

Evaluation of temperature data from the continuous monitoring sites within the bay indicate temporal trends of highest temperatures between July and October, when river discharges are normally low and air temperatures high. As well as lowest temperatures generally occurring in December through February, when winter temperatures are low and river discharges are typically higher. Review of the data indicate that the mean monthly temperature within the bay generally falls with the range of 50° to 86° F.

Monthly distribution from the 2010 existing condition hydrodynamic and water quality model simulations conducted as part of this study, as discussed in Section 2.4.5 in Appendix C, provides the response to hydrological conditions and shows the distributions for mean depth-averaged temperature for February (high flow/cold) conditions and October (low flow/hot) conditions. As seen for existing conditions, the channel has slightly higher temperatures than the shoals. In addition, in the existing October (low flow/hot condition) increases in temperatures are seen throughout the bay with higher values in the central parts of the bay.

### **2.5.5. Groundwater.**

Groundwater provides an important source of drinking water (public and private) in the Mobile Bay area. Surface water is the main public supply for the metropolitan areas of Mobile. Public water supply systems utilize groundwater, except the Prichard Water Works Board and the Mobile Area Water and Sewer System, which serves the metropolitan area of Mobile and uses surface water sources outside the Mobile Bay area. Groundwater hydrology in the Mobile Bay area can be generally described according to three locations: Baldwin County, Mobile County, and areas with special exceptions. These exceptions include Dauphin Island and Gulf Shores (TAI, 1998).

Groundwater in the Mobile Bay area is obtained in two ways: (1) shallow well unconfined aquifer withdrawal and (2) deep well confined aquifer withdrawal. Shallow wells typically tap Pliocene/Pleistocene alluvial and coastal deposits and are generally recharged by area rainfall. The Pliocene Citronelle Formation, which can crop at the surface (Springhill area of Mobile) and is up to 200 ft thick, is often tapped. Stratigraphically different yet hydraulically connected are the Upper Miocene and Pliocene aquifers, and most wells tap these units. The Mobile Clay, a mostly impervious unit, separates shallow groundwaters from deeper confined aquifers. Major confined aquifers in the area are within the Lower Miocene. Groundwater levels reported by the USGS have remained stable in recent years. Seasonal patterns in unconfined aquifers reveal highest levels in April and lowest levels in September. Given the shallow southerly dip of the beds, recharge of the units for Mobile County is north and west of many City wells (TAI, 1998).

However, wells are used for supplies in the southern and northern portions of the Mobile Bay area. Most wells typically tap the Miocene, with a moderate number withdrawing from the Pliocene Citronelle Formation (TAI, 1998).

Natural groundwater quality problems could include high levels of iron, manganese, sulfur compounds, dissolved solids, and other water quality parameters. Pollution concerns include septic tanks, waste sources, agriculture, and storage tanks. The entire Mobile Bay area is considered to be susceptible to contamination from the surface due to the permeability of the underlying sediments (TAI, 1998).

There are two major aquifers in Mobile and Baldwin Counties that act as recharge areas (Gillet et al., 2000). These aquifers are referred to the Miocene-Pliocene Aquifer and the Watercourse Aquifer (Chandler et al). The Watercourse Aquifer is located in the Pleistocene and Holocene alluvial deposits, and the Miocene-Pliocene Aquifer lies within the underlying series of the same name. Clay deposits are present in both of these series, especially in the Miocene and Pliocene. These clay layers act as aquitards within the Miocene and Pliocene, allowing for multiple aquifers which are hydraulically connected. The recharge areas for the Watercourse Aquifer are in close proximity to the bay, rivers, and other low-lying tributaries and waterways that are hydraulically connected to the bay. This aquifer is unconfined and also hydraulically connected to the Miocene-Pliocene Aquifer, making the two aquifers relatively subject to natural and manmade contaminants. Chandler et al. (1985) states that even though the Miocene-Pliocene Aquifer has a high yield, only a fraction of this groundwater can be used as there are many concerns with saltwater intrusion. Additionally, the Watercourse Aquifer is susceptible to contaminants via land source (Gillet et al. 2000), resulting in very few water supply wells that rely on the Watercourse Aquifer for potable water. A detailed discussion on these aquifers can be found in Section 5.4.2, Appendix A.

#### **2.5.6. Biological Resources**

Characterizations of baseline aquatic resources in estuarine, transitional, and freshwater environments are important to establish prior to channel deepening and potential impacts from saltwater intrusion and other water quality parameters. A key component of the current study is to document potential changes to aquatic resources along the salinity continuum moving upriver and estimate how far upriver changes may occur after the navigation channel is modified to its new dimensions. Elevated salinities upriver and in adjacent marshes have raised concerns among resource managers because of potential impacts to the marshes and their biological resources. Aquatic resources are a critical part of both estuarine and riverine food webs, providing habitat and forage for economically and ecologically important finfish and shellfish species, which are identified as an important indicator of potential effects.

Studies have been executed through a combination of 1) direct measurements of aquatic resources and 2) modeling approaches to characterize the existing conditions within the project area which contains a variety of natural resources that are comprised of wetlands, SAV, oysters, benthic invertebrates and fish. A discussion of the environmental conditions and existing resources are included below.

Coastal Alabama consists of several habitats including beaches, sand dunes, coastal maritime forests, emergent wetlands, SAV, rivers, tidal creeks, tidal flats, scrub/shrub wetlands, forested wetlands, and open-water benthic habitats. These areas are home to an immensely diverse, resilient, and environmentally significant group of species, including some threatened and endangered fauna. Ecological habitats within the project

site include estuarine subtidal and intertidal water bottoms populated with diverse benthic communities. Benthic communities vary depending on the substrate bottom types present in the area. Intertidal and subtidal water bottoms vary from sand to muddy sand to mud. Subtidal bottoms consist primarily of soft mud sediments (Christmas, 1973). There are no SAV beds in the vicinity of the project area. Generally, the SAV are restricted to the northern shores of the barrier islands south of the mainland shoreline.

### **2.5.6.1. Terrestrial Plant Communities**

Terrestrial uplands are areas of higher ground which are not subjected to riverine flooding or tidal inundation. Upland plant communities in south Alabama include pine woodland, pine-oak forest, and coastal pine-oak associations (U.S. Navy, 1986).

Across north Florida and south Alabama, pine woodlands are a dominant feature. Tree species include slash pine (*Pinus elliottii*) and longleaf pine (*Pinus palustris*). The understories of these habitats include gallberry (*Ilex glabra*), wax myrtle (*Myrica cerifera*), saw palmetto (*Serenoa repens*), and St. John's wort (*Hypericum* spp.) (U.S. Navy, 1986).

The pine woodland found in Mobile and Baldwin Counties integrates to pine-oak forest. The pine-oak forest is usually formed above the 10-foot contour line. Longleaf pine dominates the plant community along with southern red oak (*Quercus falcata*), sandpost oak (*Quercus margaretta*), flowering dogwood (*Cornus florida*), and persimmon (*Diospyros virginiana*) (U.S. Navy, 1986).

Along the coastal areas, the upland pine-oak association consists of species adapted to sandy substrate and salt spray from Gulf waters. In these areas, slash pine and sand pine (*Pinus clausa*) replace longleaf pine. Live oaks (*Quercus virginiana* var. *maritima*) and myrtle oaks (*Quercus myrtifolia*) are common (U.S. Navy, 1986).

The onshore portions of the project area contain no mature forests and have been disturbed frequently by past human activity. There are extensive areas of fill material.

### **2.5.6.2. Wetlands**

Wetlands occur in areas exposed to surface inundation or groundwater saturation at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions (ERDC - Environmental Laboratory 1987). As a result of these characteristics, wetlands represent one of the most productive ecological components within the project area (Reddy and DeLaune 2008). Wetlands provide a number of valuable ecological functions (e.g., flood water retention, storm surge reduction, and wildlife habitat) which benefit society (e.g., recreation, flood risk reduction; Novitski 1996). The distribution of wetlands and various wetland community types on the landscape is dictated by elevation, substrate, hydroperiod, hydroperiod, and water composition (Cowardin et al., 1979). In particular



the salinity of water supporting wetlands maintains a controlling factor in wetland zonation in many areas (Huckle et al., 2000), with salinity displaying the capacity to alter patterns of wetland community distribution and productivity in coastal and estuarine environments (Crain et al., 2004).

Mobile Bay supports one of the largest intact wetland ecosystems in the U.S., including over 250,000 acres within the Mobile-Tensaw River Delta (AWF 2018). Wetlands within the bay provide essential habitat for a wide variety of recreational and commercially valuable species, including rearing and cover areas for fishes and waterfowl (Chabreck 1989). Additionally, Mobile Bay Watershed contains diverse plant communities including many rare, listed, and endemic species (Stout et al., 1998). The natural patterns of spatial and temporal salinity fluctuations resulted in the development of diverse and resilient wetland community types within Mobile Bay.

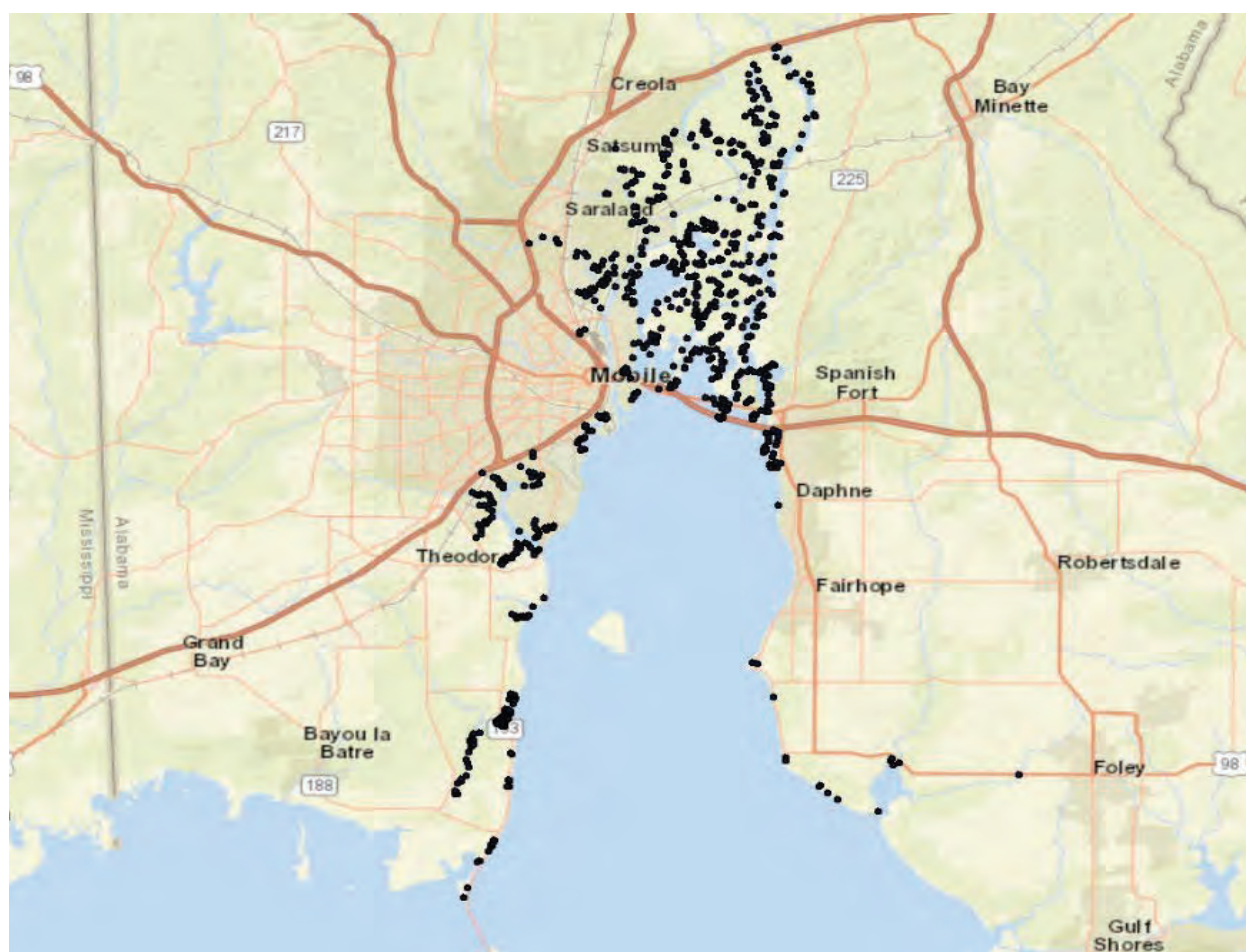
A characterization of baseline wetland community assemblages and distribution in estuarine, transitional, and freshwater habitats throughout Mobile Bay and the associated delta region was conducted (Berkowitz et al., 2018) and presented in detail in Section 2.6.2, Appendix C. The study area focused on the central and southern portions of the of Mobile Bay and the Mobile-Tensaw River Delta region. The areas identified as having the highest likelihood of potential impacts associated with the proposed channel modifications are shown in Figure 2-29. The study area included the portions of the delta south of the Interstate 65 (I-65) Bridge, above which freshwater communities are dominant. The southern extent of the sampling included wetlands dominated by wetland communities adapted to saline conditions. As a result, the study area encompasses the entire salinity gradient occurring with the Mobile Bay region, ranging from salt-intolerant bottomland hardwood forest species assemblages in the north to the halophytic plant communities common throughout coastal wetlands of the northern Gulf of Mexico.

Salinity tolerance classes were established for each wetland community using existing literature sources; including thresholds for decreased productivity and mortality. Freshwater river discharges, and thus salinity, vary seasonal with high flows typically occurring in the late winter and early spring and low flows dominating during in the summer. The lower and mid-portions of the bay (e.g., estuarine habitats) receive seawater during normal tidal exchanges.

Berkowitz et al. (2018) describes the wetlands within Mobile Bay as developed on prograding alluvial deposits as the river sediments are discharged into the drowned Pleistocene river valley (Gastaldo 1989). As a result of the observed salinity gradient increasing from north to south, wetlands in the northern portion of the bay are characterized by bottomland hardwood forests containing *Taxodium distichum*, *Nyssa aquatica*, *N. biflora*, *Acer sp.*, *Carya sp.*, *Fraxinus sp.*, *Quercus sp.*, and *Ulmus sp.* Herbaceous species within this zone include *Typha domingensis*, *T. latifolia*, *Sagittaria lancifolia*, *Schoenoplectus americanus*, and *Alternanthera philoxeroides*. Additionally a



number of aquatic bed species (e.g., *Nuphar sp.*, *Nelumbo lutea*) can be found adjacent to open water reaches in many wetland areas. Wetlands within the southern portion of the delta form a transition zone of estuarine adapted, moderate salinity tolerant species dominated by a mixture of shrubs including *Baccharis glomeruliflora*, *B. halimifolia*, *Ilex sp.*, *Morella cerifera*, *Persesa palustris*, and *Sabal minor*. The lower portions of the bay include an array of moderate to high salt tolerant herbaceous species including *Spartina cynosuroides*, *Panicum virgatum*, *Cladium jamaicense*, and *Juncus roemerianus*. Dense nearly monotypic stands of *Phragmites karka* also occur within the study area, occupying both disturbed (i.e., near the U.S. Highways 90/98 causeway) and natural portions of the bay. A detailed description of species composition and distribution within Mobile Bay is provided in the results section below.



Note: Dots represent field verification sampling sites

**Figure 2-29. The study area focusing on portions of the Mobile Bay and Mobile-Tensaw River Delta region south of the I-65 Bridge.**

Mapping of the existing wetlands (Berkowitz et al., 2018) illustrates 39 wetland communities occurring over an area of >73,000 acres as illustrated in Figure 2-30. Table 2-27 provides a list of the wetland classes, associated species, and area of their extent. The most abundant wetland community observed in the study area was the Bald cypress – tupelo – bottomland mix which accounted for 30% of the total wetland area, mostly located in upper portions of the study area and along the north eastern shore of the Bay. Additionally, the Baldcypress – tupelo – swamp bay – palmetto – shrub mix and the Tidal shrub mix each comprised nearly 15% of the total wetland area, occurring the upper to middle of the transition zone between freshwater and estuarine habitats.

### **2.5.6.3. Submerged Aquatic Vegetation (SAV).**

Coastal seagrass beds represent one of the most productive ecosystems on the planet (Berkowitz et al., 2018). SAV communities in Mobile Bay serve as thriving habitats that provide shelter for fish and invertebrates, nursery habitat for commercially and recreationally important finfish and shellfish species, a food source for over-wintering waterfowl, and prevention against erosion through sediment stabilization (MBNEP, 2008). SAV in the project area includes various types of seagrass. Historical studies have identified varying areas of SAV in Mobile Bay. Within the project area, SAV is found primarily along the northern shorelines of the bay and throughout the immediate shorelines. These areas are characterized by shoal grass (*Halodule wrightii*), manatee grass (*Cymodocea manatorum*), turtle grass (*Thalassia testudinum*), and widgeon grass (*Ruppia maritime*) (USACE, 2009a). By buffering wave energy, modifying wave currents, preventing erosion, consolidating sediment and influencing deposition, SAV can help to maintain and shape coastal landscapes (Biber and Cho 2017). It is estimated that 50–90% of all marine species utilize SAV at some point in their life cycle (Moncreiff et al., 1998).

SAV diversity and distribution are limited by a number of water quality parameters. Light attenuation and water clarity are critical as these are vascular plants that require light. In addition to light, predominant limiting factors to SAV distribution and diversity are salinity and temperature. In this study, the parameters that were considered for evaluation were salinity and DO.

The health, continued survival, and future growth of many SAV have been threatened around the bay and is likely due to consequences of land-use change such as increased turbidity, nutrient over-enrichment, and shoreline armoring along with some natural processes such as drought, salinity change, and tropical weather events (MBNEP, 2008). There are also significant seasonal and annual variations in SAV abundance and species composition (Cho and May, 2006). Other human activities detrimental to SAV survival include recreational and commercial boating which causes a re-suspension of sediments



Figure 2-30. Distribution of wetland communities within the study area (Berkowitz et al., 2018)



**Table 2-27. Wetland classes, species names, and area of extent within the study area**

Class Name	Representative Species	Area (acres)
Baldcypress – black willow – Chinese tallow	<i>Taxodium distichum</i> – <i>Salix nigra</i> – <i>Triadica sebifera</i>	155
Baldcypress – tupelo	<i>Taxodium distichum</i> – <i>Nyssa aquatica</i> /N. <i>biflora</i>	2900
Baldcypress – tupelo – bottomland mix	<i>Taxodium distichum</i> – <i>Nyssa aquatica</i> /N. <i>biflora</i> – ( <i>Acer sp.</i> – <i>Carya sp.</i> – <i>Fraxinus sp.</i> – <i>Quercus sp.</i> – <i>Ulmus sp.</i> )	22687
Baldcypress – tupelo – slash pine	<i>Taxodium distichum</i> – <i>Nyssa aquatica</i> /N. <i>biflora</i> – <i>Pinus elliotii</i>	1114
Baldcypress – tupelo – slash pine – Atlantic white cedar	<i>Taxodium distichum</i> – <i>Nyssa biflora</i> – <i>Pinus elliotii</i> – <i>Chamaecyparis thyooides</i>	1018
Baldcypress – tupelo – swamp bay – palmetto – shrub mix	<i>Taxodium distichum</i> – <i>Nyssa biflora</i> – <i>Persea palustris</i> - ( <i>Baccharis sp.</i> , <i>Morella cerifera</i> , <i>Ilex sp.</i> )	10566
Big cordgrass	<i>Spartina cynosuroides</i>	31
Big cordgrass – switchgrass	<i>Spartina cynosuroides</i> – <i>Panicum virgatum</i>	442
Big cordgrass – switchgrass – bagpod	<i>Spartina cynosuroides</i> – <i>Panicum virgatum</i> – <i>Sesbania vesicaria</i>	83
Big cordgrass – switchgrass – sawgrass	<i>Spartina cynosuroides</i> – <i>Panicum virgatum</i> – <i>Cladium jamaicense</i>	1342
Black needlerush	<i>Juncus roemerianus</i>	569
Black needlerush – Big cordgrass	<i>Juncus roemerianus</i> – <i>Spartina cynosuroides</i>	763
Black needlerush – Big cordgrass – switchgrass	<i>Juncus roemerianus</i> – <i>Spartina cynosuroides</i> – <i>Panicum virgatum</i>	553
Bottomland mix	<i>Acer sp.</i> – <i>Carya sp.</i> – <i>Fraxinus sp.</i> – <i>Quercus sp.</i> – <i>Ulmus sp.</i>	5500
Bulrush	<i>Schoenoplectus californicus</i> /S. <i>tabernaemontani</i>	3
Chinese tallow – Black willow – tidal shrub mix	<i>Triadica sebifera</i> – <i>Salix nigra</i> – <i>Baccharis sp.</i> – <i>Morella cerifera</i>	971
Giant cutgrass	<i>Zizaniopsis miliacea</i>	263
Live oak – Magnolia – Pine (Hammock)	<i>Quercus virginiana</i> – <i>Magnolia grandiflora</i> – <i>Pinus elliotii</i> /Pinus <i>taeda</i>	440
Mexican water-lily	<i>Nymphaea mexicana</i>	1
Phragmites	<i>Phragmites karka</i>	2913
Pine flatwoods	<i>Pinus elliotii</i> /P. <i>palustris</i> /P. <i>taeda</i>	3862
Saltmeadow cordgrass	<i>Spartina patens</i>	5
Sawgrass	<i>Cladium jamaicense</i>	638
Sawgrass – tidal shrub mix	<i>Cladium jamaicense</i> – <i>Baccharis sp.</i> , <i>Ilex sp.</i> , <i>Morella cerifera</i> , <i>Persesa palustris</i> , <i>Sabal minor</i>	751
Slash pine – live oak – tidal shrub mix	<i>Pinus elliotii</i> – <i>Quercus virginiana</i> – ( <i>Baccharis sp.</i> , <i>Ilex sp.</i> , <i>Morella cerifera</i> , <i>Persesa palustris</i> , <i>Sabal minor</i> )	109
Smooth cordgrass	<i>Spartina alterniflora</i>	3
Sweetbay – swampbay – yellow-poplar – netted chainfern	<i>Magnolia virginiana</i> – <i>Persea palustris</i> – <i>Liriodendron tulipifera</i> – <i>Woodwardia areolata</i>	61
Tidal shrub mix	<i>Baccharis glomeruliflora</i> , <i>B. halimifolia</i> , <i>Ilex sp.</i> , <i>Morella cerifera</i> , <i>Persesa palustris</i> , <i>Sabal minor</i>	12511

**Table 2 27. Wetland classes, species names, and area of extent within the study area**

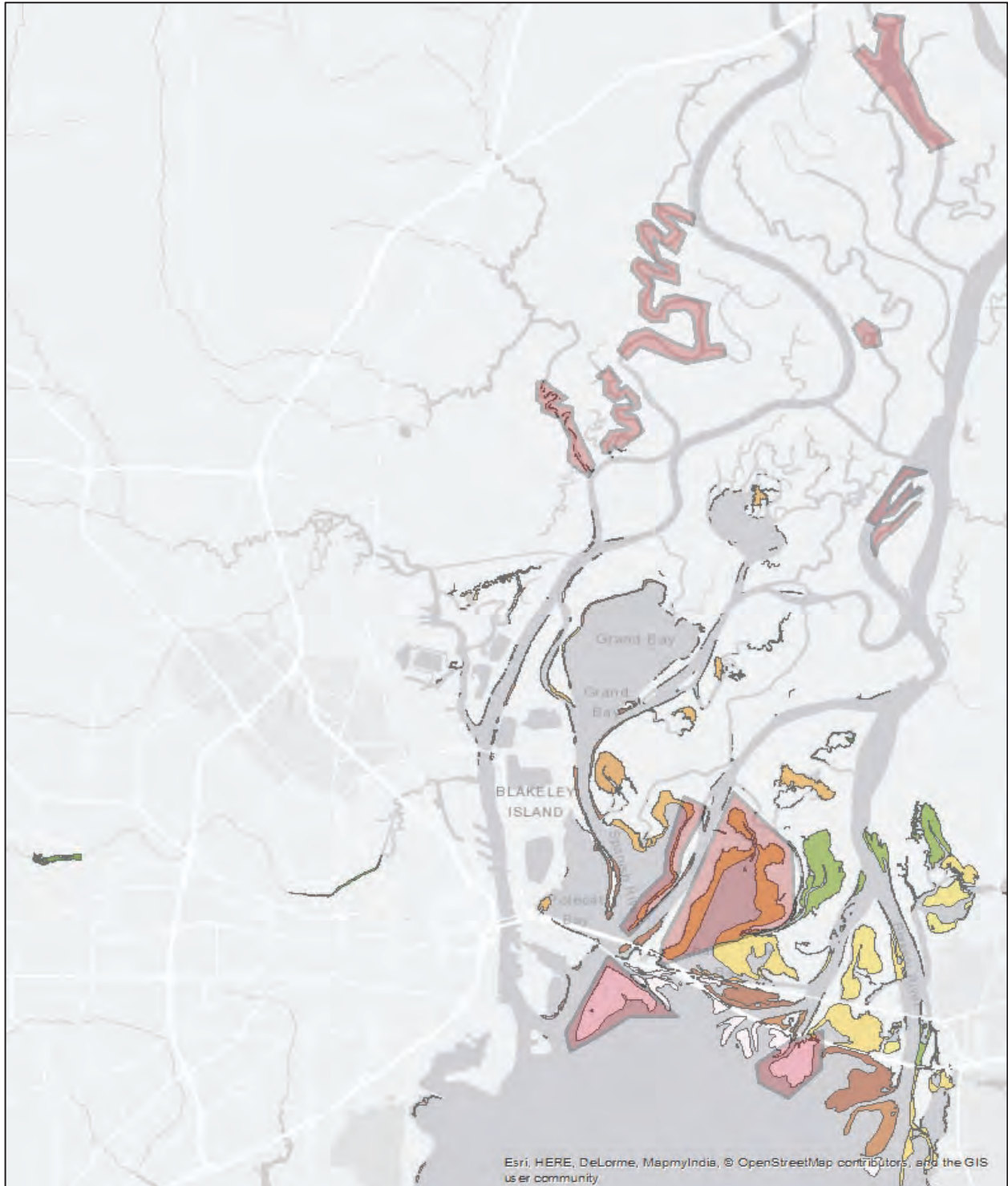
Torpedograss	<i>Panicum repens</i>	54
Typha	<i>Typha domingensis</i>	164
Typha – arrowhead – alligatorweed	<i>Typha domingensis/T. latifolia – Sagittaria latifolia – Alternanthera philoxeroides</i>	24
Typha – bulltongue	<i>Typha domingensis – Sagittaria lancifolia</i>	321
Typha – bulltongue – three-square – alligatorweed	<i>Typha domingensis/T. latifolia – Sagittaria lancifolia – Schoenoplectus americanus – Alternanthera philoxeroides</i>	2525
Typha – bulltongue – wild-rice	<i>Typha domingensis – Sagittaria lancifolia – Zizania aquatica</i>	108
Typha – bulrush	<i>Typha domingensis – Schoenoplectus californicus/S. tabernaemontani</i>	5
Water hyacinth – water spangles – Cuban bulrush	<i>Eichhornia crassipes – Salvinia minima – Oxycaryum cubense</i>	24
Water lotus	<i>Nelumbo lutea</i>	78
Wild-rice	<i>Zizania aquatica</i>	153
Yellow pond-lily	<i>Nuphar advena/N. ulvaceae</i>	28
Total		73741

Source: (ERDC 2018)

from propellers and boat wakes along bay edges. These activities increase turbidity, and grounding of outboard motor props rips seagrass leaves and rhizomes out of the sediments, leaving behind “prop scars” that can take three to five years to recover. Some other human activities impacting SAV growth include commercial and recreational trawling, which disturbs the substrate in which the plants grow and increases turbidity by stirring up sediments, and deposition of dredge material.

Berkowitz et al. (2018) established baseline conditions that were assessed by groundtruthing and utilizing baseline maps of SAV habitat within the system, identifying variation in SAV distribution across several years and seasons. The detailed study is included in Section 2.6.3, Appendix C. Baseline data from existing maps of SAV distribution were field verified to check accuracy and temporal variation in order to establish baseline distribution, within Mobile Bay, utilizing recent and historic SAV survey maps developed by Barry A. Vittor and Associates, Inc (2004). Their surveys focused on near-shore estuarine and marine aquatic ecosystems in coastal Alabama including the entire coastline (Vittor, 2004). The SAV surveys were conducted over several years to support the NEP and the Alabama Department of Conservation and Natural Resources (ADCNR).

Ground truthing surveys conducted by Berkowitz et al. (2018) as described in their report, covered a distance of 40 miles throughout the Mobile Bay, with the goal of mapping the edges of various SAV beds to compare to beds recently mapped by Vittor (as shown in Figure 2-31), which represents the baseline SAV conditions for this study. A legend identifying the species represented in Figure 2-31 is listed in Table 2-29. A total of 31,684 points were mapped and 1,788 of these points (~0.06%) detected the presence of SAV.



**Figure 2-31. Fall 2016 Field verification sites (highlighted red polygons) and Fall 2015 SAV distribution within Mobile Bay as mapped by Vittor & Associates.**



**Table 2-28. Species legend for Figure 2-31**

Species	
CC CD MS	<i>Cabomba caroliniana</i> , <i>Ceratophyllum demersum</i> , <i>Myriophyllum spicatum</i>
CC MH	<i>C. demersum</i> , <i>Myriophyllum heterophyllum</i>
CC NG	<i>C. demersum</i> , <i>Najas guadalupensis</i>
CD HD MS NG VN	<i>C. demersum</i> , <i>Heteranthera dubia</i> , <i>M. spicatum</i> , <i>N. guadalupensis</i> , <i>Vallisneria neotropicalis</i>
CD MS NG	<i>C. demersum</i> , <i>M. spicatum</i> , <i>N. guadalupensis</i>
CD RM	<i>C. demersum</i> , <i>Ruppia maritima</i>
EB LF MH NU	<i>Eleocharis baldwinii</i> , <i>Luziola fluitans</i> , <i>M. heterophyllum</i> , <i>Nuphar ulvacea</i>
HD	<i>Heteranthera dubia</i>
HD MS	<i>H. dubia</i> , <i>M. spicatum</i>
HD MS NG	<i>H. dubia</i> , <i>M. spicatum</i> , <i>N. guadalupensis</i>
HD MS NG VN	<i>H. dubia</i> , <i>M. spicatum</i> , <i>N. guadalupensis</i> , <i>V. neotropicalis</i>
HW	<i>Halodule wrightii</i>
HW RM	<i>H. wrightii</i> , <i>R. maritima</i>
MH	<i>M. heterophyllum</i>
MS	<i>M. spicatum</i>
MS NG	<i>M. spicatum</i> , <i>N. guadalupensis</i>
MS NG PP VN	<i>M. spicatum</i> , <i>N. guadalupensis</i> , <i>Potamogeton pusillis</i> , <i>V. neotropicalis</i>
MS NG RM VN	<i>M. spicatum</i> , <i>N. guadalupensis</i> , <i>R. maritima</i> , <i>V. neotropicalis</i>
MS RM VN	<i>M. spicatum</i> , <i>R. maritima</i> , <i>V. neotropicalis</i>
MS VN	<i>M. spicatum</i> , <i>V. neotropicalis</i>
NG PP	<i>N. guadalupensis</i> , <i>P. pusillis</i>
NG PP RM VN	<i>N. guadalupensis</i> , <i>P. pusillis</i> , <i>R. maritima</i> , <i>V. neotropicalis</i>
NG PP UT	<i>N. guadalupensis</i> , <i>P. pusillis</i> , <i>Utricholaria inflata</i>
RM	<i>R. maritima</i>
RM VN	<i>R. maritima</i> , <i>V. neotropicalis</i>
TT	<i>Thalassia testinudum</i>
VN	<i>V. neotropicalis</i>

Year to year and seasonal variation in SAV coverage by year is both common and extensive (Table 2-29). The species with both the most coverage and the most temporal variation in coverage were Eurasian Watermilfoil (*Myriophyllum spicatum*), Water Celery (*Vallisneria neotropicalis*), Southern Naiad (*Najas guadalupensis*), Water stargrass (*Heteranthera dubia*), and Coons Tail (*Ceratophyllum demersum*). These species ranged in mean acreages of ~1,600 to 4,000 with high variance (standard deviation ranged from ~1,300-2,000 acres). In comparison, on average, the rest of the common species covered less than 1,000 acres each and all but Widgeon Grass (*Ruppia maritima*) covered less than 400 acres each.

**Table 2-29. Variation in acreage over time. Values are obtained from Vittor SAV survey maps. Highlighted species are those predicted to have potential impacts from project implementation.**

Species	Acres					Standard Deviation
	2003	2009	Summer 2015	Fall 2015	Mean	
<i>Myriophyllum spicatum</i>	2318.5	2955.2	6734.8	4647.3	4163.9	1975.7
<i>Vallisneria neotropicalis</i>	2610.4	2499.7	5304.3	2851.1	3316.4	1333.4
<i>Najas guadalupensis</i>	762.2	1773.6	4832.9	2041.2	2352.5	1742.9
<i>Heteranthera dubia</i>	427.8	312.0	3540.0	3075.9	1838.9	1707.5
<i>Ceratophyllum demersum</i>	954.6	188.8	2002.1	3329.4	1618.7	1361.3
<i>Ruppia maritima</i>	475.2	293.1	1767.6	632.1	792.0	665.0
<i>Stuckenia pectinata</i>	0	238.9	1280.2	5.7	381.2	609.6
<i>Potamogeton pusillus</i>	0	17.1	1115.1	131.2	315.8	536.0
<i>Cabomba caroliniana</i>	0	1.9	28.1	768.8	199.7	379.6
<i>Potamogeton crispus</i>	0	27.9	375.3	9.8	103.2	181.7
<i>Utricularia foliosa</i>	0	5.7	213.4	114.1	83.3	101.4
<i>Zannichellia palustris</i>	0	0	198.8	0.2	49.8	99.4
<i>Hydrilla verticillata</i>	0	76.1	16.7	91.2	46.0	44.4
<i>Nuphar ulvacea</i>	0	46.0	5.7	29.9	20.4	21.4
<i>Myriophyllum heterophyllum</i>	0	0	5.7	29.9	8.9	14.3
<i>Myriophyllum aquaticum</i>	0	0	0	0.1	0	0.1

#### 2.5.6.4. Hard Bottom Habitat.

Natural hard bottom habitats serve as important spawning areas for fish species and support unique communities of marine organisms. “Hard” or “live” bottom habitat refers to “those areas which contain biological assemblages consisting of such sessile invertebrates as sea fans, sea whips, hydroids, anemones, ascidians, sponges, bryozoans, or corals living upon or attached to naturally occurring hard or rocky formations with rough, broken, or smooth topography; or areas whose lithotope favors the accumulation of turtles, fishes, and other fauna” (Thompson et al., 1999).

Other than existing oyster reefs which are covered in Section 2.5.6.9, no natural hard bottom habitats are located within the Mobile Bay and surrounding waters. Most natural hard bottom habitats lie east of the Alabama Coast. Small, isolated patches of lag deposits composed of shell and rock gravel are found off the south sides of the barrier islands (MDWFP, 2005). Numerous artificial reefs consisting of concrete rubble, concrete culverts, steel hull vessels, and artificial reef pyramids have been placed within or near the project area as discussed below. Additionally, there are numerous gas and oil platforms in the bay and nearshore waters of the Gulf that provide artificial structural habitats.

#### **2.5.6.4.1. Artificial Reefs and Structures.**

**Offshore.** Alabama has one of the largest artificial reef programs in the world (ADCNR, Alabama Marine Resources Division, 2009). Alabama's natural bottoms are predominately flat sand/mud type bottom that are not conducive to attract commercially or recreationally valuable fish. The creation of vertical relief is known to attract many reef fish such as snappers and groupers and numerous other valuable species. Over time, artificial reefs will appear and function as natural reefs with similar communities of encrusting organisms and bait fish. The artificial reefs created under Alabama's program have been shown to recruit juvenile fish species and other associated reef dwelling communities that allow the artificial reef to function as natural reefs (ADCNR, Alabama Marine Resources Division, 2009).

Since 1953, Alabama's artificial reef building program started with the placement of 250 car bodies and has continued with offshore placement of many different types of materials including culverts, bridge rubble, barges, boats, planes, tanks and ships. By 1987 the areas encompassed almost 800 square miles and continues to increase in size. The USACE authorized an expansion of Alabama's artificial reef construction areas in 1997 to allow for greater freedom in reef placement and greater variety in depth. The combined area for all reef permit zones now encompasses approximately 1,260 square miles.

**Inshore.** In addition to Alabama's offshore artificial reef program, the State has created numerous inshore artificial fishing reefs throughout Mobile Bay and local waters. The reef structures are meant to mimic the function of relic oyster reefs that attracted schools of fish by providing habitat for barnacles, mussels, worms and bryozoans, along with a variety of crabs and shrimp. The reefs are developed to ring marginally productive oyster reefs in the bay with some form of hard, durable material, and filled with oyster cultch such as shell or crushed limestone for vertical relief (ADCNR, Alabama Marine Resources Division, 2009). By creating such structures, it was anticipated that improved sportfishing at the sites would result due to increased vertical relief and biological diversity. Subsequent reefs were constructed using concrete rubble that became available from the demolition of old bridges of the U.S. Highways 90/98 causeway bridges (Tensaw, Blakeley, and Apalachee rivers). The locations of the inshore reefs are illustrated in Figure 2-32.

A total of 30 inshore fishing reefs are located within Mobile and Bon Secour Bays, Mississippi Sound, and the Perdido System. Concrete bridge materials, culvert pipes, concrete roof panels, oyster shells and crushed limestone were utilized as reef materials. Five reefs are experimental dual-purpose sites, providing excellent inshore fishing while improving oyster production on nonproductive relic oyster reefs. In addition, seven gas production platforms in lower Mobile Bay have been enhanced with limestone rock fish attracting pads.



Gas Platforms. The natural gas platforms in and around Mobile Bay provide hard substrate that attract fish and other marine communities. Locations of the platforms are shown in Figure 2-32. Stabilization materials originally placed around gas platforms in the lower bay once provided excellent benthic invertebrate habitat, supporting large populations of predatory fishes. Crushed limestone aggregate provides an ideal substrate for the settlement and growth of oysters and other benthic invertebrates. Local recreational fisheries associated with these gas platforms have benefited as a result these structures.



Figure 2-32. Locations of the artificial inshore reef and gas platforms within and adjacent to the project area (ADCNR, Alabama Marine Resources Division, 2009).

#### 2.5.6.5. Essential Fish Habitat.

The Magnuson Stevens Fishery Conservation and Management Act (16 U.S.C. 1801-1882) (MSFCMA) established regional Fishery Management Councils (FMC) and mandated that Fishery Management Plans (FMP)s be developed to responsibly manage exploited fish and invertebrate species in waters of the U.S. When Congress reauthorized

this Act in 1996 as the Sustainable Fisheries Act, several reforms and changes were made. One change was to charge the National Marine Fisheries Service (NMFS) with designating and conserving EFH for species managed under existing FMPs. This is intended to minimize, to the extent practicable, adverse effects on habitat caused by fishing or non-fishing activities, and to identify other actions to encourage the conservation and enhancement of such habitat.

EFH is defined as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" [16 U.S.C. § 1801(10)]. "Waters" include "aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate." "Substrate" includes "sediment, hardbottom, structures underlying the waters, and associated biological communities." "Necessary" refers to "the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem." "Fish" includes "finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds," and "spawning, breeding, feeding or growth to maturity" covers the complete life cycle of those species of interest.

The Gulf of Mexico FMC (GMFMC) currently maintains FMPs for a total of 21 selected species. These species or species complexes are shrimp (brown, pink, and white), red drum, reef fish (red, gag, and scamp grouper; red, gray, yellowtail, and lane snapper; greater and lesser amberjack; and tilefish); coastal migratory pelagic species (king and Spanish mackerel, cobia, and dolphin); stone crab, spiny lobster, and coral. For the Gulf of Mexico, EFH includes all estuarine and marine waters and substrates from the shoreline to the seaward limit of the Exclusive Economic Zone. In estuarine waters such as Mobile Bay, these habitats include areas such as estuarine emergent wetlands, seagrass beds, algae flats, mud, sand, and shell substrates, and the estuarine water column.

Table 2-30 provides a list of the species that NMFS manages under the federally implemented FMP in the vicinity of the project area (NOAA, 1999). None of the stocks managed by the FMC are endangered or threatened.

In the project area, EFH is likely to exist for red drum, brown shrimp, pink shrimp, and white shrimp. Blue crab, mullet, and redfish are known to use the wetland areas along the western shoreline. Shrimping and crabbing occur in the project area.

**Table 2-30. FMPs and Managed Species for Gulf of Mexico and Those Likely to Occur in Mobile Bay.**

Shrimp FMP	Coastal Migratory Pelagic FMP
Brown Shrimp	Spanish mackerel ( <i>S. maculatus</i> )
Pink Shrimp	
White Shrimp	<b>Gulf Stone Crab FMP</b>
Red Drum FMP	<b>Reef Fish FMP</b>
Red Drum	
<b>Stone Crab (<i>Menippe sp.</i>)</b>	<b>Gray Snapper (<i>Lutjanus griseus</i>)</b>

NMFS, 1999  
 FMP Fishery Management Plan

### 2.5.6.6. Plankton and Algae

**Phytoplankton.** A total of 13 species of blue-green algae and 23 species of green algae were collected during a study of the effects of dredging (U.S. Navy, 1986) (Table 2-31). The lowest numbers of phytoplankton occurred in Mobile Bay from October through December, whereas peak abundance occurred in April and September. Generally, the number of taxa (species richness) varied inversely with organism abundance. Species richness was greatest during late fall and early winter (U.S. Navy, 1986). Common species include diatoms (*Asterionella sp.*, *Melosira sp.*, and *Skeletonema sp.*, among others), prasinophytes (*Pyramimonas sp.*), and chlorophytes (*Ankistrodesmus sp.*, *Scenedesmus sp.*) (U.S. Navy, 1986) (Table 2-32). Generally, in estuaries along the Gulf, phytoplankton populations exhibit seasonal variations.

**Table 2-31. Phytoplankton Collected from Mobile Bay**

Blue-Green Algae		Green Algae
<i>Anabaena sp.</i>	<i>Actinastrum hantschii</i>	<i>Oocystis spp.</i>
<i>Aphanizomenon sp.</i>	<i>Ankistrodesmus concolutes</i>	<i>Scenedesmus spp.</i>
<i>Borizia trilocularis</i>	<i>Ankistrodesmus falcatus</i>	<i>Schroederia setigera</i>
<i>Chroococcus planetonia</i>	<i>Closterium acicularis</i>	<i>Tetraedron muticum</i>
<i>Coccochloris sp.</i>	<i>Closteriopsis longissimi</i>	<i>Tetraedon trigonum</i>
<i>Gloeocapsa sp.</i>	<i>Coelastrum cambricum</i>	<i>Tetrallantos lagerhermii</i>
<i>Lyngbya aestuarii</i>	<i>Coelastrum microporum</i>	<i>Tetrastrum heteracanthum</i>
<i>Lyngbya contorta</i>	<i>Crucigenia apiculate</i>	<i>Treubaria triappendiculata</i>
<i>Lyngbys sp.</i>	<i>Dictyosphaerium ehrenbergi</i>	<i>Trochischia sp.</i>
<i>Merismopedia punctate</i>	<i>Dictyosphaerium naegelianum</i>	<i>Westella botryoides</i>
<i>Microcystis incerta</i>	<i>Docidium sp.</i>	Unidentified
<i>Oscillatoria tenuis</i>	<i>Kirchneriella obesa</i>	
<i>Schizothrix calcicola</i>		

Source: U.S. Navy, 1986



**Table 2-32. Phytoplankton Survey Data Collected in Vicinity of Pinto Island, February 1986a**

Diatoms	Dinoflagellates
<i>Asterionella formosa</i>	<i>Prorocentrum minimum</i>
<i>Asterionella glacialis</i>	
<i>Coscinodiscus lineatus</i>	Chlorophytes
<i>Cyclotella sp.</i>	<i>Ankistrodesmus falcatus</i>
<i>Cylindrotheca closterium</i>	<i>Scenedesmus acuminatus</i>
<i>Fragilaria sp.</i>	<i>Scenedesmus denticulata</i>
<i>Leptocylindrus minimus</i>	<i>Scenedesmus quadracaudata</i>
<i>Skeletonema costatum</i>	
<i>Melosira moniliformis</i>	Chrysophytes
<i>Melosira granulate</i>	<i>Dinobryon sp.</i>
<i>Nitzschia delicatissima</i>	
<i>Synedra sp.</i>	Cyanobacteria
<i>Thalassiosira decipiens</i>	<i>Oscillatoria sp.</i>
<i>Thalassiosira pseudonana</i>	
	Other
Prasinophytes	Small Forms*
<i>Pyramimonas sp.</i>	

\* Small forms consist primarily of unidentifiable blue-green and green algae that are less than 2 microns in diameter. Source: U.S. Navy, 1986.

**Zooplankton.** From data collected in lower Mobile Bay, copepods were by far the most abundant taxonomic group, with peaks occurring in winter and spring. Other species found include *Amphipoda*, *Cladocera*, *Porcellanidae*, and *Sagetta spp.*, all varying from season to season.

Factors influencing zooplankton include flushing rate, patterns of circulation, salinity, turbidity, nutrient concentration, phytoplankton composition and quantity, predator abundance, and levels of various pollutants. Estuarine zooplankton exhibit volumetric and numerical abundance, but limited diversity even under favorable conditions. Most species tolerate a wide range of temperatures. Summer populations are usually high because of increased primary productivity and the seasonal effect of meroplankton. In Mobile Bay, relatively shallow depths and rapid tidal mixing could combine to enhance nutrient cycling. This results in increased primary production and increased food supply for zooplankton. Ctenophores are recognized as major predators of suspended crustaceans and constitute an important regulatory component in zooplankton populations (Navy. 1986).

### **2.5.6.7. Benthic Communities.**

The balance between freshwater inflow and saltwater tidal exchanges is an important driver establishing salinity-zone habitats in estuaries (Van Diggelen and Montagna 2016) and salinity strongly influences benthic macroinvertebrate distributions (Telesh and Khlebovich 2010). Changes to this freshwater/saltwater relationship are associated with wetland loss on the northern Gulf of Mexico via altered riverine input of freshwater and sediment (Day et al. 2000) and saltwater intrusion via canal and channel dredging (Turner 1997). Other factors affect habitat quality and the salinity balance within an estuary, including severe storms, sediment changes, and development. Alterations to inputs of freshwater (e.g., droughts, floods, flood control levees) or saltwater (e.g., channel deepening), can affect biotic communities that are adapted to particular salinity zones by changing their taxonomic composition and distributions. Important estuarine biota includes benthic invertebrates, which are relatively stationary, living within bottom sediments. Their abundances and distributions, therefore, can serve as an indicator of environmental conditions in an area. Salinity, however, is not the only factor affecting the distributions of benthic invertebrates, which also respond to sediment composition, competition, and predator-prey relationships (Little et al. 2017). Commercially and recreationally important estuarine fish feed on benthic invertebrates in estuarine and contributing freshwater habitats.

A recent evaluation conducted by Berkowitz et al. (2018) characterizes baseline benthic infaunal communities in estuarine, transitional, and freshwater habitats in the Mobile Bay Watershed. Details of this study is included in Section 2.6.7, Appendix C. Sampling was conducted in October 2016 and May of 2017 with a total 240 benthic samples collected over 40 stations within habitat zones of freshwater, brackish, and estuarine as illustrated in Figure 2-33. Changes in benthic community composition among these habitat types are documented along the salinity gradient. The empirical data were collected to document the distribution and abundance of benthic macroinvertebrates within the potential zone of influence of harbor modifications. Multivariate statistical techniques were used to determine the location(s) where the taxonomic composition of these benthic assemblages changed relative to bottom salinity concentrations.

Potential impacts of harbor modifications on benthic resources in Mobile Bay are a concern because the navigation channel has an influence on water circulation, estuarine mixing, and sedimentation patterns in the bay (Osterman and Smith 2012). Benthic macrofauna in Mobile Bay are dominated by polychaetes and macrofaunal abundances are relatively low in this area compared to other Gulf of Mexico estuaries (HX5, 2016). This benthic evaluation conducted by Berkowitz et al. (2018) examined the benthic macroinvertebrates and established how benthic communities transition from estuarine to freshwater habitat, which largely reflected a change from relatively high abundances of polychaetes to insects, respectively. A similar transition in benthic community composition was reported for Lavaca Bay and Matagorda Bay, Texas, in which

polychaetes and crustaceans were indicator taxa for brackish and marine habitats and insect larvae occurred in freshwater areas (Pollack et al. 2009). A detailed summary of the average abundances of benthic macroinvertebrates associated with the estuarine, transitional, and freshwater zones for each sampling period can be found in Section 2.6.7, Appendix C.



Figure 2-33. Benthic station locations for A-estuarine, B-transition, and C-freshwater zones.

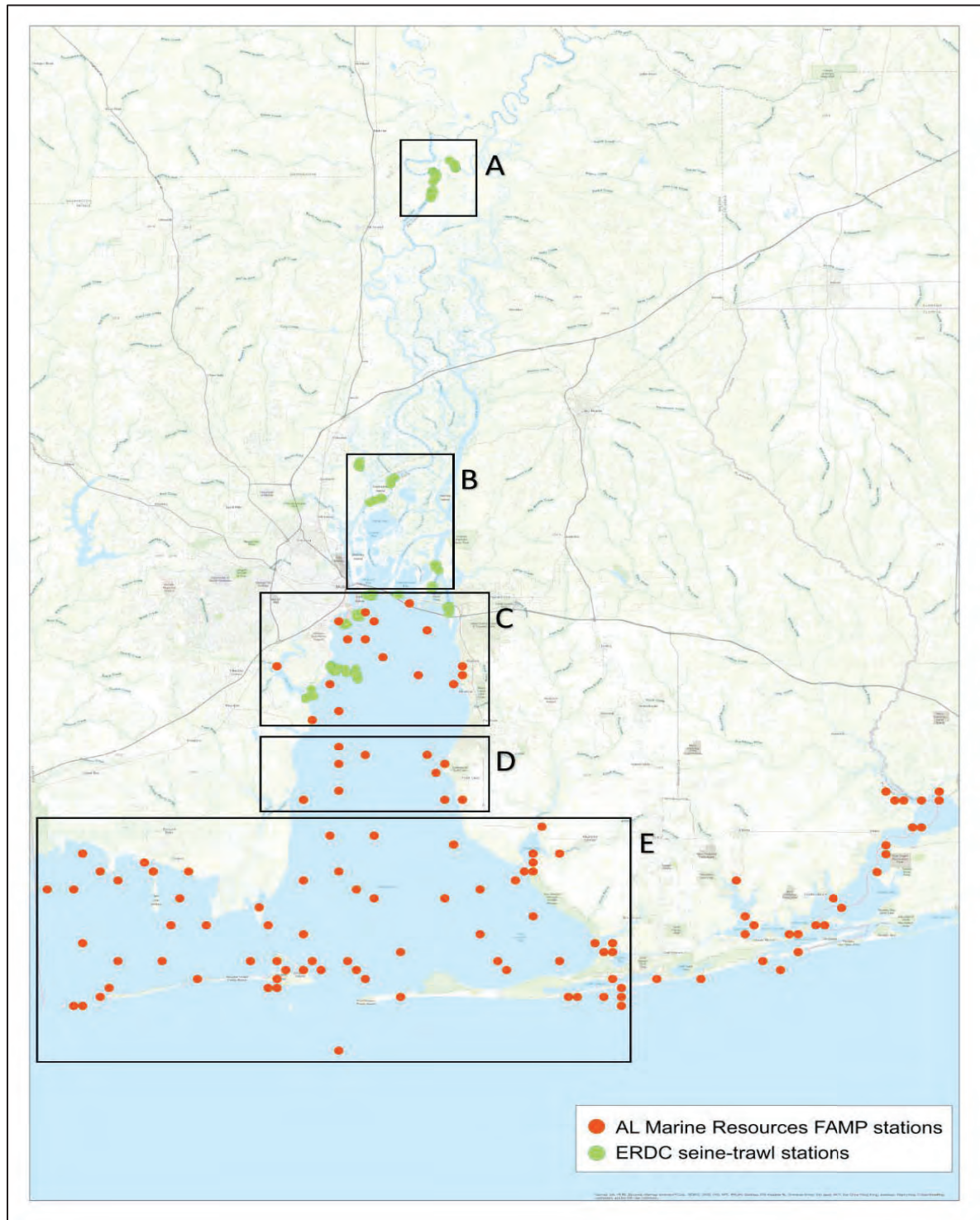
#### **2.5.6.8. Fish**

Mobile Bay ranks first in the number of freshwater species in the Southeastern Atlantic and Gulf of Mexico drainages, with a total of 157 species recorded, 40 of which are endemic (Swift et al 1986). Long-term collections in Mobile Bay estuary by the Alabama Marine Resource Division, catalogued in the Fisheries Assessment and Monitoring Program (FAMP) database, list 140 species of estuarine fishes. High biodiversity reflects the ecological importance of this drainage network, including inflows from the Black-Warrior, Tombigbee, and Alabama Rivers. A recent study was conducted by Berkowitz et al. (2018) during September 2016 to evaluate recruitment and growth and May 2017 to evaluate the spawning period and young-of-year survival. Details of this study is included in Section 2.6.1, Appendix C.

Sampling was conducted in the freshwater, transition and upper bay zones for a total of 11 sites utilizing the same gear and protocol as with the FAMP database (seine and trawl) used by the ADCNR, MRD. The sampling efforts in the upper bay zone were conducted to provide complementary data in that zone and to also aide in calibrating efforts in the transition and freshwater zones with comparable efforts in the remaining zones. Data used for the fishery analysis encompassed information from 2000-2015, and the ERDC data collected in 2016 and 2017. A map, Figure 2-34, depicting the sampling station distribution (overall map with two insets) was created that illustrates the FAMP stations historically and currently sampled by the ADCNR, MRD (1981-present) as well as the location of the ERDC samples. The inclusion of all FAMP data provides a visual aide supporting the breadth of geographic coverage represented by the data.

Outputs from the study provided for the fisheries assessment included baseline conditions, With-Project conditions and the numerical difference (change) between baseline and project values. Basic summary statistics were generated (i.e., mean, minimum, maximum, standard deviation, percentile) for each modeled cell within the grid and for each respective condition. Physical and water quality habitat measurements were taken in conjunction with fishery collections at each site. Salinity tolerances for each fish guild community in Mobile Bay study areas were identified according to the Gulf Coastal Research Laboratory publication by Christmas (1973) following the recommendations by Elliott et al (2007). Guilds included: freshwater only, freshwater entering estuary, resident estuary, marine entering estuary, and marine only. A total of 2,097,836 individuals representing 162 species were recorded and used in the analysis. Species were classified according to the salinity tolerance guilds. A detailed list of species abundance in the Mobile Bay project area by salinity classification can be seen in Section 2.6.1, Appendix C.





**Figure 2-34. Distribution of the ERDC sample stations (green) and Alabama ADNCR, MRD FAMP stations (red) utilized for fisheries assessment (A).  
2.5.6.9. Mollusks**

Important bivalves in the northern Gulf of Mexico include bay scallop (*Argopecten irradians*), Eastern oyster (*Crassostrea virginica*), and hard clam (*Mercenaria sp.*). These species typically inhabit nearshore coastal areas where they feed on phytoplankton and detritus (Pattillo et al., 1997). Bay scallop, Eastern oyster, and northern and Texas quahog clams (*Mercenaria* and *M. mercenaria texana*) are among the bivalves that have also been identified in estuaries around the northern Gulf and barrier islands (Coke, 1983).

The hard clam is an estuarine and marine species most often found in coastal bays from intertidal zones to water depths of 50 ft. These clams may be found in open ocean, but prefer shallow waters (<33 ft). Juvenile and adult clams occur primarily in soft bottom habitats of sand and mud. Spawning coincides with high concentrations of plankton during spring, fall, and winter (Pattillo et al., 1997). Other abundant mollusks found in the Mississippi Sound include various gastropods.

The commercially valuable oysters inhabit shallow estuarine waters during all lifestages. Oyster recruitment is the key driver for maintaining oyster population over time. However, this process is poorly understood due to the difficulty in tracking oyster larvae over time. Recruitment occurs through the settlement of larvae from their natal reef (intra-reef recruitment), or from other reefs within the system (inter-reef recruitment). Intra-reef recruitment has been shown to be relatively low, indicating that inter-reef recruitment is crucial for sustaining oyster populations in hydrodynamically-driven systems (Berkowitz et al., 2018).

Berkowitz et al., (2018) using information provided by the ADCNR, MRD, assessed 13 adult oyster reefs (>3,600 acres) for salinity and DO potential impacts based on juvenile and adult oyster tolerance thresholds. Details of this study are included in Section 2.6.2.1, Appendix C. Understanding the oyster larvae movement and reef recruitment dynamic is critical towards understanding how potential project actions will impact oyster populations within the project area of influence. Specifically, if oyster recruitment within the Mobile Bay area is altered so that a higher percentage of oyster larvae are flushed out of the bay due to hydrodynamic changes caused by alterations to the navigation channel, this could affect the local oyster recruitment (Berkowitz et al., 2018).

The Atlantic oyster drill (*Thais haemastoma*) is a significant predator of the economically important Eastern oyster. The species prefers the small juvenile stage of the oyster over larger adults. Predation rates for drills 50 mm in size have been documented at 85 2-week old spat per day. The drill tolerates a range of salinities, but prefers the more saline parts of estuaries. Its destructiveness to oyster beds increases as salinity increases. Reproduction occurs in waters with salinity above 20 ppt (Butler, 1985). Localized population increases in this species have occurred in Gulf Coast areas that have experienced increases in salinity (Alabama Current Connection, 2011).



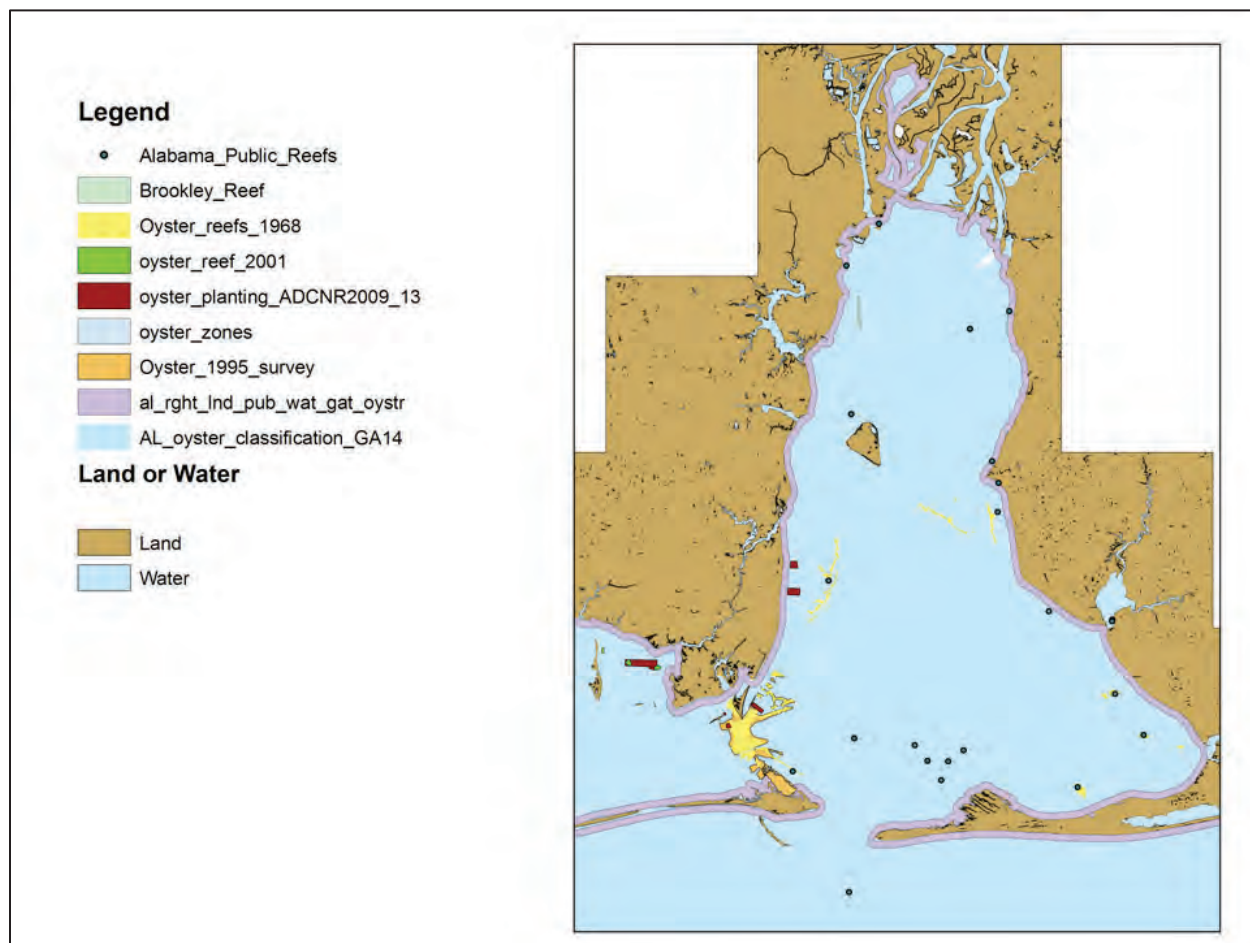


Figure 2-35. Oyster reefs in Mobile Bay

#### 2.5.6.10. Crustaceans

Crustaceans of abundance in the Mobile and vicinity include a variety of amphipods, isopods, shrimps, and crabs. Three commercially important species of shrimp and one commercially important species of crab are found in Alabama coastal waters: the brown shrimp (*Penaeus aztecus*), the pink shrimp (*Penaeus duorarum*), the white shrimp (*Penaeus setiferus*), and the blue crab (*Callinectes sapidus*). The life histories of the shrimp species are generally similar, although the time of spawning varies among the species. Mating takes place in shallow offshore waters, while actual spawning takes place in deeper offshore waters. The eggs are released and fertilized externally in the water. Within hours, fertilized eggs hatch into a microscopic larva. The larvae are capable of only limited horizontal, directional movement in response to light conditions and are unable to swim independently of the water currents. Shrimp migrate via currents from offshore waters to coastal bays during the last planktonic stage and enter estuarine nursery grounds as post-larvae. Development to the post-larval stage takes several

weeks. Post-larvae have well developed swimming capabilities. Once they move into brackish waters, the post-larvae abandon their planktonic way of life and become part of the benthic community. Young shrimp remain in the estuary until they approach maturity.

Adult shrimp migrate offshore to spawn, and the cycle is repeated. As noted above, there are seasonal variations in the spawning times of pink, brown, and white shrimp.

Brown post-larvae enter the Mississippi Sound in large numbers during the spring, with a smaller wave of migration in the fall. White and pink shrimp post-larvae arrive during the summer and fall, with white post-larvae being more abundant. Of the three species, white shrimp spawn closest to the shore and brown shrimp spawn the farthest from shore (Perry, 2010).

Mature pink shrimp inhabit deep offshore waters, and the highest concentrations occur in depths of 33 to 145 ft (Pattillo et al., 1997). Pink shrimp are most abundant in winter and early spring. They are usually found in higher-salinity waters and are generally caught at night (MDMR, 2010b). White shrimp adults are typically found in nearshore waters rarely exceeding 90 ft in depth and generally become most abundant at about 15-45 ft in depth (Pattillo et al., 1997). White shrimp are caught mostly during daylight hours in the fall months and can be found in shallower waters with mud bottoms.

Brown shrimp are most abundant from June to October and can be found in inshore and offshore waters. Pink shrimp are usually found in higher-salinity waters and are generally caught at night. These shrimp are most abundant in winter and early spring. Water temperatures, salinity, available food, and habitat area affect the size of the shrimp harvest. The most productive seasons are those when water conditions are warm and brackish, i.e., in the spring.

The blue crab is another commercially important crustacean. The blue crab spends most of its life in bays, brackish estuaries, and nearshore areas in the Gulf of Mexico. Spawning occurs near the mouths of estuaries or in open water (Pattillo et al., 1997). Crabs have a long spawning period in Alabama and egg-bearing crabs may be found in all but the coldest months. Females with eggs are found around barrier islands in large numbers during the summer. Eggs hatch near those areas and planktonic zoeal larvae are carried offshore for up to one month to spend their larval stage in the offshore plankton (Pattillo et al., 1997). Once metamorphosis to the megalopa stage is complete, they re-enter estuarine waters to develop before molting into the crab stage. Spawning activity is greatest in late spring and late summer. Most adult crabs move to deeper waters during winter (Pattillo et al., 1997).

During a 3-year (1987 to 1989) evaluation of the continental shelf, decapods comprised approximately 77.8% of the epifaunal invertebrates observed. The dominance of

decapods was due to the large numbers of shrimp sampled. Sample results suggested that decapods prefer coastal marshes during the summer and migrate to deeper waters during the winter (MMS, 1991).

### 2.5.7. Threatened and/or Endangered Species.

Several species of threatened and endangered marine mammals, turtles, fish and birds occur in the Gulf of Mexico off the coast and in upland areas of Alabama including Mobile and Baldwin Counties and waters offshore of Alabama and Mississippi. Table 2-33 includes 12 species that NOAA Fisheries, Protected Resource Division (PRD), St. Petersburg Field Office lists that may occur within the area under their purview as threatened and/or endangered. Five of these species are also listed by USFWS.

**Table 2-33. Federally Listed Threatened and Endangered Species in the Project Area**

Common Name	Scientific Name	Status <sup>a</sup>	Area of Potential Occurrence	Habitat
Dusky gopher frog	<i>Rana sevosia</i>	LE (USFWS)	Mobile County	Habitat includes both upland sandy habitats historically forested with longleaf pine and isolated temporary wetland breeding sites imbedded within this forested landscape. This frog spends the majority of its life in or near underground refugia and historically used gopher tortoise burrows for this purpose (Allen 1932).
Red Knot <sup>b</sup>	<i>Calidris canutus ssp. rufa</i>	LT (USFWS)	Mobile and Baldwin Counties	Sandy beaches, tidal mudflats, salt marshes, and peat banks (USFWS, 2010i).
Wood stork	<i>Mycteria americana</i>	LT (USFWS)	Mobile and Baldwin Counties	Optimal water regimes for the wood stork involve periods of flooding, during which prey (fish) populations increase, alternating with dryer periods, during which receding water levels concentrate fish at higher densities coinciding with the stork's nesting season.
Tan riffleshell	<i>Epioblasma florentina walkeri</i>	LE (USFWS)	Mobile and Baldwin Counties	Relatively silt-free substrates of sand, gravel, and cobble in good flows of smaller streams.
Alabama Red-bellied Turtle	<i>Pseudemys alabamensis</i>	LE (USFWS)	Mobile and Baldwin Counties	Sluggish bays and bayous in brackish marshes adjacent to the main channels of large coastal rivers (USACE, 2009a; USFWS, 1990a).
Black Pine Snake	<i>Pituophis melanoleucus lodingi</i>	LT (USFWS)	Mobile County	Well-drained, upland longleaf pine forests with a fire-suppressed mid-story and dense herbaceous ground cover (USACE, 2009a).
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	LT (USFWS)	Mobile and Baldwin Counties	Dry, mature pinelands dominated by longleaf pine, with a fire-maintained subclimax understory community (USFWS, 1982).
Gopher Tortoise	<i>Gopherus polyphemus</i>	C (USFWS)	Mobile and Baldwin Counties	Longleaf pine hills with well-drained, sandy soils, an abundance of herbaceous ground cover, and a generally open canopy with sparse shrub cover (USACE, 2009a; USFWS, 1990b).

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Saltmarsh topminnow	<u><i>Fundulus jenkinsi</i></u>	Under Review (USFWS)	Mobile and Baldwin Counties	This species prefers cord grass ( <i>Spartina</i> ) marsh with a salinity below 20 parts per thousand and is most abundant at 1-4 parts per thousand (Lee et al. 1980, Robins et al 1986). It is characterized as a small, schooling fish that can occur in large numbers in quiet fresh waters, bays, saltwater marshes, tidal creeks, estuaries, and lagoons. It is not found on reefs or far away from shore (Robins et al. 1986).
Mississippi Sandhill Crane	<i>Grus canadensis pulla</i>	LE (USFWS)	Mobile County	Nests in open area of grasses/sedges with perennial shallow water, often near grasslands, pasture, or open pine forests. Forages in savannas, swamps, and open forest lands, corn and chufa fields, pastures, and pecan orchards. Roosts in fresh and brackish marshes, freshwater ponds, open forests, pastures, and moist clearings (USFWS, 1991).
Piping Plover <sup>b</sup>	<i>Charadrius melodus</i>	LT and Critical Habitat (USFWS)	Mobile and Baldwin Counties	Barrier islands, along sandy peninsulas, and near coastal inlets. Also on sand, mud, and algal flats, washover passes, salt marshes, and coastal lagoons (USFWS, 1996).
Southern clubshell	<u><i>Pleurobema decisum</i></u>	LE(USFWS)	Mobile and Baldwin Counties	All populations are experiencing sediment and water quality problems, and are susceptible to stochastic and chronic events (e.g., spills, drought and/or landuse runoff).
West Indian Manatee	<i>Trichechus manatus</i>	LT (USFWS)	Mississippi Sound and Mobile Bay	In marine, estuarine, and freshwater environments (USACE, 2009a).
Alabama sturgeon	<u><i>Scaphirhynchus suttkusi</i></u>	LE (USFWS)	Mobile and Baldwin Counties	Based on capture data, it inhabits the main channel of large coastal plain rivers of the Mobile River Basin. Most specimens have been taken in moderate to swift current at depths of 6 to 14 m, over sand, gravel or mud bottom (Williams and Clemmer 1991).
Green Sea Turtle <sup>b</sup>	<i>Chelonia mydas</i>	LT (USFWS and NOAA)	Mississippi Sound and oceanward waters near the barrier islands	Throughout the Atlantic, Pacific, and Indian Oceans, primarily in tropical regions and shallow waters (USACE, 2009a).
Kemp's Ridley Sea Turtle <sup>b</sup>	<i>Lepidochelys kempii</i>	LE (USFWS and NOAA)	Mobile and Baldwin Counties and oceanward waters near the barrier islands	Nearshore and inshore waters of the northern Gulf of Mexico, especially Louisiana waters (NOAA Fisheries et al., 2010).
Loggerhead Sea Turtle <sup>b</sup>	<i>Caretta</i>	LE (USFWS) LT (NOAA)	Mobile and Baldwin Counties and oceanward waters near the barrier islands	Ocean beaches and estuarine shorelines with suitable sand and relatively narrow, steeply sloped, coarse-grained beaches (USACE, 2009a).
Leatherback Sea Turtle <sup>b</sup>	<i>Dermochelys coriacea</i>	LE (USFWS)	Mobile and Baldwin Counties and oceanward waters near the barrier islands	High energy beaches with deep, unobstructed access along continental shorelines. Oceans worldwide.
Hawksbill Sea Turtle <sup>b</sup>	<i>Eretmochelys imbricate</i>	LE (USFWS)	Mobile and Baldwin Counties and oceanward waters	Coral reefs, shoals, lagoons, lagoon channels, and bays with marine vegetation; also can tolerate muddy bottoms with sparse vegetation.

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			near the barrier islands	
Gulf Sturgeon <sup>b</sup>	<i>Acipenser oxyrinchus desotoi</i>	LT (USFWS and NOAA)	Mobile and Baldwin Counties, and offshore waters	Rivers, estuaries, and Gulf of Mexico waters (USFWS and NOAA Fisheries, 2009).
Alabama (=inflated) heelsplitter	<i>Potamilus inflatus</i>	LT (USFWS)	Mobile and Baldwin Counties	Soft, stable substrate in slow to moderate currents (Stern 1976). It has been found in sand, mud, silt and sandy gravel, but not in large gravel or armored gravel (Hartfield 1988).
Oceanic whitetip shark	<i>Carcharhinus longimanus</i>	LT (NOAA)	Offshore waters	Offshore waters.
Maui remya	<i>Remya mauiensis</i>	LE (USFWS)	Baldwin County	
American chaffseed	<i>Schwalbea americana</i>	LE (USFWS)	Baldwin County	
Perdido Key beach mouse	<i>Peromyscus polionotus trissyllepsis</i>	LE (USFWS)	Baldwin County	Sandy coastal and beach dune areas
Alabama beach mouse	<i>Peromyscus polionotus ammobates</i>	LE (USFWS)	Baldwin County	Sandy coastal and beach dune areas
Finback Whale	<i>Balaenoptera physalus</i>	LE (USFWS and NOAA)	Offshore waters	Offshore waters.
Giant manta ray	<i>Manta birostris</i>	LT (NOAA)	Offshore waters	Offshore waters.
Bryde's whale	<i>Balaenoptera edeni</i>	Proposed endangered (NOAA)	Offshore waters	Offshore waters.
Sei Whale	<i>Balaenoptera borealis</i>	LE (NOAA)	Offshore waters	Offshore waters.
Sperm Whale	<i>Physeter macrocephalus</i>	LE (NOAA)	Offshore waters	Offshore waters.
<sup>a</sup> LE = Listed Endangered; LT = Listed Threatened, C = Candidate for listing <sup>b</sup> Species with the potential to occur in the project area.				

There are nine Federally listed species, two critical habitat designations for piping plovers and nearshore productive and nesting habitat loggerhead sea turtles, and one candidate species (Bryde's whale) for Federal protection that may occur in the vicinity of the proposed project and could be affected by construction activities.

**Species Not Discussed Further**

Due to a lack of suitable habitat and their location in coastal upland, coastal freshwater, or nearshore coastal estuarine environments, the following 16 species would not occur in or around the proposed project area and are not further discussed:

- Inflated heelsplitter
- Dusky gopher frog
- Wood stork
- Black pine snake
- Eastern indigo snake
- Gopher tortoise
- American chaffseed
- Maui remya
- Tan riffleshell
- Mississippi sandhill crane
- Saltmarsh top minnow
- Southern clubshell
- Oceanic whitetip shark
- Humpback whale
- Perdido key beach mouse
- Giant manta ray

The USACE, Mobile District, does not anticipate sperm, bryde's, fin, or sei whales would be adversely affected by the varying dredging methods (i.e. hydraulic, hopper, and/or mechanical) described by the proposed action along the entire proposed action area. Previous coordination with NOAA Fisheries, under the 2003 Gulf Regional Biological Opinion (GRBO) (amended 2005 and 2007) with a determination that dredging activities have a "not likely to adversely affect" (NLAA) determination for whale species potentially within the project area. The possibility of collision with the dredge is remote since these are deepwater species and the likelihood for collision would be reduced by the highly mobile nature of these species. Given their likely absence, feeding habits, and very low likelihood of interaction, the USACE, Mobile District, does not anticipate the proposed actions identified in this EIS will affect these species. As such, sperm, fin, and sei whales are not considered further in this assessment.

The life cycle descriptions of the protected species and critical habitats known to occur in the project area are included in more detail in Section 2.7, Appendix C.

#### **2.5.8. Marine Mammals.**

All marine mammals are covered under the Marine Mammal Protection Act (MMPA), regardless of their status under the ESA. It should be noted that the only two whale species that may occur in the project area are also covered under the ESA. There are a total of six threatened or endangered whale species (i.e., whale species protected under both the ESA and MMPA).

All marine mammals are protected by the MMPA of 1972, as amended, but the West Indian manatee and four whale species, which include the finback, sei, sperm, and Bryde's whales, are also listed as endangered and, therefore, are also protected under the ESA. The MMPA prohibits, with certain exceptions, the *take* of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.

The marine mammal species listed in Section 2.8, Appendix C, including the West Indian manatee, have been, or are known to occur, in the Gulf of Mexico. Based on NOAA



Fisheries aerial surveys, the most often sighted groups along the upper continental slope of the north-central Gulf of Mexico were Risso's dolphin, Atlantic bottlenose dolphin, Atlantic spotted dolphin, pantropical spotted dolphin, striped, spinner, and clymene dolphin, sperm whale (*Physeter macrocephalus*), dwarf and pygmy sperm whales, and short-finned pilot whale (Evans, 1999; Waring et al., 2013). However, sperm whales tend to inhabit areas with a water depth of 1,968 ft or more, and are uncommon in waters less than 984 ft deep.

Recently, the NMFS has identified the Bryde's whale as a potential concern in the Gulf of Mexico. The Bryde's whale (*B. edeni*) is a large baleen whale found in tropical and subtropical waters worldwide. The Bryde's whale is proposed for the federal listing as an endangered species under the Endangered Species Act (50 CFR Part 224, Federal Register 2016-29412). However, it is currently protected under the Marine Mammals Protection Act. The northeastern Gulf of Mexico encompasses the current areal distribution of a small resident population. Sightings have been found in the Northeastern Gulf of Mexico along the continental shelf break in an area known as the DeSoto Canyon which is between 328 ft and 984 ft deep.

Vessel collisions are a significant source of mortality for a variety of coastal large whale species. The northern Gulf of Mexico is an area of considerably high amount of ship traffic, which may increase the risk of vessel-whale collisions. Several important commercial shipping lanes travel through the primary Gulf of Mexico Bryde's whale habitat in the northeastern Gulf of Mexico, particularly vessel traffic from ports in Mobile, Pensacola, Panama City, and Tampa.

Of the other more common species sighted along the upper continental shelf, three marine mammal species are commonly found along nearshore areas of Alabama. They include Atlantic bottlenose dolphin, Atlantic spotted dolphin (*Stenella frontalis*), and spinner dolphin (*Stenella longirostris*) (MMS, 2000; Waring et al., 2013).

The western north Atlantic bottlenose dolphin populations found along the mid-Atlantic coast have been designated as depleted under the MMPA and, therefore, are more stringently managed to replenish them (NOAA Fisheries, 2010a). The Gulf of Mexico population, however, is not considered to be at risk and is managed less stringently. The Alabama coastal and estuarine waters are home to stable populations of Atlantic bottlenose dolphins, generally because of the warm and protected waters (Institute for Marine Mammal Studies [IMMS], 2007). Atlantic bottlenose dolphins inhabiting different areas of the bays and sounds form distinct communities.

The West Indian manatee is one of four remaining marine mammals in the order *Sirenia*. Manatees were originally listed as endangered throughout their range in 1967. The Florida manatee, a geographically distinct population, is currently federally listed as endangered only in Florida, Georgia, Puerto Rico, Mexico, and the Caribbean but occurs

as far west as Texas in the summer and early fall. Manatees undertake large seasonal migrations with distribution controlled by temperature. In the summer and fall, manatees seek shallow grass beds with ready access to deep channels as preferred feeding areas in coastal and riverine habitats including secluded canals, creeks, embayments, and lagoons, particularly near the mouths of coastal rivers and sloughs. Artificial sources of fresh water are also attractive to manatees. Manatees are herbivores and forage on submerged aquatic vegetation (SAV), especially undersea grasses. These grasses typically grow at 3-6 ft in depth. However, manatees have been noted in water as shallow as 1.5 ft and in deeper waters during coastal and other migrations to SAV areas. Areas with SAV are particularly important to manatee conservation.

In the winter, manatees from the Gulf Coast typically return to Florida, congregating en masse around on warm water springs and effluent discharges such as those below power plants. Increasing numbers of manatees are found in Alabama waters in the summer. They are known to utilize bay channels extensively as they migrate throughout Mobile Bay and into the adjacent rivers. A major threat to the manatee, accounting for over one third of all death of adults, is watercraft strikes. Water control structures and navigation aides also are significant causes of deaths, as are red tides and incidents of freezing. Some manatees are also believed to die as a result of poor nutritional status when the underwater vegetation they feed on is killed by salinity changes or pollution.

#### **2.5.9. Wildlife Communities.**

**Birds.** The Gulf Coast, including the Alabama and Mississippi Coasts and the Mobile Bay and associated watershed, provides feeding, nesting, resting, and wintering habitat for numerous resident and migratory bird species (MDMR, 2010d). Over 300 species of birds have been reported as migratory or permanent residents within the area, including several species that breed there. Shorebirds found in the area include osprey, great blue heron, great egret, piping plover, sandpiper, gulls, brown and white pelicans, American oystercatcher, and terns (USACE, 2009a).

The project area serves as part of an important migration corridor (i.e., the Mississippi Flyway) for birds migrating to and from tropical wintering areas in the Caribbean, Mexico, and Central and South America. The majority of the birds migrating through the Mississippi Flyway in spring and fall cross the Gulf of Mexico. The coastal woodlands and narrow barrier islands that lie scattered along the northern coast of the Gulf of Mexico provide important stopover habitat for these neotropical landbird migrants. They represent the last possible stopover before fall migrants make a non-stop flight (18–24 hours) of greater than 600 miles, and the first possible landfall for birds returning north in spring (USACE, 2009a).

The coastal marshes, islands, and beaches of Alabama are utilized by large populations of waterfowl, passerines, wading birds, and shorebirds. Passerines common to the coast of Alabama include the gray kingbird (*Tyrannus dominicensis*), fish crow (*Corvus*

*ossifragus*), boat-tailed grackle (*Quiscalus major*), marsh wren (*Cistothorus palustris*), and seaside sparrow (*Ammodramus maritimus*).

**Table 2-34. Marine Mammals Occurring in the Gulf of Mexico**

Scientific Name	Common Name
<i>Balaenoptera acutorostrata</i>	Minke whale
<i>Balaenoptera borealis</i>	Sei whale <sup>a</sup>
<i>Balaenoptera edeni</i>	Bryde's whale
<i>Balaenoptera musculus</i>	Blue whale <sup>a</sup>
<i>Balaenoptera physalus</i>	Finback whale <sup>a</sup>
<i>Eubalaena glacialis</i>	Northern right whale
<i>Feresa attenuate</i>	Pygmy killer whale
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale
<i>Grampus griseus</i>	Risso's dolphin
<i>Kogia breviceps</i>	Pygmy sperm whale
<i>Kogia simus</i>	Dwarf sperm whale
<i>Lagenodelphis hosei</i>	Fraser's dolphin
<i>Megaptera novaeangliae</i>	Humpback whale <sup>a</sup>
<i>Mesoplodon bidens</i>	Sowerby's beaked whale
<i>Mesoplodon densirostris</i>	Blainville's beaked whale
<i>Mesoplodon europaeus</i>	Gervais' beaked whale
<i>Orcinus orca</i>	Killer whale
<i>Peponocephala electra</i>	Melonheaded whale
<i>Physeter macrocephalus</i>	Sperm whale <sup>a</sup>
<i>Pseudorca crassidens</i>	False killer whale
<i>Stenella attenuate</i>	Pantropical spotted dolphin
<i>Stenella clymene</i>	Clymene dolphin
<i>Stenella coeruleoalba</i>	Striped dolphin
<i>Stenella frontalis</i>	Atlantic spotted dolphin
<i>Stenella longirostris</i>	Spinner dolphin
<i>Steno bredanensis</i>	Rough toothed dolphin
<i>Trichechus manatus</i>	West Indian manatee <sup>a</sup>
<i>Tursiops truncates</i>	Atlantic bottlenose dolphin
<i>Ziphius cavirostris</i>	Cuvier's beaked whale
Sources: MMS, 2000; NOAA Fisheries, 2010a.	
<sup>a</sup> Protected under the ESA of 1973 as endangered.	

Common wading birds in the area include the great egret (*Casmerodius albus*), snowy egret (*Egretta thula*), great blue heron (*Ardea herodias*), little blue heron (*Egretta caerulea*), and tricolored heron (*Egretta tricolor*) (U.S. Navy, 1986; Audubon, 2002).

In Alabama, most of the migratory waterfowl winter in the Tennessee Valley, on Upper Mobile Bay, and on Mississippi Sound (U.S. Navy, 1986). Considering the location of the project area in the upper portion of Mobile Bay, it is likely that some migratory waterfowl use the area for foraging and loafing. Coastal areas and river valleys provide abundant food and shelter for migrants. The more abundant species in the Mobile Bay area include the lesser scaup (*Aythya affinis*), ring necked duck (*Aythya collaris*), gadwall (*Anas strepera*), green-winged teal (*Anas carolinensis*), mallard (*Anas platyrhynchos*), and ruddy duck (*Oxyura jamaicensis*) (U.S. Navy, 1986).

**Mammals.** Diversity among the upland mammal species is limited in the project area because there is not a wide variety of vegetative communities to serve as habitat. Species likely to be found in the project area are common throughout Mobile County, and are somewhat opportunistic species such as the nine-banded armadillo (*Dasypus novemcinctus*), opossum (*Didelphis marsupialis*), and raccoon (*Procyon lotor varius*) (U.S. Navy, 1986). Fox (*Vulpes sp.*) have been spotted in the area. The swamp rabbit (*Sylvilagus aquaticus littoralis*) may also be found throughout the coastal marshes of Alabama.

Other mammals that could be found in the region include the hoary bat (*Lasiurus cinereus*), black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), and rice rat (*Oryzomys palustris palustris*) (U.S. Navy, 1986).

**Reptiles/Amphibians.** The Mobile Bay and Mobile-Tensaw River Delta are rich in wildlife diversity with more than 126 species of reptiles and amphibians.

Reptiles are cold-blooded, meaning their body temperature is not internally regulated and so it's similar to that of the external temperature. These vertebrates usually lay eggs and have an external covering of scales or horny plates. They breathe by means of lungs. The ADCNR reports that that Alabama is home to 93 native reptiles, including 12 lizards, 49 snakes, 31 turtles and the American alligator. In addition, four exotic lizard species have established populations in south Alabama. The only snake to habitually occupy the salt marsh habitat in Alabama is the Gulf salt marsh water snake (*Natrix fasciata clarki*) (Mount, 1975). Many of these species occur within the project area.

Amphibians are cold-blooded (body temperature is not internally regulated and therefore is similar to the external temperature), smooth-skinned vertebrates that characteristically hatch as an aquatic larva with gills. The larva then transform into an adult having air-breathing lungs. According to the ADCNR, Alabama is home to 73 native amphibians, including 30 species of frogs and 43 species of salamanders. One established exotic species, the greenhouse frog, occurs in Baldwin and Mobile counties. Two native

species, the Mississippi gopher frog and the flatwoods salamander have not been observed in many years and may be extirpated from Alabama.

The Alabama red-bellied turtle (*Pseudemys alabamensis*), a Federally listed endangered species, has been sighted in the brackish marshes in the area north of the Arlington and Garrows Bend Channels (U.S. Navy, 1986). However, Dr. David H. Nelson, Associate Professor at the University of South Alabama (2003), has indicated that the turtle is usually not found in brackish or saltwater, but prefers freshwater. Other turtle species that could occur in the area include the river cooter (*Chrysemys concinna concinna*) and Mississippi diamondback terrapin (*Malaclemys terrapin pileata*).

#### **2.5.10. Fisheries Resources**

**Fish, Crustaceans, and Mollusks.** Mobile Bay supports a varied mix of commercially and recreationally important species of finfish and shrimp. These species are present in Mobile Bay during part or all of their life cycle. In 1996, the American Sportfishing Association (ASA) reported that recreational fishing in Alabama is a major industry. Common recreational fishes that could be targeted in Mobile Bay, as well as in the project area, include red drum (redfish), spotted sea trout, mullet, and flounder. Bay anglers generally fish from private boats, beaches, piers, and jetties, whereas offshore anglers tend to focus on a few naturally occurring sites such as rock piles and topographic highs.

Land access to the shoreline of the project area is somewhat limited by expansive wetland complexes and upland land uses such as industry and private property. The large expanses of wetland do not allow shore anglers to reach open water to fish. Sediments along the shoreline are somewhat soft and do not allow for anglers to wade-fish.

Along the eastern shore, shoreline fishing is most likely limited by the industrial activities and the limited access due to private property. Considering the substantial amount of industrial activity in the project area, recreational anglers in boats would most likely have to stay near the shorelines to avoid boat traffic and the necessity to relocate often.

**Red Drum.** The red drum is common in the Mobile Bay area (Nelson, 1992). This species is overfished throughout the Gulf and is managed by the GMFMC. Stringent catch restrictions are in place to control the level of commercial and recreational red drum catch. Red drum are heavily exploited, beginning as late juveniles, by the recreational fishery in the Mobile Bay area. The work by Van Hoose (1987) indicates that in creel surveys, the smallest red drum (7.9 to 11.8 inches total length) occurred in June and were a result of the previous fall's spawn. By their second spring, most red drum disappeared from the inshore anglers' catches in Alabama (Van Hoose, 1987). At this age, the fish are moving to offshore waters.



Adult red drum are found in Gulf waters off the Mobile Bay area and likely spawn from mid-August to early October (Van Hoose, 1987). Comyns et al. (1991) observed spawning dates for red drum in Louisiana, Mississippi, and Alabama coastal waters that ranged from August 21 to November 2, with peak spawning in September. Reports of red drum eggs and larvae in the Mobile Bay area are scarce in the literature. Holt, Godbout, and Arnold (1981) determined that the best conditions for hatching and early larval survival were at 30 ppt salinity and 77° F. Eggs were found to sink at salinities below 25 ppt.

Larvae were found in samples collected in Mobile Bay at 3 to 4 mm standard length (Van Hoose, 1987). The literature suggests that larval red drum appear in September around Dauphin Island (Eckmayer et al., 1982) and in October in the Bay Channel (Williams, 1983).

Habitat preferences for red drum postlarvae and early juveniles are unclear, in that two stations where they were collected had similar bottom types but dissimilar shorelines, and both were adjacent to strong tidal flows (Van Hoose, 1987). Greatest postlarval catch per unit effort occurred at the Dauphin Island area from mid-September to mid-October. Van Hoose reports that postlarvae were present at salinities ranging from 8 to 31 ppt, that temperatures ranged from 66°F to 88°F, and that early juveniles were captured primarily in March.

***Shrimp Fishery, Life History, and Habitat in Mobile Bay.*** Shrimp have been the single most important commercial fishery species group in Alabama, in both quantity and value (Swingle, 1971), accounting for 85 to 95% of the total value of the fishery. Commercial shrimp catches in Alabama have been composed of 87% brown, 10% white, and 3% pink and royal red (Swingle, 1971). In 1999, the shrimp fishery in Alabama had a combined value of nearly \$17 million. Brown shrimp dominate the shrimp fishery in early summer, white shrimp in the fall, and pink shrimp are taken in the early spring along with browns and whites from the previous year. Most shrimp trawling takes place in the lower bay and coastal waters (Chemock, 1974).

A general summary of the life history and environmental tolerances for these three species of shrimp is provided by Pattillo et al. (1997). All three shrimp species spawn offshore in the Gulf. Shrimp postlarvae migrate into the bay where they concentrate in shallow vegetated marsh habitat. As they grow, they move into the deeper portions of the bay before migrating out into the Gulf waters to spawn. The results of the fish stock assessment suggests key bay areas for postlarval abundance are marshes at the western mouth of Mobile Bay (eastern Mississippi Sound); Weeks Bay; the eastern mouth of the GIWW, and the marshes associated with tributaries on the western shore of the bay. A limiting factor for all three species in Mobile Bay is the availability of shallow marsh edge vegetated habitat.

**Brown Shrimp.** Adult brown shrimp are the most abundant and commercially valued shrimp fishery in Mobile Bay (Swingle, 1971). Landing statistics of brown shrimp from the Alabama Gulf of Mexico, Alabama reaches of Mississippi Sounds, and Bon Secour Bay during the period of 2013 through 2016 has been reported by the ADCNR, MRD (2018) as over 15.5 million pounds and valued at a gross dock-side value of over \$38 million over that time period. They occur in Mobile Bay from April to November, peaking in May. They occur most frequently in shallow vegetated areas, in water <3 ft in depth. They have a high affinity for vegetated habitat (Howe et al., 1999). Brown shrimp have been taken from salinities of 0.2 to >30 ppt in Mobile Bay but are most abundant in the bay at 2 to 20 ppt (Swingle, 1971).

The peak spawning period for brown shrimp occurs in December and January. Postlarvae and juveniles first appear in Mobile Bay in late March and early April (Swingle, 1971). Immigration of postlarvae may occur from February to October, with a peak in April (Swingle, 1971). The greatest concentration of juvenile brown shrimp is found in the western portion of the bay, perhaps because it is shallower than the eastern portion. They inhabit shallow bay waters, and are most abundant at <10 ft of water. The preferred habitat is select shallow, vegetated areas.

**White Shrimp.** The adult white shrimp occur in Mobile Bay from June to late November, reaching a maximum abundance in July and August. These commercially valuable shrimp are harvested from the Alabama waters in the Gulf of Mexico, Mobile and Bon Secour Bays, and Mississippi Sound. The ADNCR, MRD indicates the white shrimp harvest in these areas from 2013 through 2016 consists of approximately 6.9 million pounds with a dock-side value of about \$19.8 million.

White shrimp have been recorded in Mobile Bay waters with salinities ranging from 1.3 to >30 ppt, with the highest quantity occurring when salinities are 25 to 29 ppt (Swingle, 1971). Adults are much more abundant in the western than the eastern portion of the bay and also in the northern than the southern portion. The post-larvae and juveniles are most often found in <2 ft of water. They are most abundant in areas of high quantities of organic detritus and have a high affinity for vegetated habitat. Their abundance at the marsh edge was described by an observer as “thousands in a band no more than 6 ft wide along the edge.” This species is generally considered to be more tolerant of sudden salinity changes than the brown shrimp (Pattillo et al., 1997). From September through November, they move to the deeper parts of bay. Emigration of white shrimp into the Gulf begins in August and continues through October, with a peak in September. The Swingle (1971) study found peak abundance of white shrimp in Alabama estuaries at salinities of 15 to 29.9 ppt.

**Pink Shrimp.** Adults occur in Mobile Bay in highest numbers from October to May. They occur most frequently in the lower portion of the bay. They typically occur in waters

with salinities >10 ppt (Swingle, 1971). The postlarvae and juveniles have a high affinity for vegetated habitat.

**Oyster.** Oyster harvesting is an active industry in Mobile Bay. The oyster reefs have progressively migrated down-bay, with most occurring near the Gulf at the lower end of Mobile Bay. According to a 1995 survey of reefs south of the East Fowl River, the reef area at Cedar Point was nearly twice that found in 1968 (Mobile Bay National Estuary Program, 2002a). A study conducted in 2002 in the upper Mobile Bay surrounding the Garrows Bend area has indicated that most of that area is permanently closed to oyster harvesting (Mobile Bay National Estuary Program, 2002a). According the ADNCR, MRD, the oyster harvest in Mobile and Bon Secour Bays and the Alabama portion of Mississippi Sound for the period of 2013 through 2016 was reported at just over 274,000 pounds of shucked oysters which translates to an approximate dock-side value of over \$2.1 million.

**Blue Crab.** Adults, juveniles, and larvae are highly abundant in Mobile Bay (Pattillo et al. 1997; Nelson, 1992). Blue crabs are euryhaline and have been found from freshwater to hypersaline lagoons (0 to 50 ppt). Typically, juveniles are found in lower-salinity waters (2 to 21 ppt). Adult males are usually found in waters with salinities less than 10 ppt, whereas egg-bearing females are found in 23- to 33 ppt salinity and 19 to 29° C waters. The interaction of salinity and temperature reveals the blue crab to be less tolerant of low salinities at high temperatures and high salinities at low temperatures. Mating of the blue crab occurs in the bay (Pattillo et al., 1997). Blue crab mate and ovulate in spring and summer in the bay estuary. Juvenile crabs can be found congregating in channels and marine and brackish marshes along the bay throughout the year. They prefer soft mud substrate sediment and low salinity. Marketable size is reached in about 1 year. Blue crab are widely distributed throughout Mobile Bay.

As a commercially valuable species, the ADNCR, MRD has indicated that between 2013 and 2016 approximately 4.9 million pounds of crabs have been harvested from the Alabama waters in the Gulf of Mexico, Mobile and Bon Secour Bays, and Mississippi Sound. The harvest during this time period represents a gross dock-side value of about \$4.8 million.

**Striped Mullet.** Striped mullet live in a wide range of habitats and depths depending on life stage, season, and location. This species is one of the most abundant fishes in shallow Gulf waters and often has the highest biomass. It is most abundant in waters near-shore, occupying virtually all shallow marine and estuarine habitats including open beaches, flats, lagoons, bays, rivers, salt marshes, and grass beds.

In Mobile Bay, striped mullet adults, juveniles, and larvae are abundant (Pattillo et al., 1997). Spawning begins in October to mid-November and lasts until March. Ripe adults

collect in large schools and migrate offshore. Spent adults usually return in about 10 days. Spawning takes place in the offshore marine waters of the Gulf over a broad area of the continental shelf. Pre-juveniles, juveniles, and adults are nektonic and form schools ranging from a few individuals up to several hundred. Pre-juveniles enter bays and estuaries to mature. This occurs from November to June after they have reached 15 to 32 mm in total length, with the highest occurrence from December to February. Juvenile and adult feeding preferences include organic detritus, diatoms, filamentous algae, organic matter, benthic organisms, plant tissue, foraminifera, and plankton of correct particle size, but they have also been observed with fish scales, sponge spicules, and minute gastropods in their stomach contents.

The mullet are a commercially valuable species harvested in the Alabama waters in the Gulf of Mexico, Mobile and Bon Secour Bays, and Mississippi Sound. Included with harvesting of other finfish species, statistics collected by the ADNCR, MRD indicates that for the years of 2013 through 2016 the total harvest of finfish from Alabama waters yields approximately 20.1 million pounds. This represents a gross dock-side value of about \$18.5 million.

#### **2.5.11. Invasive Species.**

Invasive species in Mobile Bay include both plant and animal species. Currently, the Eurasian watermilfoil, water hyacinth (*Eichhornia crassipes*), nutria (*Myocastor coypus*), and cattle egrets (*Bubulcus ibis*) are known invasive species. The plant species (Eurasian watermilfoil and water hyacinth) in some instances have clogged some area waterways, altering hydrology and navigation, while also crowding out native submerged and emergent aquatic vegetation. The nutria, an exotic estuarine rodent, is responsible for the destruction of large areas of marsh vegetation in the Mobile Bay estuary. Cattle egrets directly compete with native wading birds for nesting habitat (Mobile Bay National Estuary Program, 2002b).

Eurasian watermilfoil, a submerged aquatic weed native to Europe, Asia, and northern Africa, has spread rapidly throughout the U.S. Watermilfoil invades lakes, ponds, and reservoirs and is especially troublesome in nutrient-rich waters with high motorboat use. Watermilfoil has been spread inadvertently throughout the country by anglers and aquarium dealers. The plant disperses primarily by vegetative propagation through stem fragmentation. Due to its unique growth habits, watermilfoil competes aggressively with native aquatic plants. Soon after becoming established at a new site, it quickly forms an extensive root system. In the early spring, the species begins to grow well before native species. Later in the season, watermilfoil forms a dense canopy that overtops and shades out existing vegetation. The plant's ability to grow in eutrophic conditions and over a broad temperature range also contributes to its competitive edge over native plants. In the Mobile-Tensaw River Delta of Alabama, watermilfoil has displaced populations of native eelgrass and southern naiad (Westbrooks, 1998).

The water hyacinth was probably introduced from South America into the U.S. at the World's Industrial and Cotton Centennial Exposition of 1884-1885 in New Orleans. Substantial environmental harm can result from large water hyacinth populations, e.g., degraded water quality and drastic changes in plant and animal communities. Light and oxygen diffusion are severely curtailed by this floating plant, and water movement can be reduced by 40 to 95%. In addition, spawning areas for fishes are reduced by water hyacinth mats. Once the plant dies, the large masses shade out benthic communities and can nearly block the diffusion of oxygen through the water-atmosphere interface. Low oxygen concentrations underneath water hyacinth mats have been implicated in fish kills (University of Florida, 2002a).

The nutria occurs generally in temperate South America and is now widely dispersed in the U.S. and Western Europe. The nutria is a large rodent, almost equal in size to a beaver. It measures up to 40 inches in total length. The first nutria are said to have been released in the Louisiana marshes in the early 1930s near New Orleans to destroy objectionable aquatic plants. As a biological agent in the control of aquatic plants, nutria have been vastly overrated. Typically, they eat vegetation that humans do not want controlled, passing up water hyacinths, alligator weed (*Alternanthera philoxeroides*), coontail (*Ceratophyllum demersum*), bladderwort (*Utricularia* sp.), and other plants that they were introduced to destroy (Lowery, 1974).

Overall invasive species management priorities in Alabama include water hyacinth, as well as the plants hydrilla (*Hydrilla verticillata*) and giant salvinia (*Salvinia molesta*), and the animals bighead carp (*Hypophthalmichthys nobilis*) and spotted jellyfish (*Phyllorhiza punctata*) (EPA, 2000).

#### **2.5.12. Air Quality.**

Ambient air quality is determined by the type and amount (concentration) of pollutants emitted into the atmosphere, the size and topography of the air basin in question, and the prevailing meteorological conditions in that air basin. Through its passage of the Clean Air Act of 1970 (CAA) and its amendments, Congress has mandated the protection and enhancement of our Nation's air quality. The EPA has established the National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants to protect the public health and welfare: sulfur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM) whose particles are less than or equal to 10 micrometers (PM<sub>10</sub>), particulate matter whose particles are less than or equal to 2.5 micrometers (PM<sub>2.5</sub>), carbon monoxide (CO), and lead (Pb). The State of Alabama adopted the NAAQS as the state ambient air standards (ADEM 2017a).

The description of the criteria pollutants and their effects on public health and welfare and the NAAQS are detailed in Section 2.12, Appendix C. The primary NAAQS were promulgated to protect public health, and the secondary NAAQS were promulgated to



protect public welfare (e.g., visibility, crops, forests, soils and materials) from any known or anticipated adverse effects of air pollutants.

Since the localized air quality condition can be correlated with the close proximity of major emission sources, sensitive receptors (e.g., individuals with respiratory conditions) that are close to major emission sources generally tend to have more air quality concerns than those located far from emission sources.

Mobile Harbor's operational activities are mostly associated with mobile source operations conducted around port terminals and River Channels within a relatively large geographic area. The air quality impact analysis selected for this SEIS purpose estimates emissions that occur from operational activities under both baseline 2011 conditions and the future 2035 No Action and Action Alternatives. The sources of criteria pollutant emissions evaluated include those identified within Mobile Harbor such as:

- Stationary sources
  - : terminal exhaust stacks and coal transport operations
- Mobile sources:
  - Drayage, cargo handling equipment, and on-terminal activities
  - Harbor craft
  - Ocean going vessels including
  - Ships at terminal
  - Ships underway along the channels
  - Roadway vehicles including trucks in and out of the port
  - Railroad and railyard

The areas around Mobile Harbor are considered in attainment for all criteria pollutants. When emissions associated with a Federal action would occur in areas that are in attainment, the CAA general conformity rule is not applicable, but NEPA and its implementing regulations require analysis of the significance of air quality impacts from these sources. However, neither NEPA nor its implementing regulations have established de minimis emission thresholds to determine potential significance of air quality impacts in attainment areas on a local level as compared to an area that is nonattainment.

### **2.5.13. Hazardous and Toxic Materials**

Hazardous substances, including hazardous waste, are defined as any substance or material that has been determined to be capable of posing an unreasonable risk to health, safety, and property. Hazardous waste is listed under the Resource Conservation and Recovery Act (RCRA), meeting certain characteristics relating ignitability, corrosivity, reactivity, or toxicity.



Hazardous materials and management of these materials are regulated under a variety of Federal laws including the Occupational Safety and Health Administration (OSHA) standards, the Emergency Planning and Community Right to Know Act (EPCRA), and the Toxic Substances Control Act along with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The USACE adheres to these requirements. Under EPCRA regulations 40 CFR 355, facilities that have any extremely hazardous substances present in quantities above the threshold planning quantity, are required to provide reporting information to state and local emergency agencies, and local fire department. Inventory reporting to the indicated emergency response parties is required for facilities with greater than the threshold planning quantity of any extremely hazardous substances or greater than 10,000 pounds of any OSHA regulated hazardous material. EPCRA also requires inventory reporting for all releases and discharges of certain toxic chemicals. Dredged material is excluded from RCRA and regulated under the CWA and MPRSA.

The Mobile Harbor Federal Navigation Channel, itself, does not generate hazardous materials; however, approximately 10 terminals currently handle coal, petroleum products, and containerized hazardous materials. The petroleum products are considered hazardous with respect to human and ecological health. These operations are regulated such that the risk of spills or other releases are minimized. Additionally, large vessels have fuel and other lubricants on board while traveling in the channel. The two dredges used in the channel for routine maintenance dredging would also have these supplies on board. Unless there is an unavoidable accident or other unforeseeable conditions, the transportation of hazardous materials and petroleum products should not harm human health or the environment.

#### **2.5.14. Noise.**

Noise sources in the project area include: (1) air noise (which can impact humans and marine and coastal birds) and (2) underwater noise (which can impact fish, marine mammals, and sea turtles). Air noise is measured in sound pressure units called decibels (dB). Underwater noise is also measured in dB and then compared to a fixed reference level. Noise levels continuously vary with location and time. In general, noise levels are high around major transportation corridors along highways, railways, airports, industrial facilities, and construction activities. Sound from a source spreads out as it travels from the source, and the sound pressure level diminishes with distance. In addition to distance attenuation, the air absorbs sound energy; atmospheric effects (wind, temperature, precipitation) and terrain/vegetation effects also influence sound propagation and attenuation over distance from the source. An individual's sound exposure is determined by measurement of the noise that the individual experiences over a specified time interval. A detailed discussion of noise regulations, sound levels, and standards are included in Section 2.14, Appendix C.

**Airborne Noise.** The area surrounding the project site consists of conditions ranging from a highly populated urban area, to a heavily industrial area to unpopulated open water in Mobile Bay. The locations of potential noise sensitive receptors were assessed using a 0.5 mile buffer from the center of the proposed channel modifications. These sensitive receptors included National Register of Historic Properties, schools, churches and hospitals. The web-based search yielded 4 churches, 3 schools and 17 historic properties along the length of the channel. All but two of these are located in the vicinity of the I-10 tunnels under Mobile Bay (NEPAssist 2018).

Sound is measured in units of decibels (dB). Sound level measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel (dBA). A noise change of 3 dBA or less is not normally detectable by the average human ear. An increase of 5 dBA is generally not readily noticeable by anyone, and a 10 dBA increase is usually felt to be "twice as loud" as before. Existing noise levels in the project area where sensitive receptors are located are already relatively high ranging from 56 to 85 dBA (2. USACE 2003, 3. FHWA and ALDOT 2014). Airborne noise levels in the portions of the channel in open water would be very low and there are no sensitive receptors located in these stretches. Therefore, changes to airborne noise levels in the open water areas are not analyzed further in this SEIS.

Road traffic noise is not usually a serious problem for people who live more than 500 ft from heavily traveled freeways or more than 100 to 200 ft from lightly traveled roads (6. Federal Highway Administration 2011). Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic would result in a 3 dBA increase in noise levels, which in and of itself would not normally be a perceivable noise increase.

The level of construction noise is dependent upon the nature and duration of the project, and the type of construction equipment used. Construction activities for most large-scale projects would be expected to result in increased noise levels as a result of the operation of construction equipment onsite and the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the surrounding roadways. Noise levels associated with construction activities will increase ambient noise levels adjacent to the construction site and along roadways used by construction-related vehicles. Construction noise is generally temporary and intermittent in nature as it generally only occurs on weekdays during daylight hours, which minimizes the impact to sensitive receptors (residences or other developed sites where frequent human use occurs such as churches and schools).

**Underwater Noise.** Underwater (waterborne) sound measurements are different from airborne sound measurements. When underwater objects vibrate, they create sound-

pressure waves that alternately compress and decompress the water molecules as the sound wave travels through the water. Because of the differences in reference standards, noise levels for air do not equal underwater levels.

As noted above, sound levels are referenced to a standard pressure at a standard distance. The reference level used in air (20  $\mu\text{Pa}$  at 1m) was selected to match human hearing sensitivity. A different reference is used for underwater sound: 1 $\mu\text{Pa}$  at 1m.

The mechanical properties of water differ from those of air and, as a result, sound moves at a faster speed in water than in air. Temperature also affects the speed of sound, which travels faster in warm water than in cold water.

Sound is the only form of energy that travels efficiently through water. For instance, radio and other electromagnetic waves are attenuated in water at a much greater degree than sound. The different medium also affects the rate at which sound energy is lost. In general, shallow water areas experience a higher transmission loss than deep water areas, especially when sound-absorbing, soft bottom material is present. However, in areas with a highly reflective bottom such as hard rock, the transmission loss may be less than in deep water. Low-frequency sounds travel farther than high-frequency ones. There are many sources of underwater noise, including physical phenomena (e.g., waves and wind); biological activity (marine mammals); and human actions (e.g., vessel traffic, shoreline industrial activities).

#### **2.5.15. Coastal Barrier Resources**

The Coastal Barrier Resources Act of 1982 (CBRA)(PL 97-348) restricts Federal expenditures and financial assistance within designated CBRA zones in the Gulf and Atlantic Coasts. There are no designated CBRA zones within the project area and will not be considered further under this study.

#### **2.5.16. Cultural and Historic Resources**

Cultural resources is a broad term encompassing all aspects of human culture, both tangible and intangible. More specifically the National Historic Preservation Act (NHPA) has defined historic properties as prehistoric and historic archaeological sites, structures, buildings, districts, objects or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Several Federal laws and regulations protect these resources, including the NHPA of 1966, the Archaeological and Historic Preservation Act of 1974, the American Indian Religious Freedom Act of 1978, the Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990.

Section 106 of the NHPA and its implementing regulations, 36 CFR Part 800, require an assessment of the potential impact of an undertaking on historic properties that are within the proposed project's Area of Potential Effect (APE), which is defined as the geographic area(s) "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." The APE for the project area includes the area where dredging activities and the placement of dredged material would occur.

Documentation of historic/cultural resources is important for this project because Mobile Harbor provides an environment that is rich in prehistoric and historic human activity, and its geological setting is characterized by sediment types that are known for preserving shipwrecks and their contents. In addition to submerged resources such as prehistoric landforms that were well suited for human occupation when sea levels were lower, as well as historic resources such as shipwrecks, there are a number of terrestrial archaeological sites and historic buildings and structures in Mobile Bay or along the shoreline. The shoreline structures include historic structures such as the National Register listed Forts Morgan and Gaines; structures in the bay include the National Register listed Middle Bay Lighthouse and historic Sand Island Lighthouse. An extensive discussion of the prehistory and history as well as known cultural resources within and near the proposed project's APE is included in detail in Section 2.16, Appendix C.

#### **2.5.17. Protected Managed Lands and Resources**

According to the ADCNR, Alabama is home to 11 national wildlife refuges that represent a cross-section of Alabama's diverse natural environment as well as state and private managed areas. Alabama's protected lands and resources encompass the beaches and estuaries of the Gulf Coast, the waters of the Tennessee River, and the swamps and wetlands along the Tombigbee River. The ADCNR is the state agency responsible for the conservation and management of Alabama's natural resources, including state parks, state lands, wildlife, and aquatic resources.

**Gulf State Park.** The Gulf State Park is a public recreation area on the Gulf of Mexico in the city of Gulf Shores in southern Baldwin County. The park's 6,500 acres mostly encompass the land just north of the Gulf Shores beach community, between State Highways 59 and 161 and extending south to a wide beach area. The park also includes marshland, boggy tea-colored streams, pine forests, and three spring-fed, fresh-water lakes: Lake Shelby (750 acres); Middle Lake; and, Little Lake (Ress, 2012). The park is managed by the ADCNR, with park enforcement rangers providing around-the-clock security and enforcing anti-littering regulations.

**Weeks Bay National Estuarine Reserve.** This Reserve is a field research facility along the Weeks Bay estuary, about 6,000 acres in size. The reserve area receives freshwater from the Magnolia and Fish Rivers, and drains a watershed of about 127,000 acres into

the portion of Mobile Bay via a narrow opening. This sub-estuary of Mobile Bay averages just 4.8 ft deep and provides rich and diverse habitats for a variety of fish, crustaceans and shellfish, as well as many unique and rare plants fringed with marsh and swamp habitats. The reserve lands also include upland and bottomland hardwood forests, freshwater marsh, SAV, and unique bog habitats. Weeks Bay is a critical nursery for shrimp, bay anchovy, blue crab and multitudes of other fish, crustaceans and shellfish that support robust commercial fisheries providing \$450 million/year for Alabama. The Weeks Bay Interpretive Center offers the public opportunities to learn about coastal habitats through its exhibit, live animals displays and collections of animals and regional plants. Self-guiding nature trails wind through wetlands, marshes, bogs and forests.

**Grand Bay National Wildlife Refuge (NWR).** This refuge falls within the borders of both Alabama and neighboring Mississippi along the Gulf Coast. The 10,188-acre reserve is part of the Federal Gulf Coast National Wildlife Refuge (NWR) Complex. The refuge was established in 1992 to protect one of the largest remaining expanses of wet pine savanna habitat consisting of a complex of wet pine savanna, maritime forest, tidal wetlands, salt marshes bays, and bayous. Protected species that inhabit the refuge include the threatened gopher tortoise, the endangered red-cockaded woodpecker, and the endangered brown pelican.

**Bon Secour NWR.** The Reserve is located on the Morgan peninsula about 10 miles west of the city of Gulf Shores in Baldwin County. Approximately 7,000 acres the refuge consists of beaches, dunes, saltwater marshes, freshwater swamps, and scrubland. Established in 1980, the goal of the refuge is for preserving coastal habitat for migratory song birds. The refuge lies directly on the migration path for many of these birds who use the refuge as a stopping point on their fall migration before they begin the long flight to the Caribbean and Central and South America. Bon Secour is considered one of the last remaining natural patches of coastal habitat among the coastal areas and thus vital for the survival of migratory birds. Coyotes, red foxes, American alligators, armadillos, and more than 370 species of birds have been sighted at the refuge. The refuge contains nesting habitat for the endangered Alabama beach mouse and loggerhead and Kemp's Ridley sea turtles. Other protected habitats within the refuge include beaches and sand dunes, scrub forest, fresh and saltwater marshes, fresh water swamps, and upland.

**Meaher State Park.** Meaher State Park is a publicly owned recreation area located on Big Island in the north end of Mobile Bay lying within the city limits of Spanish Fort. The state park occupies 1,327 acres along the bay shoreline at the junction of Mobile Bay and the Mobile-Tensaw River Delta (Ress, 2012) and is surrounded by wetlands of the Mobile Bay estuary. The park is accessed from the U.S. Highways 90/98 causeway and is managed by the ADCNR.

**Historic Blakeley State Park.** Located on the site of the former town of Blakeley, Historic Blakeley State Park is on the Tensaw River. The park encompasses an area once



occupied by settlers in what was a thriving community on the river. Later, Confederate soldiers were garrisoned here and fought in the last major battle of the U.S. Civil War against superior Union forces. The park was founded by school teacher Mary Grice, of Mobile, Alabama. In 1976 the park was established as a private not-for-profit foundation. The goal was to preserve and redevelop the area. In 1981, the Alabama Legislature named Blakeley a state park and created a separate state authority to oversee operations. Although it is called a state park, it is not operated by the ADCNR. State funding was suspended during 2011, and the park is now fully funded by private contributions and gate receipts.

### **2.5.18. Aesthetics and Recreation**

Coastal-based tourism and recreation account for a significant portion of Alabama's tourism and recreation industry. Opportunities for recreation include arts and entertainment, boating, golfing, sightseeing, picnicking, swimming, bird watching, and fishing. For land lovers, Mobile and Baldwin Counties also offer plenty to do away from the water, including cultural, historic, educational and family-friendly attractions. Visitors can enjoy outdoor activities such as fishing and swimming in waters of the Gulf of Mexico in the beach towns of Gulf Shores, Orange Beach, and Fort Morgan, and Dauphin Island as well as several historic places.

Alabama has a rich history and diversity of freshwater, inshore, and saltwater sport fishing opportunities within its extensive rivers systems, farm ponds and the inshore and offshore waters of the Gulf of Mexico. According the ADCNR, the State contains 47 reservoirs larger than 500 acres that cover an area of 551,220 acres, 23 Alabama State Public Fishing Lakes, and 77,000 miles of perennial rivers, streams and the Mobile-Tensaw River Delta as well as over 60 miles of shoreline along the Gulf Coast that provide fresh and saltwater fishing opportunity. Alabama supports 11 million angler fishing days with expenditures of three-quarters of a billion dollars. There is excellent access to the inshore waters of Mobile Bay and offshore waters of the Gulf of Mexico from Mobile and Perdido Bay. Inshore and estuarial fishing opportunities are extensive in both upper and lower Mobile Bay, but extend from Grand Bay in the Mississippi Sound on the West to the western shores of Perdido Bay near Orange Beach, Alabama. Numerous local, regional and national fishing tournaments take place throughout the State every year.

As described by Douglass (2009), the Alabama coastline stretches 60 miles and is home to beaches along the Gulf and provides quality of life for many Alabamians. It also plays a major role in the State's economy as well as being recognized as valuable environmental asset. The beaches of the coastal towns of Orange Beach, Gulf Shores, and Dauphin Island are popular instate vacation destinations for out-of-state visitors and are top tourist destinations. The beach tourism industry in south Baldwin County provides more than 50,000 jobs and generates more than \$2 billion in revenue annually, and beaches are the linchpin of that industry (Douglass, 2009). The coastal bays, rivers, and



bayous tidal shoreline that borders all of the Mobile and Baldwin counties extends another 600 miles, with the shoreline around Mobile Bay accounting for about 100 of those miles (Douglass, 2009). Today, Alabama's coastal beaches remain a major tourist attraction as well as a lifestyle staple for Alabama residents (ADEM, 2017). Alabama has approximately 50 miles of Gulf beach and an estimated 65 to 70 miles of bay beaches where the adjacent waters are classified for swimming under the State's Water Use Classification System (ADEM, 2017)

Ecotourism, one of the largest industries in Alabama, has been identified globally as one of the few industries that can actually have a positive impact on the area. The potential market for ecotourism is significant. Worldwide, ecotourism is experiencing a 5% annual growth rate and it represents 6% of the world gross domestic product (Alabama Communities in Transition (ACTION), 2006). In addition to Mobile Bay and adjacent inshore and nearshore waters including the Gulf beaches, approximately 77,000 miles of rivers and streams, 50,000 small impoundments and 42 large reservoirs are found within our state boundaries. These abundant water resources provide a wide range of environments that harbor the most diverse aquatic fauna of any state in North America featuring a range of activities such as hiking, road and mountain biking, canoeing, kayaking, horseback riding, camping, wildlife watching, sail and power boating, hunting, and fishing (ACTION, 2006). The "5 Rivers – Alabama's Delta Resource Center" is a facility of the ADCNR State Lands Division and home of the Coastal Section offices. It provides public access to over 250,000 acres that comprise part of the Mobile-Tensaw River Delta.

Alabama's Gulf Coast has several historic places worth visiting, including Civil War-era Fort Morgan, near Gulf Shores, and Fort Gaines on Dauphin Island. Fort Conde, in downtown Mobile, is a replica of an 18th century French Fort. Battleship Memorial Park in Mobile includes the USS Alabama, one of the most decorated World War II battleships in America; the USS Drum, which is America's oldest submarine on display; and numerous combat planes.

#### **2.5.19. Socioeconomics**

This section provides an overview of the existing socioeconomic conditions within the project area. Components of socioeconomic resources that are analyzed include population, employment, and income. The Region of Interest (ROI) encompasses Alabama's two southernmost coastal counties - Mobile and Baldwin Counties. It includes the developed urban area of the City of Mobile, the maritime facilities, and residential areas along the east and west banks of the Mobile River and Mobile Bay which are immediately adjacent to the navigation channel.

Mobile and Baldwin counties form the economic ROI, which is the geographic area in which the predominant social and economic impacts of the Proposed Action are likely to

occur. Mobile County is geographically smaller than Baldwin County, but has almost double its population. Together, the counties cover a land area of 2,819 square miles (USCB 2017). Mobile County includes the City of Mobile, which is the largest city in the region. Other cities in the Region of Interest (ROI) with more than 10,000 residents are Prichard, Saraland, Foley, Daphne, and Fairhope (TWT 2017).

In 2014, the total economic value of the marine cargo and vessel activity at Mobile Harbor including the revenue and value added at each stage of moving an export to the port or an import from the marine terminals was estimated at nearly \$24.8 billion. In the state of Alabama, 149,432 jobs were in some way related to the cargo and vessel activity at the public and private marine terminals at Mobile Harbor.

The 2016 estimated population of Mobile County was 414,291 (USCB 2016). Population in the county is stable. Between 1990 and 2016, the population increased by 9.4 percent, yielding an average annual growth rate of 0.6 percent. The 2016 estimated population of Baldwin County was 199,510 (USCB 2016). Population in the county exhibits strong growth. Between 1990 and 2016, the population increased by 103.0 percent, yielding an average annual growth rate of 6.4 percent. Total employment in Mobile County in 2016 was 236,901 (BEA 2017) and 107,334 in Baldwin County, Alabama.

Additional detailed information on Regional Economic Activity, Population, Employment and Income concerning the socioeconomics of the ROI is included in Section 2.19.2, Appendix C.

### **2.5.20. Transportation**

An overview of existing transportation resources within the project area is included in detail in Section 2.20, Appendix C. Components of transportation resources that are analyzed include roads, traffic, railroads, and airports

I-10 is the most southern major highway connector in the U.S.; it travels in an east-west direction, linking Florida to California. In the southeastern U.S., I-10 stretches from Jacksonville, Florida, to Houston, Texas, covering a majority of the coastline of the Gulf of Mexico. Along the Gulf, major seaports, including Pensacola, Florida; Mobile, Alabama; Gulfport, Mississippi; New Orleans, Louisiana; and Houston, Texas, are linked. Mobile is located at approximately the halfway point between Houston, Texas, and Jacksonville, Florida. I-10 in the vicinity of Mobile Harbor is a multi-lane (6 to 8 lanes), divided interstate level highway with controlled access. The speed limit is signed for 65 to 70 miles per hour (mph) (USACE 2003).

To the west of the harbor, I-10 has numerous interchanges with the Mobile Central Business District (CBD) and then crosses under the Mobile River by means of the Wallace

Tunnels, a four-lane facility. Hazardous truck cargoes must bypass the tunnels by exiting at Water Street and detouring to cross the Mobile River via the Cochrane-Africatown Bridge to the north. I-10 then crosses the Mobile Bay by the four-lane I-10 Bayway to the Eastern Shore (Daphne in Baldwin County) and continues east to Florida. Direct access for Mobile Harbor to I-10 and its connecting network can be made by Broad Street and Virginia Street to their interchanges with I-10. A variety of other surface streets provide access to the harbor including Old Water Street, Water Street and State Docks Road (Google Earth 2018a). Currently, Broad Street and Virginia Street are two-lane roadways between the harbor and I-10.

Rail transportation includes public terminals around Mobile Harbor that are connected to I-10 and I-65 and five Class I railroads- CSX, Canadian National, Burlington Northern Santa Fe (Alabama & Gulf Coast Railroad), Norfolk Southern, and Kansas City Southern. All-water, rail connections into Mexico's national railroad system is offered by C.G. Railway every four days between Mobile and Coatzacoalcos, Mexico (Alabama Department of Commerce 2016).

Air transportation consists of Mobile Downtown Airport, previously and locally known as Brookley Field, which is located approximately 2.75 miles southwest of the Choctaw Point Turning Basin. This facility is a former U.S. Air Force Base. The closing of Brookley Field was initiated in 1964, and the City of Mobile accepted ownership on July 3, 1969. Management of the facility was transferred to the Mobile Airport Authority in 1982. The facility is now managed by the Mobile Airport Authority as a public facility, with private aviation and non-aviation light industrial companies located on the property (USACE 2003). The airport currently also houses the Mobile Aeroplex at Brookley (Mobile Aeroplex at Brookley 2018). Mobile Regional Airport is the primary commercial passenger airport serving the Mobile area. It is located approximately 11 miles west of the Choctaw Point Turning Basin and does not have rail access. The primary highway routes between the harbor and the airport are I-10, I-65, and Airport Boulevard (Google Earth 2018b).

Public transportation includes services such as The Wave Transit System, which is funded by the City of Mobile, and is the largest fixed-route transit system in the region. It provides service within Mobile City limits, limited service into the City of Prichard to the north, and paratransit service, in accordance with the Federal Transit Authority mandated 0.75 mile radius to those who qualify, and neighborhood curb-to-curb service in predefined areas. Wave Transit operates a network of 14 fixed routes and one downtown circulator in Mobile. Some populations have a higher propensity to take public transit than the national average. These populations include the young, elderly, low income, those with no access to personal vehicles, and minorities. Downtown, northwest of downtown along I-165 into Prichard, and southwest along I-10 just north of the Brookley Aeroplex are the areas with the highest propensity for transit. These areas currently have

fixed route bus service from Routes 5, 9, 11, and 16 (SARCOR et al. 2014). These areas are also close to Mobile Harbor.

Less than one percent of the working population, ages 16 and older, use public transportation for their commute in Mobile and Mobile County. Of those without access to a vehicle, only 7.6% of individuals and 8.6% of individuals, respectively, use public transportation to commute.

### **2.5.21. Utilities and Infrastructure**

The existing infrastructure and utilities within the vicinity of the project area include roads, rail lines, airports, ports, electrical power sources, gas lines, water and sewer lines, and communications lines. More detail can be found in Section 2.21, Appendix C.

Alabama Power provides electrical service to Mobile County and parts of Baldwin County. Baldwin County EMC, and Rivera Utilities, and other area providers supply electrical service to parts of Baldwin County. Near the Choctaw Terminal, several large transmission lines occur along the boundary of the project site. These pole-supported lines extend adjacent to Baker Street and Yeend Street. The lines adjacent to Yeend Street conduct three-phase current, and are mounted on tall concrete poles. Wooden poles support the lines adjacent to Baker Street. Other electrical distribution lines extend across the northern end of the Choctaw Terminal, in various directions (USACE 2003). In Baldwin County, Alabama Power Company has substations, and 22KV, 44 KV 110KV transmission lines (Alabama Power 2018)

Natural gas is supplied throughout the project area by Spire (formerly Mobile Gas Service Corporation) (Mobile Area Chamber of Commerce 2018).

Mobile Area Water & Sewer System (MAWSS) provides drinking water and sanitary sewer service for the Mobile metropolitan area. Water is supplied from a reservoir, which is continually fed by groundwater, streams and rainfall. MAWSS has an alternative source of water to provide raw water for industrial use. Many area industries draw and treat water directly from the Tombigbee or Mobile rivers for industrial use (Mobile Area Chamber of Commerce 2018). Utilities, and other local providers, provide water and wastewater services to Baldwin County.

The EPA and the ADEM designated Mobile County as an owner/operator of a Phase II municipal separate storm sewer system (MS4). This necessitates Mobile County to develop a stormwater management program designed to protect water quality and to prevent harmful pollutants in stormwater runoff from entering the MS4 area. Stormwater runoff is rainfall that does not seep into the ground but runs off over developed areas. The runoff then enters the storm sewer system which flows directly into creeks, rivers, bays and the Gulf of Mexico (Mobile County 2018). Within the City of Mobile, the Storm

Drain and Heavy Equipment Section is responsible for all pipe laying and roadside ditches, cleaning catch basins and repairing erosion along the stormwater system. The Flood Control Section is responsible for maintaining storm water systems through chemical and mechanical mowing and for cleaning debris from the system to allow the free flow of storm water. The Dredging Section is responsible for removing sand and silt from the City's rivers, canals and creeks in the stormwater system (City of Mobile 2018).

BellSouth Telecommunications doing business as (dba) AT&T, Alabama and CenturyTel and Gulf Telephone, both dba CenturyLink are the Incumbent Local Exchange Carriers (ILECs) operating and providing services to customers located near Mobile Bay in Mobile and Baldwin counties. Other telecommunications providers in the Mobile area include Southern Light, Madison River Communications, Southern Telecom, Inc. dba Sotelco, MCI Communications Services, Inc. dba Verizon Business Services and ITC DeltaCom among others (Alabama Public Service Commission 2018). Cable television is provided by DIRECTV, Xfinity, AT&T U-verse TV, and Mediacom Cable among others (CableTV 2018).

Mobile Harbor provides significant oil and gas infrastructure. Oil and Natural Gas wells and platforms are located in Mobile Bay and in the Gulf of Mexico south of Dauphin Island. Petroleum refineries, natural gas processing plants, petroleum and natural gas pipelines, import/export terminals, electrical transmission lines and power plants are also prominently located in the Mobile area. More details are presented in Section 2.21, Appendix C.

### **2.5.22. Environmental Justice**

A summary overview of environmental justice (EJ) considerations within the project area is included here. However, due to the extensive analysis that was conducted for this subject matter, the detailed analysis for EJ is presented in Section 2.22, Appendix C. The components of EJ that are analyzed include minority and low-income populations.

EO 12898 (59 Federal Register [FR] 7629) directs Federal agencies to identify and address, as appropriate, potential disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Council on Environmental Quality (CEQ) has provided guidance for addressing environmental justice in *Environmental Justice: Guidance under the National Environmental Policy Act* (CEQ 1997).

In identifying minority and low-income populations, the following CEQ definitions of minority individuals and populations and low-income populations were used:



- *Minority individuals.* Individuals who identify themselves as members of the following population groups: American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, Black, Hispanic, or two or more races.
- *Minority populations.* Minority populations are identified where (1) the minority population of an affected area exceeds 50% or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. For the purposes of this analysis, “meaningfully greater” is defined as greater than 20% of the minority population percentage in the general population of the county.
- *Low-income populations.* Low-income populations in an affected area are identified with the annual statistical poverty thresholds from the Census Bureau’s Current Population Reports, Series P-60, on Income and Poverty. In this analysis, low-income populations are identified where (1) the population of an affected area exceeds 50% low-income based on the Census data or (2) the percentage of low-income population in the affected area is greater than 20% of the low-income population percentage in county.

According to CEQ guidance, U.S. Census data are typically used to determine minority and low-income population percentages in the affected area of a project in order to conduct a quantitative assessment of potential environmental justice impacts.

There are two components of consideration for potential environmental justice impacts: (1) whether the proposed action results in significant adverse health or environmental impacts; and, if so, (2) whether disproportionate adverse impacts would be experienced by minority or low-income populations, as compared to other parts of the population found within any of the communities in the Region of Interest (ROI). The ROI is the affected environment for the environmental justice analysis.

The project site is located in Mobile Harbor, at the junction of Mobile River with the head of Mobile Bay. The project area is located in Mobile County, but is adjacent to Baldwin County. Therefore, for this project, the ROI encompasses Mobile and Baldwin Counties. The geographic unit used in the analysis to identify any environmental justice communities of concern is the census block group.

For the purposes of this analysis, a census block group constitutes an environmental justice community if it contains 50% or more aggregate minority or low-income population (the “Fifty Percent” analysis), or 20% or more aggregate minority or low-income population than the county average in which the block group is located (the “meaningfully greater” analysis). The most conservative metric, yielding the greatest number of block groups, was used in the analysis. See Section 2.22, Appendix C for more information.



### **2.5.23. Public and Occupational Safety**

This section describes an overview of existing public health and safety related issues and the potential impacts associated with the No Action Alternative and the TSP. Public health issues include emergency response and preparedness to ensure project construction and operations do not pose a threat to public health and safety. Safety issues include occupational (worker) safety in compliance with the OSHA standards.

Workplace health and safety regulations are designed to eliminate personal injuries and illnesses from occurring in the workplace. These laws may comprise both Federal and state statutes. OSHA is the main organization protecting the health and safety of workers in the workplaces. The USACE has internal safety programs and processes designed to identify actions required for the control of hazards in all activities, operations and programs. It also establishes responsibilities for implementing OSHA and state requirements. There are several Federal safety regulations and requirements which apply to all USACE projects. These include:

- Comprehensive Environmental Response Compensation and Liability Act (CERCLA) 42 USC, 9601 et seq.)
- Superfund Amendments and Reauthorization Act (SARA) PL 99-499 (100 Stats. 1613)
- Resource Conservation and Recovery Act (RCRA; 42 USC, 6901 et seq.)
- Clean Water Act (CWA) (33 USC, 1251 et seq.)
- Hazardous Material Transportation Act (HMTA)
- Toxic Substances Control Act (TSCA) (15 USC, 2601 et seq.)
- Federal Regulations on Hazardous Waste Management (40 CFR, 260-279)
- Chemical Accident Prevention Provisions
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- Occupational Safety and Health Standards
- Spill Prevention Control and Countermeasures Plans (SPCC)
- Emergency Evacuation Plan

The USACE ensures that all regulations are followed and requirements are met during the course of a project.

The general project area considered in the evaluation of public and occupational safety includes 37 miles of channel and the area surrounding Mobile Harbor. Land use in the project area is urban, industrial, commercial and open water. Although residences are located in the area, no persons or businesses are currently located within the footprint of

the TSP dredging sites. The proposed dredging areas also do not include infrastructure such as roads, powerlines, water lines, or other utilities.

Public emergency services in the region include hospitals, law enforcement services, and fire protection services. There are four hospitals in the area (Mobile Infirmary, USA Medical Center, Springhill Medical Center, and Providence Hospital). Mobile Infirmary (2.5 mi) is the closest to Mobile Harbor. There are numerous occupational health clinics, a women's and children's hospital, infirmaries and doctor's offices located throughout Mobile. Medical and health resources are not located along the channel, but multiple options are available along both shores of Mobile Bay to the Gulf. Law enforcement in Mobile is provided by the Mobile Police force. Mobile County and Baldwin County both have Sheriff's Departments; and a number of smaller municipalities along the shores of the bay have police forces as well. The City of Mobile has a Fire and Rescue Department which includes first-responders. In addition, multiple fire departments are in the smaller municipalities along the shores of Mobile Bay, including volunteer fire departments in the less populated areas. The nearest fire station to ASPA Main Dock Complex of Mobile Harbor is located approximately 2 miles west of the facility. The Alabama Emergency Management Agency has the responsibility and authority to coordinate with state and local agencies in the event of a release of hazardous materials in association With-Project activities.

It is the USACE's policy that contractors have in place a site-specific health and safety plan prior to conducting construction activities at USACE controlled areas. The contractor site-specific health and safety plans address the hazards and controls as well as contractor coordination for various construction tasks. A health and safety plan would also be required for workers involved in the dredging projects.

The potential offsite consequences and emergency response plan are discussed with local emergency management agencies. Health hazards may also be associated with emissions and discharges from dredging machinery throughout the project area.

Hazardous wastes are not handled by the ASPA; additionally, hazardous materials would not be used during dredging operations. Limited quantities of petroleum products would be associated with dredging operations.

The ASPA has a Port-Wide Mass Notification System to alert ASPA employees, tenants, visitors and interested stakeholders in the event of an emergency within the Authority's seaport facilities. The system is designed to provide registrants alerts in the event of security incidents, hazardous chemical leaks, tornados and other severe weather (ASPA 2018). The system includes loudspeakers on the ASPA's Main Docks Complex, McDuffie Terminal, Pinto Terminal, Marine Liquid Bulk Terminal and Mobile Middle Bay Port. In high noise areas, strobe lights are used to signify a safety message. There are also LED signs throughout the port, which transmits security messages, etc (ASPA 2018).

Stakeholders outside of the Port's network can take advantage of the system by registering to be notified on land-line telephones or electronic devices. Up to 10,000 people can opt-in to be notified via text and email messages on iPhones, Androids and BlackBerry devices. The notification system keeps a record of who was notified and who responded. In order to opt-in to the notification system, it is necessary to register on the WebMsg website (ASPA 2018).

## **SECTION 3.0 PLAN FORMULATION**

### **3.1. Planning Strategy**

The USACE planning process follows a process defined in the U.S. Water Resources Council Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. This process, used for all planning studies conducted by the USACE, provides a structured approach to problem solving and provides a rational framework for sound decision making.

The USACE plan formulation process identifies existing and anticipated problems and opportunities to develop planning objectives. It then identifies and refines specific measures that could be combined to develop alternative plans that meet the planning objectives. These alternatives are then screened, analyzed, and compared with each other to identify the alternative that best addresses the objectives and avoids the constraints.

During repeated refinement, the alternatives are designed to be complete, effective, efficient, and acceptable in an effort to maximize overall benefits and minimize costs and adverse impacts. To select a plan, the alternatives are compared from the perspectives of National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE) to identify and recommend the alternative that provides the best and most balanced solutions, considering all four accounts.

The USACE began implementing a modernization of its planning program in 2012. The initiative applies a risk-based approach to shorten schedules and reduce the cost to complete the study process by eliminating non-essential activities while still producing reports that make and adequately support prudent recommendations. The risk-based process concentrates on collecting and presenting information related to the factors that most influence the decisions being considered and minimizing the collection and reporting of information that does not meaningfully influence the decisions and recommendations. When appropriate, it also uses assumptions, professional judgment, and/or estimates instead of acquiring new data to support the decision-making process after considering the relative likelihood, nature, and magnitude of the impacts to the overall decision and the associated environmental, social, and economic consequences. With this in mind, the PDT determined that the study would identify the potential measures, develop an initial array, narrow that array into a focused array of alternatives, and narrowing that array into the final array of alternatives. As the focused array of alternatives was being analyzed, the PDT would also determine which of the considered alternatives would most

likely bracket the maximum dimensions that would be implemented for the purpose of evaluating the environmental impact analysis. The results of analyses on the focused array would be screened to narrow the alternatives to a final array of alternatives. From that array, additional screening would narrow the plans to the likely alternative that could be considered as the TSP.

### **3.2. Summary of Management Measures**

A management measure is a feature or activity that can be implemented at a specific geographic site to address one or more planning objectives. They are generally categorized as structural or nonstructural. Preliminary alternatives are formulated and refined by combining, adapting, and scaling management measures to best address four criteria described in the Principles and Guidelines:

**Completeness.** Extent to which the alternative provides and accounts for all necessary investments or actions to ensure realization of the planning objectives

**Effectiveness.** Extent to which the alternative contributes to achieving the planning objectives

**Efficiency.** Extent to which the plan is the most cost-effective means of addressing the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment

**Acceptability.** The extent to which the alternative plans are acceptable in terms of applicable laws, regulations and public policies

In accordance with 40 CFR 1502.14, the USACE will "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives eliminated from detailed study, briefly discuss the reasons for their having been eliminated." For this feasibility study, a reasonable alternative is defined as an alternative that meets the objectives of the study and is under USACE authority to implement. A measure that could be implemented by others can be considered as long as it meets the objectives on its own or it can be a component of an alternative that meets the objectives in a way that is complete, effective, efficient, and acceptable.

Structural measures identified to be considered for Mobile Harbor include deepening the channel, widening the channel, bend easing in the Bar Channel, and modifying the turning basin. Nonstructural measures that could be considered include relocation of navigation aids, use of tugs, lightering, topping-off offshore, and scheduling. Table 3-1 presents the measures that were considered for this study.

**Table 3-1. Measures Considered**

Structural Measures	Non-Structural Measures
<ul style="list-style-type: none"> <li>• Deepening</li> </ul>	<ul style="list-style-type: none"> <li>• No Action</li> </ul>
<ul style="list-style-type: none"> <li>• Widening</li> </ul>	<ul style="list-style-type: none"> <li>• Relocation of buoys</li> </ul>
<ul style="list-style-type: none"> <li>• Bend Easing</li> </ul>	<ul style="list-style-type: none"> <li>• Additional tugs</li> </ul>
<ul style="list-style-type: none"> <li>• Passing Lanes</li> </ul>	<ul style="list-style-type: none"> <li>• Light-loading</li> </ul>
<ul style="list-style-type: none"> <li>• Meeting Areas</li> </ul>	<ul style="list-style-type: none"> <li>• Lightering offshore</li> </ul>
<ul style="list-style-type: none"> <li>• Turning Basin</li> </ul>	<ul style="list-style-type: none"> <li>• Topping-off offshore</li> </ul>
	<ul style="list-style-type: none"> <li>• Scheduling</li> </ul>

### 3.3. Initial Array of Alternatives

The Mobile Harbor Draft GRR/SEIS included evaluation of a future Without-Project condition that would not include any changes to the current channel dimensions. The PDT screened the measures considered to develop an initial array of alternatives to be analyzed to develop a focused array of alternatives. In addition to the non-structural measures, an array of structural measures was identified to address the planning objectives and included modifications to the Bay and Bar Channels, bend easing, and the turning basin. Specifically, this included:

Deepening – Based on the study objectives, the alternative depths to screen for analysis ranged from 46 to 55 ft with an additional 2 ft of depth in the Bar Channel.

Widening - Based on the study objectives, the alternative depths screened for analysis were 500 and 550 ft to allow for two way traffic within the Bay Channel for up to 15 nautical mile length.

Bend Easing – Based on study objectives, widening of the two sharpest bends in the Bar Channel would be considered to conform with engineering guidance would allow for 24-hour operations.

Turning Basin - Based on study objectives, modifications to the turning basin would be considered to conform to proposed design depth alternatives and the proposed design vessel.

The initial array of alternatives is displayed in Table 3-2.



**Table 3-2. Initial Alternatives**

Initial Alternatives		
Structural Measures		Non-Structural Measures
Depth	Width	
<ul style="list-style-type: none"> <li>• 46 ft to 55 ft in 1 ft increments (48 ft to 57 ft in Bar Channel)</li> <li>• Turning Basin Depth to match channel depth (also, modification as needed for design vessel)</li> </ul>	<ul style="list-style-type: none"> <li>▪ 500 ft and 550 ft in Bay Channel</li> <li>▪ Widen full channel length</li> <li>▪ 700 ft in Bar Channel</li> <li>▪ Bend easing</li> </ul>	<p>Nonstructural alternatives will match nonstructural measures list in Table 3-1.</p>

### 3.3.1. Evaluation and Comparison of Alternatives

Alternative plans are evaluated by applying rigorous criteria. Per the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, as stated in Section 3.2, four general criteria are considered during alternative plan screening: completeness, effectiveness, efficiency, and acceptability.

There are also specific technical criteria related to engineering, economics, and the environment, which also need to be considered in evaluating alternatives. These are:

#### **Engineering Criteria:**

- The plan must represent a sound, acceptable, safe, efficient and reliable engineering solution.

#### **Economic Criteria:**

- The plan must contribute benefits to NED.
- Tangible benefits of a plan must exceed economic costs.
- Each separable unit of improvement must provide benefits at least equal to costs.

#### **Environmental Criteria:**

- The plan will fully comply with all relevant environmental laws, regulations, policies, and executive orders.

- The plan represents an appropriate balance between economic benefits and environmental sustainability.
- The plan has been developed in a manner that is consistent with the USACE Environmental Operating Principles.

### **3.3.1.1. Screening of Initial Alternatives**

For the stated evaluation criteria, there would be a significant amount of analysis required to fully evaluate the entire range of deepening and widening alternatives. In 2012, the USACE adopted a Specific, Measureable, Attainable, Risk-Informed, and Timely (SMART) Planning process to accelerate feasibility study execution. Based on guidance from this initiative, the number of alternatives to be analyzed were reduced considering information developed in previous study efforts, a planning Charette held in January 2015, and vertical coordination. After discussions within the PDT, it was determined that nonstructural measures alone would not achieve the planning objectives. The PDT determined that the best approach to achieve the project objectives would be to examine an array of structural measures including the existing condition, channel deepening, two widths and three lengths of wideners. The results of this analysis would develop a focused array of alternatives. Widening measures would evaluate adding 100 or 150 ft of width in the Bay Channel. The length of the widener to be analyzed for economic justification would have length increments of 5, 10, and 15 nautical miles. It was determined through ship simulation that bend easing was not a separable element but those changes would be necessary from a safe operations standpoint for the deepening alternatives. The turning basin would also be deepened to match any deepening alternative but ship simulation also found that some modification of the turning basin was needed to assure safe operations.

Based on historical vessels calling at Mobile Harbor, few had design drafts greater than 52 ft. Data showed an increase in vessels calling at Mobile Harbor with design drafts of 52 ft or less. Therefore, alternatives with depths greater than 53 ft were eliminated from further analysis. The depth of 46 ft was also screened from further analysis because the protocol in deep draft navigation projects is typically a minimum of 2 ft greater than the existing channel depth. As a result, the deepening alternatives considered for evaluation would range from useable drafts from 47 to 52 ft in the Bay Channel and 49 to 54 ft in the Bar Channel (additional depth and width in the bar channel is authorized to account for increased wind, wave, and tidal action in that area).

The analysis to this point also demonstrated the potential construction cost of each initial alternative. The NFS used the cost data to determine the range of cost that could be suitable for their cost share. The NFS indicated that deepening to 50 ft appeared to be the maximum that they could support. It should be noted at this point that the NFS's desire to not deepen below 50 ft led the benefit analysis to utilize the categorical

exemption to the NED Plan per paragraph 3-2b(10) of Engineer Regulation (ER) 1105-2-100.

Based on this information and in coordination with the NFS, for environmental impact analysis, the PDT determined that the maximum project dimensions that could reasonably be expected would be a 50 foot deep channel (with an additional 2 ft of depth in the Bar Channel) with an added 100 ft of width for a widener for 5 nautical miles with bend easing and turning basin modification. This information was provided to the engineering and modeling team for their development of the environmental impact analysis.

### **3.4. Focused Array of Alternatives**

An analysis of the remaining initial deepening and widening alternatives was conducted using rough order of magnitude costs and benefits that the PDT considered an appropriate level of detail. As this analysis progressed, the results helped shape the focused array of alternatives that would utilize more refined cost and economic data. It was found that each of the deepening alternatives had positive net benefits. It was also found that widening 5 nautical miles of the channel with an additional width of 100 ft or 150 ft had negative net benefits. Based on this determination, widening lengths greater than 5 nautical miles with widths of 100 ft or 150 ft would likely not be economically feasible for the depths being considered and therefore were dropped from consideration. Review of the 5 nautical miles widening results and previously conducted ship simulation suggested that 100 ft of widening with a 3 nautical mile length might be acceptable and economically feasible. With the above considerations, the focused array of alternatives considered is shown in Table 3-3.

**Table 3-3. Focused Array of Alternatives**

Measure	Alternatives			
Deepening	47	48	49	50
Widening	Additional 100 ft of width for 3 nautical miles for each depth alternative			

Following determination of the focused array, the PDT further refined the cost and economic data to provide information needed to meet the technical criteria above to narrow alternatives to a final array to determine the plan that could be considered as the TSP. Cost and economic data for the focused array is presented in Table 3-4. Cost and Economic Data for Focused Array

**Table 3-4. Cost and Economic Data for Focused Array**

Preliminary Project Cost* (\$M)				
Measure	Depth (Ft)			
	47	48	49	50
Deepening**	169.4	238.4	302.5	373.5
Deepening** and Widening 100 ft for 3 nautical mi	179.09	249.53	315.41	387.76
Preliminary Project Net Benefits (\$M)				
Measure	Depth (Ft)			
	47	48	49	50
Deepening	\$14.8	\$19.6	\$24.3	\$34.4
Deepening and Widening 100 ft for 3 nautical mi	***	***	***	\$34.5

Notes: \*Price Level FY 18, Includes Associated Costs, Excludes O&M Costs

\*\*Deepening of River, Bay, and Bar Channels, Bend Easing and Choctaw Pass Turning Basin

\*\*\* Net benefits were only calculated for the optimized depth.

### 3.5. Final Array of Alternatives

The project objectives defined previously are:

- Reduce vessel congestion.
- Improve the efficiency of operations for containerships, bulk, and other cargo vessels within Mobile Harbor.
- Accommodate current and anticipated growth in containerized and bulk cargo vessel traffic.
- Provide navigation improvements to improve vessel transit safety.

To achieve the objectives, modification to project depth and width are necessary. Combining the results of the refined cost and economic data for the depth and widening alternatives that would satisfy the project objectives defined the values to be considered as a TSP in the final array of alternatives. Those values are provided in Table 3-5. Final Array of Alternatives

**Table 3-5. Final Array of Alternatives**

Combined Measures Preliminary Project Cost and Net Benefits (\$M) Deepening, 3 Nautical Mile Widener, Bend Easing, Turning Basin				
	Alternative (Depth in Ft)			
	47	48	49	50
Cost*	\$179.09	\$249.53	\$315.41	\$387.76
Net Benefit	**	**	**	\$34.5

\*FY18 Price Level, Includes Associated Costs, Excludes O&M Costs.

\*\* Net benefits were only calculated for the optimized depth.

### 3.6. Plan Selection

Based on analysis of the final array, the PDT was able to narrow the array to an alternative that appeared likely to satisfy the project objectives and be considered for selection as the TSP; that plan is the 50-foot alternative. This alternative has greater net benefits than smaller scale plans (47, 48, and 49 ft), and, considering categorical exemption from the NED Plan per paragraphs 3-2b(10) of ER 1105-2-100, a sufficient number of alternatives were analyzed to insure that net benefits do not maximize at a scale smaller than the 50-foot plan.

## **SECTION 4.0 TENTATIVELY SELECTED PLAN (TSP)**

### **4.1. Plan Components**

The Bar, Bay, and River (lower 1,850 ft below station 226+16) Channels of the Mobile Harbor Federal Navigation Project are currently 47, 45, and 45 ft deep, respectively, (as shown in Figure 1-1) with an additional 2 ft for advanced maintenance plus 2 ft of allowable overdepth for dredging (total depths of 51, 49, and 49 ft, respectively). Those same channel segments are currently 600, 400, and 600 ft wide, respectively. In addition, the Choctaw Pass Turning Basin, located at the northern limit of the Bay Channel, is currently 45 ft deep by approximately 1,570 ft long (including the 400-foot width of the existing Bay Channel) by 715 ft wide at its easternmost extent. It also contains a 100-foot widener/transition section about 3,500 ft in length along the eastern edge of the existing Bay Channel immediately south of the basin to improve basin access, reduce the basin size needed for turning, and increase vessel maneuverability.

Modifications to these channel features, as recommended in the TSP, are as follows:

- Deepen the existing Bar, Bay (including the Choctaw Pass Turning Basin), and River Channels (south of station 226+16) by 5 ft to project depths of 52, 50, and 50 ft, respectively, with an additional 2 ft for advanced maintenance plus 2 ft of allowable overdepth for dredging (total depths of 56, 54, and 54 ft, respectively).
- Incorporate minor bend easings at the double bends (at stations 1857+00 and 1775+26) in the Bar Channel approach to the Bay Channel.
- Widen the Bay Channel from 400 ft to 500 ft from the mouth of Mobile Bay northward for 3 nautical miles to provide a two-way traffic area for passing.
- Expand the Choctaw Pass Turning Basin 250 ft to the south (at a depth of 50 ft) to better accommodate safe turning of the design vessel and other large vessels.

Details of the TSP components are shown in Figure 4-1 through Figure 4-5.

### **4.2. Dredging and Dredged Material Management for the TSP**

Approximately 24.1 mcy of “new work” material will need to be dredged to construct the TSP for the Mobile Harbor Federal Navigation Project. In addition, increases of 5 to 15% in maintenance dredging volumes are anticipated post-implementation. For reference of scale, approximately 5.9 mcy of sediment are currently dredged annually as part of the routine maintenance of the project (see Section 2.4.3 of this report and/or Section 4.10, Appendix A for further information). The details of dredged material placement options for the new work construction and future maintenance operations are provided in the following paragraphs. A summary of the new work quantities by channel segment is shown in Table 4-1.





Figure 4-1. TSP for the Mobile Harbor Federal Navigation Project

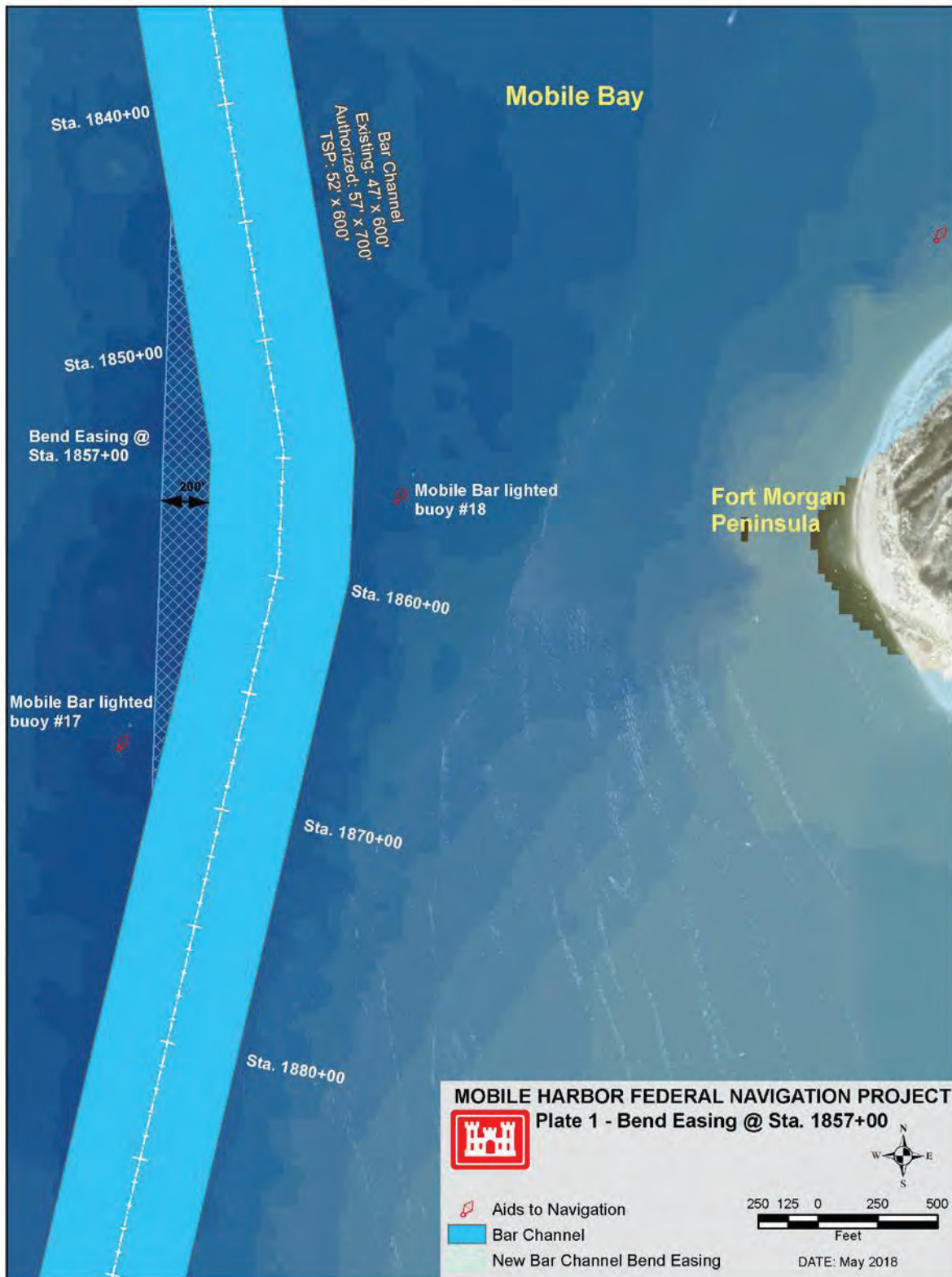


Figure 4-2. Bend Easing in Bar Channel at Station 1857+00



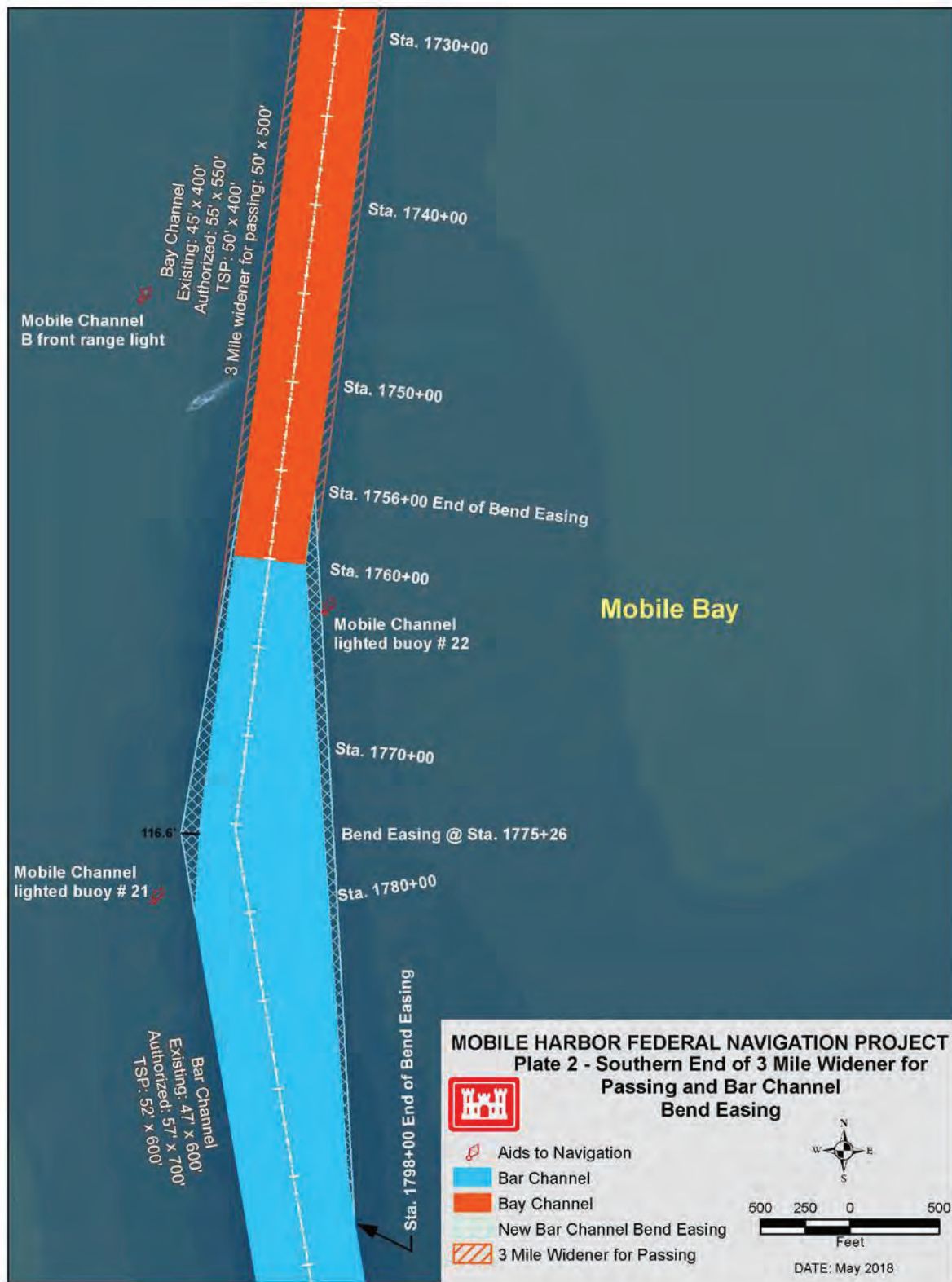


Figure 4-3. Bend Easing in Bar Channel at Station 1775+26 and Southern End of 3 Nautical Mile Channel Widener for Passing in Bay Channel

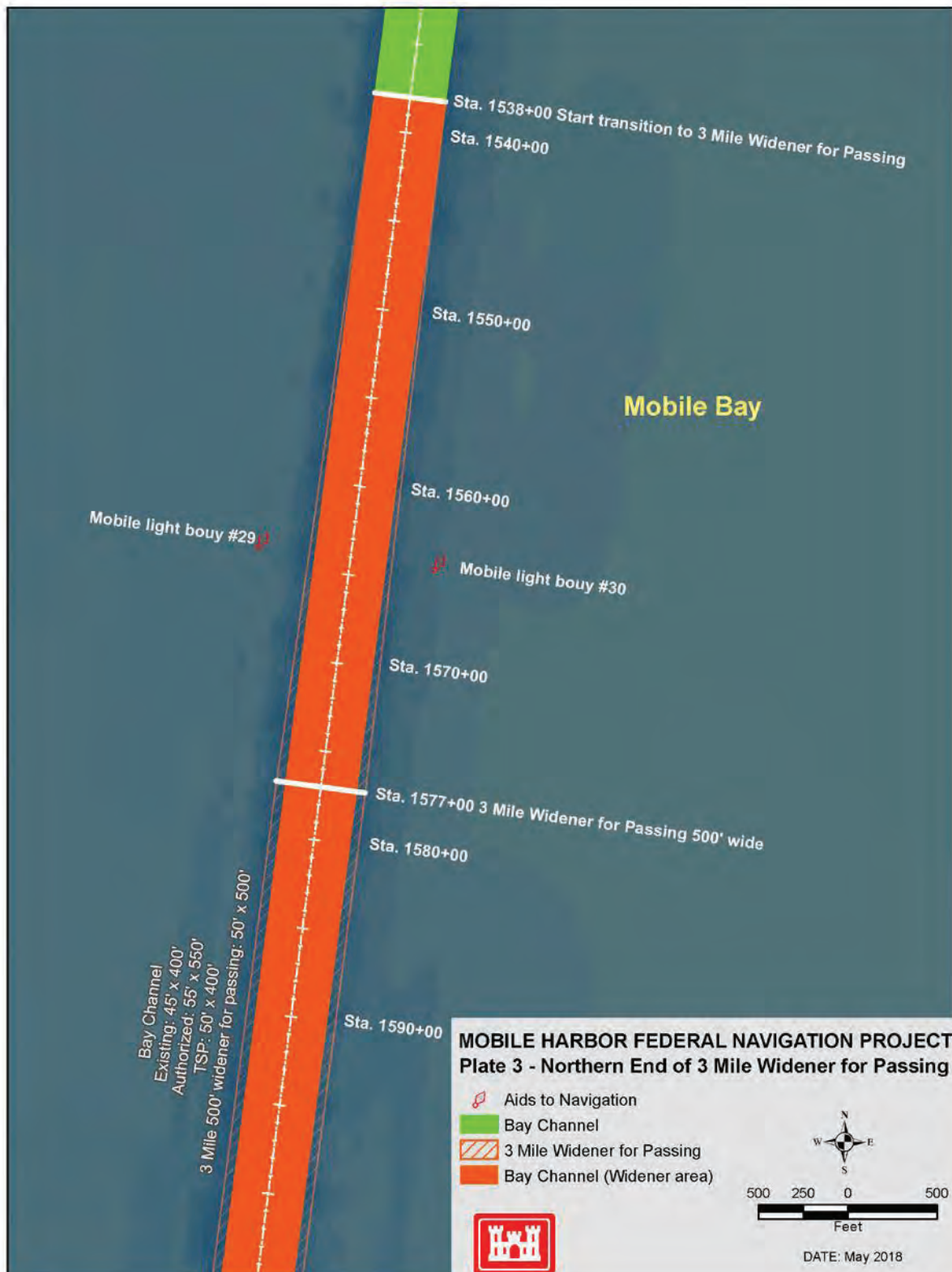


Figure 4-4. Northern End of 3 Nautical Mile Widener for Passing in Bay Channel





Figure 4-5. Choctaw Pass Turning Basin Expansion

**Table 4-1. New Work Quantities by Channel Segment**

Channel Segment	Quantity (cy)
River (stations 226+16 to 244+66)	260,444
Bay (stations 244+66 to 1760+09.28)	15,331,506
Bar (stations 1760+09.28 to 2189+59)	5,077,827
3 Nautical Mile Widening for Passing (stations 1577+82 to 1760+10)	1,368,685
Bend Winders (stations 1775+43 and 1854+69)	155,259
Turning Basin (250 foot Expansion to the South)	1,688,864
<b>Total New Work Volume</b>	<b>24,082,585</b>

Note: Quantities include the authorized depths plus advanced maintenance and allowable overdepth.

#### 4.2.1. New Work Material Placement Options

Several sites were evaluated for potential placement of new work material for the TSP. These included six relic shell mining areas, the ODMDS, and the SIBUA (if new work sand sources are found within the Bar Channel). Further discussion on these elements is provided in the following paragraphs. Details of the capacity estimates for the northwest extension of the SIBUA and the expansion of the ODMDS are discussed in this report in Section 2.4.4 and Section 4.11, Appendix A.

##### 4.2.1.1. Relic Shell Mined Areas

The Relic Shell Mined Areas are located to the northeast of Gaillard Island on the eastern side of the ship channel as shown in Figure 4-6. The proposed placement within this site is the result of beneficial use discussions with the cooperating agencies where it was suggested that Mobile District conduct open bay placement of the dredged material in strategic areas of the bay in an effort to restore sediment to the system and improve bay bottom conditions

Approximately 5.5 mcy of new work material are anticipated to be placed in the Relic Shell Mined Areas. Site selection and volume estimates for these sites were based on the



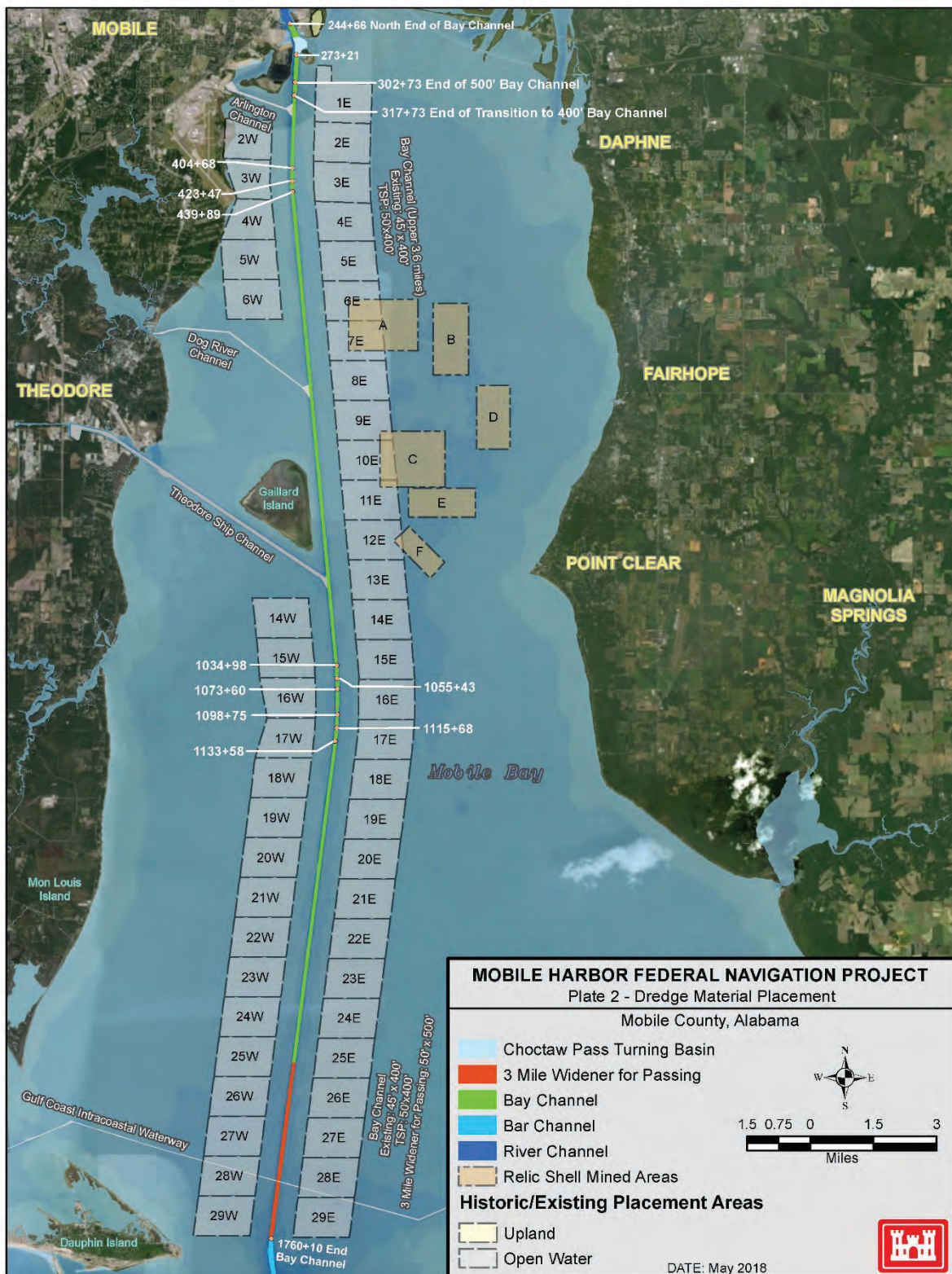


Figure 4-6. Relic Shell Mined Areas

NOAA compiled surveys within the area between 1960 and 1961 and 1984 and 1987. The potential placement areas were laid out in sections where there were disturbances with 15-foot depths or greater based on the combined surveys from 1960/61 and 1984/87. These areas encompass approximately 4,100 acres and existing depths within the sites generally range from 10 to 14 ft.

Placement is anticipated to be accomplished with a maximum thickness of approximately 3 ft due to the characteristics of the new work material; however, the volume of material planned to be placed in the sites is based on an average material thickness of 1.5 ft over the sites. The quantity of material planned for placement in each area is shown in Table 4-2 and a map detailing the locations of the sites is shown in Figure 4-6. Additional detailed hydrographic surveys of these sites will be collected during the Preconstruction, Engineering and Design (PED) Phase.

**Table 4-2. Placement Capacities within the Relic Shell Mined Areas**

	Area (acres)	Placement Volume (cy) Placement Thickness assumed 1.5-foot	Bulking Factor= 1.2 O&M, 1.8 New Work	Approximate Distance from Channel (ft) Center to Placement Center
A <sup>1</sup>			0	10,000
B	920	2,226,000	1,237,000	18,000
C	770	1,863,000	1,035,000	22,000
D	1306	3,161,000	1,756,000	12,000
E	702	1,699,000	944,000	16,000
F	403	975,000	542,000	12,000
<b>Total</b>	<b>4101</b>	<b>9,924,000</b>	<b>5,514,000</b>	

Note: 1) Area A is located within the bounds of existing open water placement sites used for operation and maintenance material and was therefore not considered here for new work.

#### 4.2.1.2. Expanded ODMDS

The capacities of the existing ODMDS site and the proposed expansion were obtained from ongoing environmental coordination documents between the USACE, Mobile District, and EPA and are provided in Table 4-3. As shown, an available/remaining capacity of approximately 52 mcy is expected after 20 years of future placement of maintenance material in the site. This volume is more than adequate to handle the anticipated 18.6 mcy of new work material that will be placed in the site during construction of the TSP. The boundaries of the current and expanded area are shown in Figure 4-7. (Note: The approximately 1.7 million cubic yards of new work material to be dredged for the Choctaw Pass Turning Basin expansion are anticipated to be predominantly clean sands with some pockets of silty sands. For conservative cost and placement location planning purposes, this quantity is included in the 18.6 million cubic yards slated for the ODMDS; however, it could be considered for beneficial use at other

locations, if deemed suitable. The suitability of this material will be further investigated prior to the completion of the Final Report or during the PED Phase of this project.)

**Table 4-3. Placement Capacity within the Expanded ODMDS**

ODMDS	Area (Acres)	Volume (CY) <sup>1</sup>
Current ODMDS (4.75 square nautical mi)	4,017	20,000,000
Expanded ODMDS (24 square nautical mi)	20,341	260,000,000
<b>Total</b>	<b>24,358</b>	<b>280,000,000</b>
20 year Capacity Need		228,000,000
<b>Remaining Capacity after 20 Years</b>		<b>52,000,000</b>
Note: Volume estimates including capacity needs were taken from ongoing environmental coordination documents with EPA.		

**Table 4-4. Upland Dredged Material Placement Site Capacities**

	Area (Acres) <sup>1</sup>	Projected Maximum Dike Elevation (ft) <sup>1</sup>	Total Idealized Volumetric Capacity (CY) <sup>1,2</sup>
North Blakeley	69	50	3,172,000
Mud Lake 6	70	46	3,388,000
Mud Lake 7	129	46	8,562,000
South Blakeley	196	65	12,087,000
North Pinto	48	47	3,434,000
<b>Totals</b>	<b>512</b>		<b>30,644,000</b>
<b>20 year Project Capacity Needs of River Channel (1.3 mcy/year)</b>			26,247,060
<b>Remaining Capacity After 20 Years</b>			4,396,000
Notes: 1) Taken from Table 7 of Resource Management Group, Inc., 2010 updated with USACE dredge material placement records through 2016.			
2) Idealized volumetric Capacity includes interior capacity plus the volume to build projected			



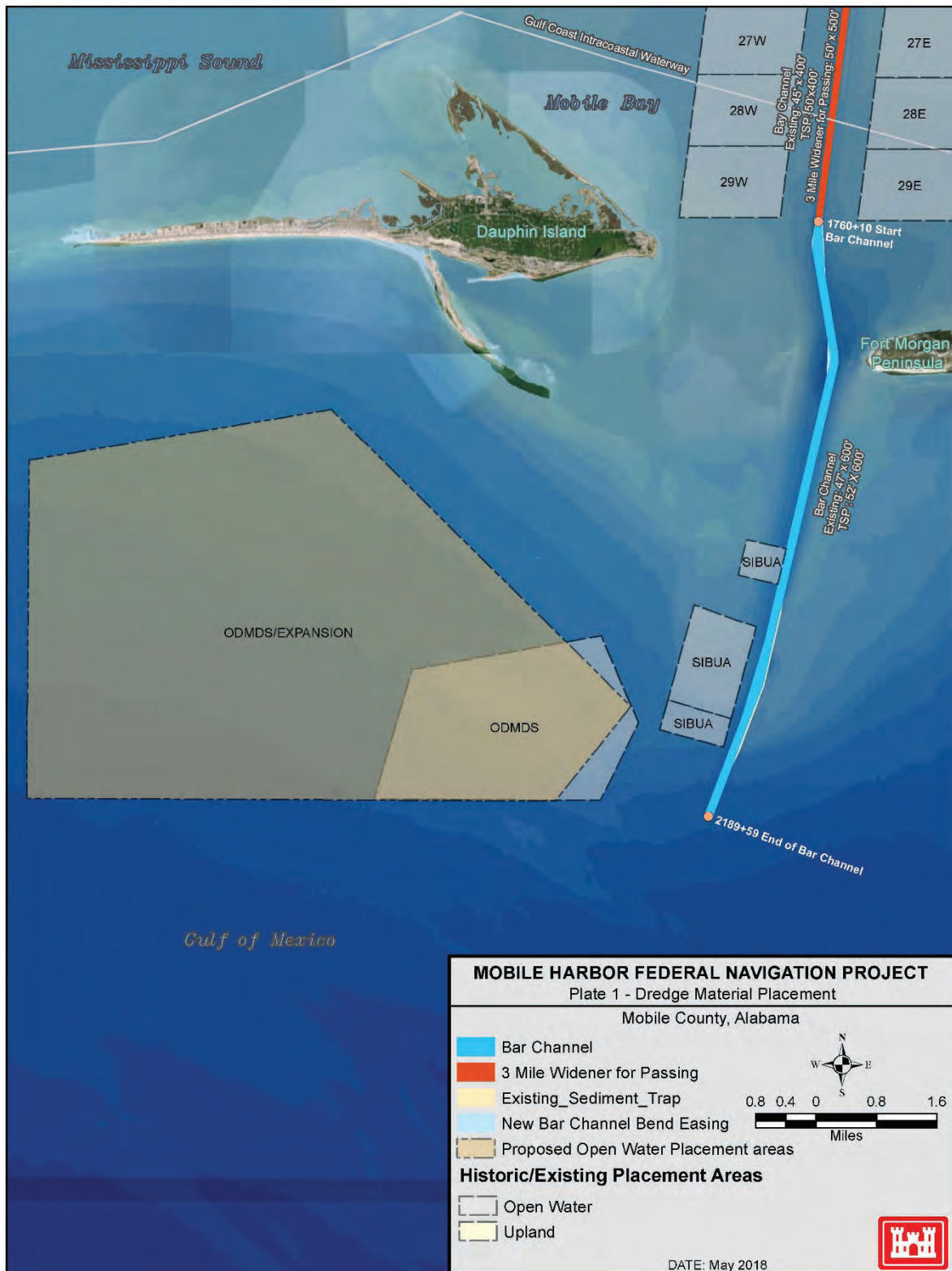


Figure 4-7. Expanded ODMDS Boundary

#### **4.2.1.3. SIBUA and Northwest Extension**

Currently, no new work material from the Bar Channel is anticipated to be placed in the SIBUA or the northwest extension (see Figure 4-8) as part of the TSP. The new work material in the Bar Channel is predominately clays and silts with some intermixed sands, and, per the geotechnical information obtained to-date, none of this material meets the suitability criteria for placement in the SIBUA. Placement of new work material in the SIBUA or the northwest extension will be considered in the future if sandy material is identified during additional geotechnical investigations of the Bar Channel.

#### **4.2.2. Future Maintenance Material Placement Options**

Material dredged as part of maintenance operations for the future With-Project conditions will continue to be placed in a combination of upland sites adjacent to the River Channel; open water placement sites within the bay; the SIBUA on the ebb tidal shoal, including a proposed northwestward expansion of the site; and the ODMDS in both the current limits and a future expansion area. Details of these areas are provided in the following paragraphs.

##### **4.2.2.1. Upland Dredged Material Placement Sites for the River Channel**

Material dredged as part of the routine maintenance of the River Channel (primarily fine-grained sediments) is currently placed in the upland dredged material placement sites located east of the River Channel, as shown in Figure 2-21. Existing capacity estimates for these sites were obtained from Resource Management Group, Inc., 2010 “Guidelines for Sustainable Maintenance Dredging and Long-Term Dredge Material Management of the Mobile River Federal Management of the Mobile River Federal Navigation Project,” and updated with the USACE, Mobile District dredge records for the River Channel to 2016. Volume estimates were evaluated in an effort to determine if sufficient capacity exists to accommodate projected increases in routine maintenance material associated with the TSP and are shown in Table 4-4. Per the estimates, adequate capacity exists to support the placement of maintenance material dredged from the River Channel over the next 20 years.

##### **4.2.2.2. Open Water Dredged Material Placement Sites for Bay Channel**

A portion of the material dredged as part of the routine maintenance of the Bay Channel (primarily fine-grained sediments) is currently placed in the open water placement areas adjacent to the channel, as shown in Figure 2-19 (the remaining material is placed in the

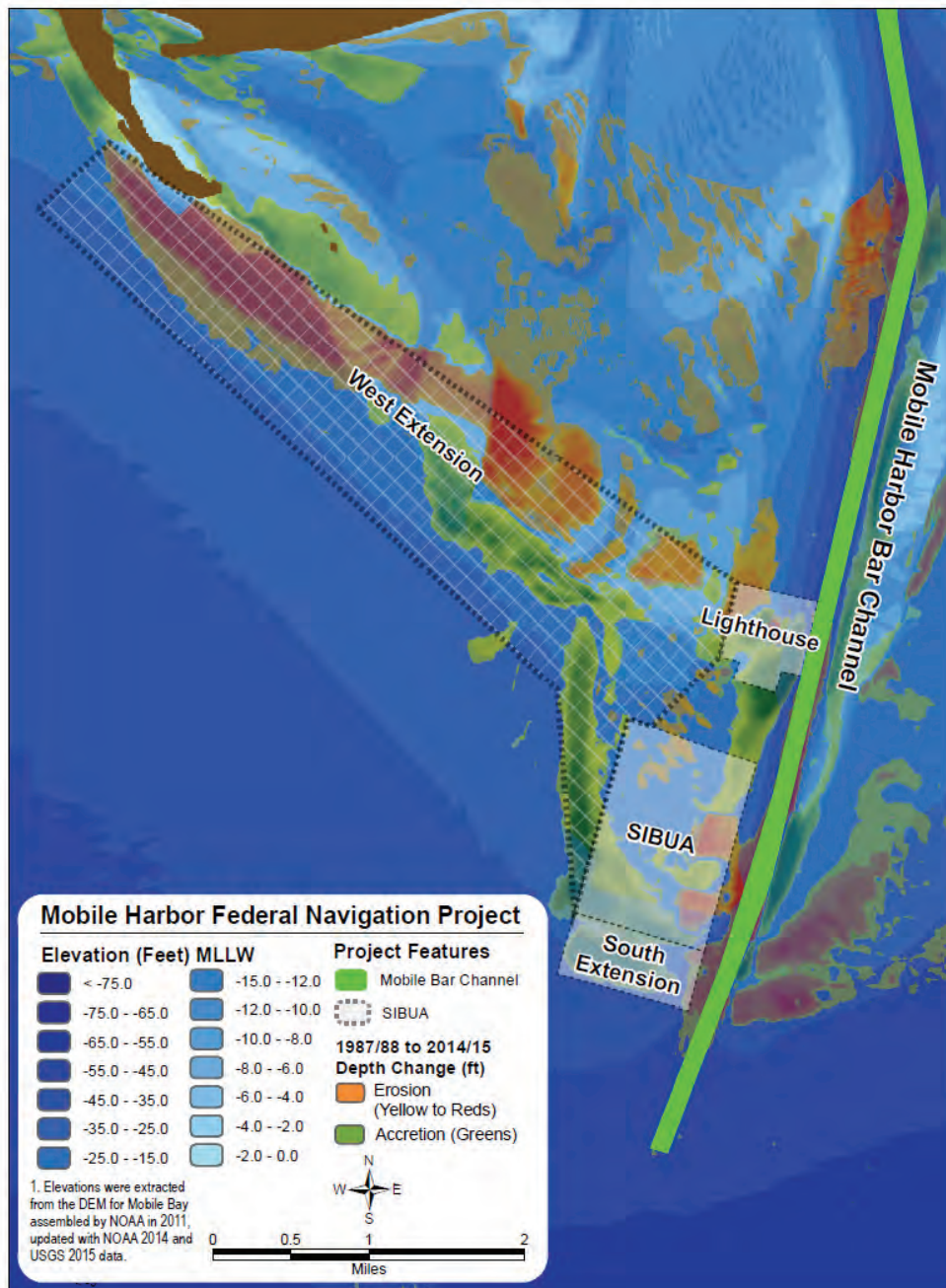


Figure 4-8. SIBUA Northwest Extension Limits

ODMDS). These areas were evaluated in an effort to determine if capacity exists for future maintenance associated with the TSP. Bathymetric surveys of the areas were obtained from the USACE, Mobile District Irvington Site Office and site capacities were calculated



based on the most recent survey data available at the time of analysis (2012-2015) (see Table 4-5). The available survey data were limited to areas designated for placement in the survey year within the placement site, rather than over the entire site. Additional data for the sites were obtained from the NOAA nautical charts. A minus four (-4) ft MLLW upper elevation limitation was applied over the sites before analyzing capacity. Per results of the analysis, adequate capacity exists to support the placement of maintenance material dredged from the Bay Channel over the next 20 years.

**Table 4-5. Open Water Dredge Material Placement Site Capacity**

Open Water Placement Sites	Area (Acres)	Volume Capacity (CY) <sup>1</sup>
Placement Sites 1 - 29	21,560	140,974,000
20 Year Capacity Needs of the Bay Channel (4.5 mcy/year)		90,380,000
<b>Capacity Remaining after 20 Years</b>		<b>59,594,000</b>
Notes: 1) No estimate of sediment transport from the sites were incorporated into the capacity estimates. 2) Conservative estimate as it assumes all material dredged from the bay will be placed in open water sites. In actual practice open water sites in the bay and the ODMDS are used.		

#### 4.2.2.3. SIBUA for the Bar Channel

Material dredged (primarily sandy sediments) as part of the routine maintenance of the Bar Channel is placed in the SIBUA as a means of bypassing sand from the Bar Channel to the downdrift littoral system. The SIBUA, located west of the channel on the ebb tidal shoal (see Figure 1-2), was evaluated to determine whether capacity exists to accommodate projected increases in maintenance dredged material associated with implementation of the TSP. An additional level of analysis to evaluate transport rates leaving the SIBUA as well as capacity available within depth constraints of dredging equipment were made in an effort to balance safe and efficient dredge material placement practices, while ensuring sandy material dredged from the Bar Channel is maintained within the littoral system.

A bathymetric change analysis was conducted on the ebb tidal shoal over a time period from 1987-1988 to 2018 using the NOAA 1987-1988, NOAA 2014, USGS/USACE 2015, and the USACE 2008-2018 survey datasets. Particular focus was placed on the SIBUA and the sediment transport pathways feeding the Sand/Pelican Island complex. This analysis shows sand has been transported out of the SIBUA at rate of approximately 260,000 cubic yards per year. This material has primarily continued to move northwest to join in with the shallow platform associated with Sand and Pelican Islands (see **Error! Reference source not found.**).

The main source of sedimentation within the Bar Channel is the dominate east to west sediment transport along Morgan Peninsula onto the offshore ebb shoal of the inlet complex forming the Dixey Bar. As discussed in Section 2.4.4.3, dredging of the Bar Channel since the last deepening has ranged from a longer term average of 525,000 cubic yards to a recent shorter term average of 624,000 cubic yards. The rate of dredged material placement has been higher than the rate of transport out of the SIBUA, leading to decreased depths and restricted use of the SIBUA for dredged material placement by a large hopper dredge to the southernmost extents of the site. An estimate using the USACE 2018 surveys (see Table 4-6) shows the majority of the site capacity is within the shallower depths, ultimately limiting the use of the existing the SIBUA boundaries over the next 20 years to hydraulic cutter heads and smaller hopper dredge fleet.

In an effort to ensure adequate placement capacity for maintenance dredging of the Bar Channel, the USACE, Mobile District is currently pursuing modifications to extend the SIBUA beyond its existing boundaries. The site will be extended to the northwest, following the shoal and pathway of sediment transport towards Dauphin Island. Figure 4-8 **Error! Reference source not found.** and Table 4-6 provide the proposed limits of the northwest extension as well as the estimated available capacity volumes. Per the estimates, adequate capacity exists to support the placement of maintenance material dredged from the Bay Channel over the next 20 years.

#### **4.2.2.4. Expanded ODMDS**

The expanded ODMDS, which can be used for the placement of maintenance material in the future, is discussed in Section 4.2.1.3 and shown in Figure 4-7. As shown in Table 4-3, adequate capacity will exist once the expansion is finalized.

#### **4.2.3. Construction Methodology**

The exact methodology to construct the TSP would be determined by the contractor selected through the contracting process; however, assumptions regarding various possible construction techniques were made for planning and estimating purposes. Dredged material from channel modifications would most likely be excavated using a cutterhead-suction dredge, hydraulic hopper dredge, or mechanical excavator.

##### **4.2.3.1. Type of Dredging Equipment**

The type of dredging equipment considered depends on the type of material, the depth of the channel, the depth of access to the placement site, the amount of material, the distance to the placement site, the wave-energy environment, etc. A detailed description of types of dredging equipment, which includes mechanical-clamshell, hydraulic hopper, cutter-suction, dredges with spider barges for transportation of dredged material to

**Table 4-6. SIBUA Capacity**

	2018 Volume (CY) Below -15' MLLW	2018 Volume (CY) Below -20' MLLW	2018 Volume (CY) Below -25' MLLW
SIBUA	7,487,906	2,202,690	644,437
SIBUA South Extension	4,679,635	2,891,301	1,415,534
SIBUA Lighthouse <sup>(3)</sup>	1,320,708	682,208	309,517
<b>Total 2018 Capacity</b>	<b>13,488,249</b>	<b>5,776,199</b>	<b>2,369,488</b>
20 Year Net Erosion out of SIBUA (260,000 cy/yr)	5,200,000	5,200,000	5,200,000
20 Year Projected Capacity Needs (624,000 cy/yr + 15% increase)	15,272,000	15,272,000	15,272,000
<b>Remaining Capacity after 20 years</b>	<b>3,416,249</b>	<b>-4,295,801</b>	<b>-7,702,512</b>
SIBUA Northwest Extension	9,294,614	6,241,179	1,014,424
<b>NOTES:</b>			
(1) Capacity estimates displayed in this table do not account for uncertainty in volumetric change.			
(2) Capacity estimates are rough order of magnitude assuming vertical side slopes. Final volume estimates will account for side slopes of the fill, which would likely result in reduced capacity.			
(3) 2018 survey data did not cover the eastern section of the SIBUA Lighthouse Site therefore volume estimates for this area are based on NOAA 2014 Survey Data			

designated placement sites, can be found in EM 1110-2-5025, Engineering and Design - Dredging and Dredged Material Disposal.

#### 4.2.3.1.1. Mechanical – Clamshell Dredging

Mechanical dredges are classified by how the bucket is connected to the dredge. The three standard classifications are structurally connected (backhoe), wire rope connected (clamshell), and chain and structurally connected (bucket ladder). The advantage of mechanical dredging systems is that very little water is added to the dredged material by the dredging process and the dredging unit is not used to transport the dredged material. This is important when the placement location is remote from the dredging site. The disadvantage is that mechanical dredges require sufficient dredge cut thickness to fill the bucket to be efficient and greater resuspended sediment is possible when the bucket impacts the bottom and as fine-grained sediment washes from the bucket as it travels

through the water column to the surface. Clamshell excavators are likely to be employed on portions of the Choctaw Pass Turning Basin. These dredges are able to work in confined areas, can pick up large material, and are less sensitive to sea conditions than other dredges.

For cost estimating purposes, it is anticipated given recent history that a clamshell dredge will be used within the Choctaw Pass Turning Basin. Conservatively estimating, it is assumed material from this area would be placed in a scow for transport to the ODMDS.

#### **4.2.3.1.2. Hydraulic – Hopper Dredging**

Hopper dredges include self-propelled ocean-going vessels that hydraulically lift dredged material from the bottom and deposit it into an open hopper within the vessel. The dragarm(s) operates like a vacuum cleaner being dragged along the bottom. When the hopper is full, the dredge transits to a placement location and releases the dredged sediment into an underwater placement site by opening doors on the hopper bottom or in some cases the vessel is designed to split open longitudinally. Hopper dredges can also be designed to hydraulically pump the material from the hopper. This is sometimes used for beach nourishment projects. Since hopper dredges are self-propelled, they are more maneuverable than dredges that rely upon tug boats to move. However, they require numerous passes over the same area to remove the required material; they are inefficient in small confined dredging areas and are most effective in removing sand and other unconsolidated materials.

Although mechanical clamshell and cutterhead-suction may be used for many segments of the channel, for initial cost estimating purposes and historical comparisons (Gulfport and Pascagoula), a hopper dredge is assumed for removal of sediment in the Bay Channel and Bar Channel. Most of the sediment transported by the hopper dredge is assumed to be placed in the ODMDS while a smaller portion of the material is assumed to be placed in the relic shell mined area.

#### **4.2.3.1.3. Hydraulic – Cutterhead-Suction Dredge**

Large cutter-suction dredges, or cutterhead dredges, are mounted on barges. The cutter suction head resembles an eggbeater with teeth. It mobilizes the dredged material as it rotates. The mobilized material is hydraulically moved into the suction pipe for transport. The cutter suction head is located at the end of a ladder structure that raises and lowers it to and from the bottom surface. The cutter suction dredge moves by means of a series of anchors, wires, and spuds. The cutter suction dredges as it moves across the dredge area in an arc as the dredge barge swings on the anchor wires. The discharge pipeline connects the cutter suction dredge to the placement area. The dredged material is hydraulically pumped from the bottom, through the dredge, and through the discharge pipeline to the placement location. Booster pumps can also be added along the discharge

pipeline to move the material greater distances. Cutterhead-suction dredges are limited to dredging depths within reach of the ladder.

It is anticipated that a cutter-suction dredge may be considered for this project with further analysis. If it is determined that any dredging area appears too consolidated for a hopper dredge or less economical, a hydraulic cutterhead or mechanical clamshell dredge may be considered. Material may be placed in a scow barge or pumped depending on distance to placement area.

#### **4.2.3.1.4. Post-Dredging Operations**

Since dredging equipment does not typically result in a perfectly smooth and even channel bottom a drag bar, chain, or other item may be pulled along the channel bottom to smooth down high spots and fill in low spots. This finishing technique also reduces the need for additional dredging to remove any high spots that may have been missed by the dredging equipment. It may be more cost-effective to use a drag bar or other leveling device (and possibly less hazardous to sea turtles) than to conduct additional hopper dredging.

#### **4.2.3.2. Beneficial Use of Dredged Material**

The Federal Government has placed considerable emphasis on using dredged material in a beneficial manner. Statutes such as the WRDAs of 1992, 1996, 2000, and 2007 demonstrate that beneficial use has been a Congressional priority. The USACE has emphasized the use of dredged material for beneficial use through such regulations as 33 CFR Part 335, ER 1105-2-100, and ER 1130-2-520 and by Policy Guidance Letter No. 56. ER 1105-2-100 at E-69 states that “all dredged material management studies include an assessment of potential beneficial uses for environmental purposes including fish and wildlife habitat creation, ecosystem restoration and enhancement and/or hurricane and storm damage reduction”.

In accordance with ER 1105-2-100, the USACE, Mobile District considered beneficial use of dredged material as a part of the project. As shown on Figure 4-9, opportunities for beneficial use of dredged material were identified in the project vicinity. In addition to the agency scoping meeting, two meetings were held with the support agencies specifically addressing beneficial use opportunities associated with the placement of the new work material. The meetings were instrumental in the process of identifying realistic beneficial use opportunities associated with the proposed widening and deepening activities. Through these meetings, the agencies provided their input and support for a variety of potential placement options. Because it met the requirements of the guidance outlined above, the relic oyster shell mining area is included as a proposed placement area for the project.



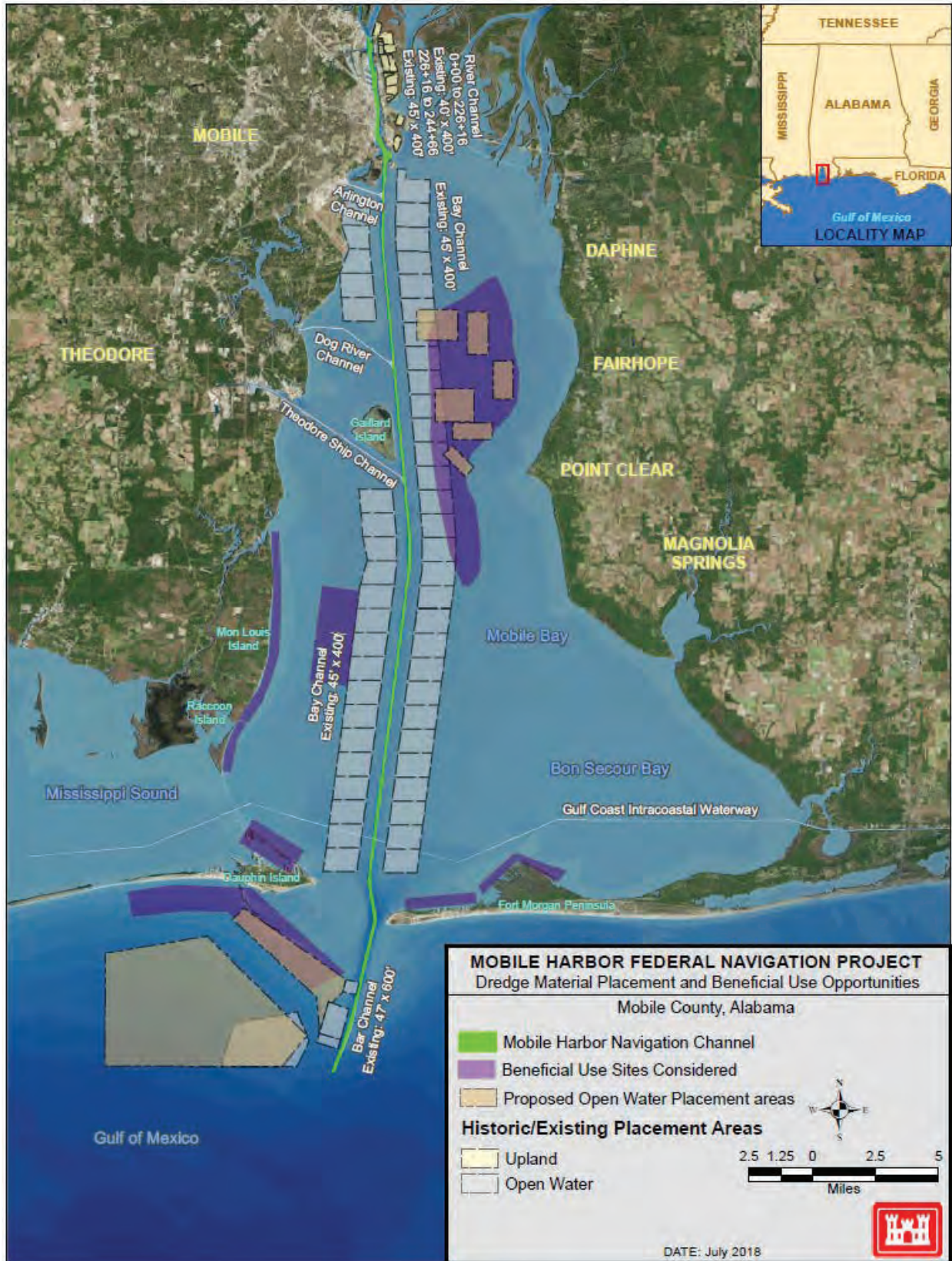


Figure 4-9. Opportunities for Beneficial Use of Dredged Material

Other beneficial use options that will require cost sharing with a willing sponsor include:

- Shoreline protection measures such as living shorelines
- Oyster reef restoration
- Thin-layer placement in strategic areas to reduce hypoxia
- Thin-layer placement for marsh conservation and restoration
- Raising bottom elevation in strategic locations to promote productivity
- Strategic placement of berms for shoreline protection

#### **4.2.3.2.1. Beneficial Use Analyses**

If a willing partner is found for an acceptable beneficial use option, a grain size/compatibility analysis and modeling of sediment transport and fate will be required. Because of the time and effort involved with the additional analysis, beneficial use measures will be discussed in the GRR/SEIS without detailed analysis. The detailed analysis along with the final designs, decisions to implement, and environmental considerations/clearances would be conducted during the PED phase or within a separate study in coordination with the cooperating agencies and the interested public.

### **4.3. Detailed Cost Estimates and Benefits**

Section 7.0, Appendix A contains detailed information on project costs, cost assumptions, and the associated risks. Appendix B includes detailed discussions of the transportation cost savings and benefit analysis.

#### **4.3.1. Project Costs and Cost Sharing TSP**

Table 4-7 contains project cost sharing guidelines. Although currently developed costs are not for budgetary purposes, Table 4-8 is presented to show the application of USACE cost sharing guidelines for the TSP. The Final GRR/SEIS will include detailed costs for budgetary purposes. The estimates used for the cost sharing tables shown in Table 4-8 is based on the Project First Cost (Constant Dollar Basis) (second column) of the Total Project Cost Summary (TPCS) spreadsheet presented in Attachment G, Appendix A. The Constant Dollar Costs at current price levels serve as the basis for the cost of the project

**Table 4-7. Cost sharing allocation for construction, operations, and maintenance**

	For Project Depths < 50 ft	
Construction	Federal	Non-Federal

General Navigation Features (GNF)	75%	25+10% <u>1/</u>
Aids to Navigation	100%	0%
Service Facilities	0%	100%
Lands, Easements, Rights-of-way and Relocations (LERR)	0%	100%
<b>Operations and Maintenance</b>	<b>Federal</b>	<b>Non-Federal</b>
GNF (including mitigation)	100%	0%
Aids to Navigation	100%	0%
Local Service Facilities	0%	100%
LERR	0%	100%
<u>1/</u> Ten percent (10%) post-construction contribution is reduced by credit amount for LERR		
Note: Table derived from ER-1105-2-100, Table E-12, Navigation, Construction, and O&M, pages E-62 and E-63.		
Note: ER 1105-2-100, Table E-11 Navigation PED, pages E-61 and E-62		
PED - All PED, and planning accomplished after the feasibility study is cost shared at 75% Federal and 25% Non-Federal, CECW-PC Memorandum on Modification of non-Federal contribution in Design Agreement, 24 May 2013, which changed PED cost sharing to the same as project construction.		

as required by the USACE regulations for feasibility studies. As detailed in Table 4-8, the TSP has a total first project cost of \$387,762,000. This total includes costs for PED; construction management; construction of the GNF with both Federal and NFS in-kind contributions as applicable, Lands, Easements, Rights-of-way and Relocations (LERR) values; risk-based contingencies determined through the Abbreviated Risk Analysis (ARA); and associated costs for local service facilities and aids to navigation. The TPCS also includes a fully funded cost with escalation to the estimated midpoint of construction. Table 4-8 also reflects the estimated incremental annual maintenance costs (\$2,358,000).

**Table 4-8. Cost Allocation for the TSP (50' Bay Channel/52' Bar Channel)**

Description	Total Costs (K)	Implementation of Costs (K)			
		Federal	%	Non-Federal	%
General Navigation Features (GNF)					

*Mobile Harbor, Mobile, Alabama  
Integrated General Reevaluation Report with Supplemental Environmental Impact Statement*

Dredging: Deepening including Bend Easing and Turning Basin	\$350,372	\$262,779	75	\$87,593	25
Dredging: 100' Widening 3 Nautical Mile Lane	\$12,773	\$9,580	75	\$3,193	25
LERR	\$40	\$0	0	\$40	100
Preconstruction, Engineering & Design	\$8,542	\$6,406	75	\$2,136	25
Construction Management	\$4,029	\$3,022	75	\$1,007	25
Subtotal of GNF	\$375,756	\$281,791	75	\$93,969	25
10% of GNF		(\$37,576)	-	\$37,576	-
GNF LERR credit		\$40		(\$40)	
Associated Costs:					
Local Service Facilities: Berthing (ASPA)	\$11,397	\$0	0	\$11,397	100
Aids to Navigations (U.S. Coast Guard)	\$609	\$609	100	\$0	0
Total Estimated Costs:	\$387,762	\$244,860	63	\$142,981	37
<b>Incremental Annual Maintenance Cost (FY18 Price Level)</b>					
Deepening, Bend Easing, Widening, Turning Basin	\$2,358	\$2,358	100	\$0	0

GNF costs are cost shared 75% Federal and 25% NFS during construction. An additional 10% of the GNF costs, less the amount of LERR credit afforded to the NFS for the value of LERR, shall be paid by the NFS over a period not to exceed 30 years with interest. The average annual costs were determined to be approximately \$17.5 million for the TSP. The average annual benefit for the TSP is approximately \$52.0 million. Therefore, the benefit-to-cost ratio is estimated at 3.0 to 1 for the TSP plan. Also see Table 41, Appendix B for costs and benefits.

The cost estimate shown in Table 4-8 reflects all project features, including maintenance costs, real estate costs, and associated costs.



### 4.3.2. Project Schedule

Based on reasonable estimated productivities, the construction duration is estimated to range from 36 to 48 months. The overall schedule and durations may change depending on the time required to obtain congressional appropriations. Other areas of schedule uncertainty include the availability of dredging equipment to complete the work and to comply with environmental requirements for endangered species, and delays due to unexpected severe weather conditions. Table 4-9 summarizes the PED and construction activities.

**Table 4-9. Approximate PED and construction duration**

Description	Duration in Months	Cumulative Months
Division Engineer's Transmittal (S= PED Start)	0	S
Plans and Specifications	12	S+12
Advertise (Contingent upon funding) Contract	3	S+15
Award Contract	3	S+18
Construction Start (C=Construction Start)	0	C
Construction Complete	36-48	C+36/48

### 4.3.3. Operation, Maintenance, Repair, Rehabilitation, and Replacement

Increased O&M costs over the existing project O&M costs result from modifications of the Federal navigation channel as described. For the described measures, the estimated increases in incremental quantities that will need to be dredged were determined from engineering analyses of expected shoaling rates. The majority of increased shoaling is due to the increase in channel footprints. The increased annual cost for O&M dredging between the existing condition (45-foot project depth) and the future With-Project condition for the TSP is estimated to be \$2,358,000. O&M costs for the TSP is a 100% Federal expense. In cases of depths in excess of 50 ft, the O&M costs are 100% the responsibility of the NFS.

### 4.3.4. Financial Analysis of NFS's Capabilities

The NFS, the ASPA, concurs with the financial responsibility as it pertains to the cost sharing rules as outlined in Table 4-7, above. Under the WRDA of 1986, as amended by



Section 201 of the WRDA of 1996, Federal participation in navigation projects is limited to sharing costs for design and construction of the GNF consisting of breakwaters and jetties, entrance and primary access channels, widened channels, turning basins, anchorage areas, locks, and dredged material placement areas with retaining dikes. Non-Federal interests are responsible for and bear all costs for acquisition of necessary lands, easements, rights-of-way, and relocations; terminal facilities; as well as dredging berthing areas and interior access channels to those berthing areas. Current policy requires the NFS to document their ability to pay through submission of a self-certification of financial capability as described in CECW-PC memorandum dated 12 June 2007. Appendix E contains this certification.

#### **4.3.5. View of NFS**

The ASPA fully supports the TSP and has agreed to the cost sharing as outlined above. Appendix E contains the NFS's letter of intent which documents acceptance of, or desired departures from, the terms of the applicable model Project Partnership Agreement (PPA), including: 1) applicable cost sharing and financial policies; 2) policies regarding provision and valuation of non-Federal lands, easements, rights of-way, and dredged material placement areas provided by the NFS; 3) policies governing non-Federal project construction; and 4) other provisions required by law and policy for new start construction projects.

The NFS believes that there is opportunity to deepen and widen the navigation channel at Mobile Harbor to use current vessels more efficiently and accommodate larger vessels. Particularly important is the increase in the deployment of those larger vessels, which is occurring now and expected to increase with the completion of the Panama Canal expansion project.

The McDuffie coal shipments are currently utilizing Cape/Post-Panamax size vessels. At the current depth, vessels cannot fully utilize their capacity. Coal shippers forecast that availability of deeper drafts along with an expanded Panama Canal would increase the U.S. coal competitiveness in Asia.

In addition to the economic opportunities afforded by a larger channel, there also exists safety and potential environmental opportunities. Hazards of traffic moving in and out of Mobile Harbor as well as navigation features of the channel would be improved by a larger channel. There is also potential for beneficial use of sediment material that would be obtained from the channel dredging.

#### **4.3.6. Risk and Uncertainty**

Risk and uncertainty exists in the potential fluctuation of the Federal interest rate, changes in vessel operating costs, unexpected construction costs such as discovery of

unmarked/unknown pipelines or cultural resources, and deviations from vessel or cargo forecasts. Interest rates, forecasts, and vessel operating costs are discussed further in the Appendix B. Cost contingencies for items such as discovery of cultural artifacts and/or pipeline relocations are discussed in Section 7, Appendix A. There are also additional risks which were addressed during the study using a Risk Register. The purpose of the register is to apply a risk-based decision making approach throughout the study. The register was used to highlight areas of study risks and identify ways to address those risks, such as reducing the schedule, optimizing the study area, and identifying the optimum amount of modeling to make a risk-based decision.

Several assumptions applied to analyses during the study result in conservative cost and impact estimates and reduce cost risks. Of particular note is the application of the “maximum” widening measures. This assumption generates the “maximum” dredging quantities, construction cost estimates, and construction duration times. The same assumptions were also applied to all of the engineering and environmental modeling efforts and generated the “maximum” shoaling rates and impacts to water quality, wetlands and all other habitat types and species. If some or all of these measures are reduced through additional analysis during PED, reductions can be expected across a broad range of cost, and minimal environmental impacts would be further reduced. Additionally, the hydrodynamic, water quality, and sediment transport models are based on a 5 nautical mile length of widener (rather than the TSP for a 3 nautical mile length of widener) leading to a very conservative estimate of the associated impacts of that feature.

#### **4.4. Description of LERR**

The requirements for LERR should include the rights to construct, operate, and maintain channel improvement works in connection with the proposed project. Based on the current plan/profile study drawings, no fee or easement acquisition would be required for staging, access, construction, or O&M in furtherance of the project except for that portion of Little Sand Island, which is already owned by the NFS, as more particularly described in the Real Estate Plan (REP), Appendix D.

The TSP set out herein follows an existing authorized and navigable watercourse and potential deepening of this channel falls within the jurisdiction of the navigable waters of the U.S. which is identified as that area below the ordinary high water mark. Furthermore, it is readily apparent that said purposes of the proposed project have a nexus to navigation. As a result of applying the Determination of Availability two-step process, the issue of navigational servitude is deemed applicable to this project as it relates to the Federal construction and subsequent operation and maintenance responsibilities. Therefore, no further Federal real estate interest is required for project construction and operation and maintenance in navigable waters below the ordinary high water mark.

There are no real estate requirements for upland dredged material placement sites for the placement of dredged material. Moreover, Section 201 of the WRDA of 1996 redefined disposal site preparation costs as being GNF and not a real estate requirement. There are no real estate requirements anticipated for project access or temporary staging areas.

No relocations of facilities or utilities will be required based on current research under the current TSP. Additional channel surveys will take place post-feasibility to better reduce risk associated with facilities/utilities traversing the channel. There are no additional lands, easements, or rights-of-way to be acquired by the NFS in furtherance of the TSP unless future real estate interests are required for beneficial use or mitigation sites not yet identified.

For additional information, refer to the Appendix D - Real Estate Plan attached to this report.

## **SECTION 5.0 ENVIRONMENTAL EFFECTS**

This section describes the environmental effects of alternative actions for the proposed Mobile Harbor Federal Navigation Project. Performing an evaluation of environmental consequences for proposed Federal actions is a requirement of Federal law (40 C.F.R. §§ 1500-1508). An impact analysis must be compared to a significance threshold to determine whether a potential consequence of an alternative is considered a significant impact. If the impact is significant, it may be mitigable (i.e., measures are available to reduce the level of impact, so it is no longer significant) or unmitigable. The discussion includes potential impacts to biological, physical, and chemical conditions, fishing and recreation, and socioeconomic conditions in the project area.

The following evaluation of environmental effects compares the baseline conditions of the No Action Alternative which includes a projected SLR of 0.5 meters (from here on referred to simply as the No Action Alternative) to the modeled channel improvement dimensions as described in Section 4.1. The TSP consists of: deepening the existing channel an additional 5 ft (existing 45-foot deep channel in the bay to 50 ft and existing 47-foot deep channel in the bar to 52 ft); adding an additional 100 ft of widening for a distance of 3 nautical miles beginning at the upper end of the bend area at the 50-foot depth; including bend easing with the deepening at the upper end of the Bar Channel; and, modification to the Choctaw Pass Turning Basin to ensure safe operation at the 50-foot depth. For preparation of the Draft GRR/SEIS, the USACE, Mobile District conducted extensive modeling of a "maximum potential impacts" scenario with potential environmental effects equal to or greater than the TSP (i.e. dredging to a depth of 50 ft with widening of a 5 nautical mile channel section by 100 ft). It should be noted that the actual TSP represents conditions less than the modeled channel dimensions.

### **5.1. Geographic Setting**

Neither the future Without-Project condition/No Action Alternative nor the proposed project including any future O&M activities would change the current general setting within the project area. The proposed project would not directly affect land use. It is not anticipated that the proposed project alone would result in the conversion of additional natural areas to urban use. The analysis is based on the existing throughput capacity estimated for Mobile Harbor and the project itself would have no effect on the conversion of additional natural area.

With the exception of Little Sand Island, the dredging templates lie entirely within the water column of Mobile Harbor and the project would not include dredging any natural upland or wetland areas. Maintenance dredging under the No Action Alternative, would place dredged material in existing dredged material placement areas and these actions would not affect land use. The effects to Little Sand Island is discussed in Section 5.7.

## **5.2. Climate, Tides, and Gulf Circulation**

Generally, the scale and type of activities associated with the No Action Alternative, TSP, or future O&M activities would not result in overall regional climate, meteorological, or oceanographic impacts. No activities associated with any of the alternatives could result in impacts on regional processes and would not change the climate or weather patterns in the project area. As a result there would be no impacts to winds, rainfall, temperature, astronomic tides, or the Gulf of Mexico circulation patterns.

## **5.3. Mobile Bay and Coastal Processes**

Hydrodynamic modeling was conducted by the ERDC to characterize the existing conditions (e.g., flows, circulation, waves, etc.) of the study area and determine the relative changes in those conditions due to proposed navigation channel modifications. A summary of the overall approach and results of these analyses are described in detail in Section 6.1, Appendix A.

### **5.3.1. Waves**

As covered in greater detail in Appendix A, parallel versions of ADCIRC and STWAVE coupled via the CSTORM-MS framework (Massey *et al*, 2011) were utilized to provide the offshore water surface elevation tidal boundary, wave height, period, direction, and radiation stress gradient forcing to the GSMB hydrodynamic (MB-CH3D-WES) and sediment transport (MB-SEDZLJ) modules. The time period selected for GSMB hydrodynamic, sediment transport, and water quality modeling of Mobile Bay was January through December of 2010. This time period represented an average hydrologic year, as illustrated in Appendix A, and the annual mean flow for year 2010 also roughly falls into average condition; however, January and February are closer to high flow conditions, whereas July through December are within low flow conditions. The combination of this data results in a year (i.e., 2010) that covers the range of hydrological conditions (i.e., low, average, and high). In addition to the 2010 time period, CSTORM was used to provide a screening level comparison of storm tide levels in Mobile Bay between existing conditions and with project conditions for two historical hurricanes, Hurricane Katrina 2005 and Hurricane Ike 2008. These two hurricanes were selected as they produced some of the highest water levels on record in the area.

#### **5.3.1.1. Alternative 1 – No Action**

Under the No Action Alternative, current channel and harbor maintenance operations would continue. Dredging and placement operations would remain unchanged utilizing the current water quality certification for Mobile Harbor. Under this scenario, wave conditions in and around the project would be unchanged.



### **5.3.1.2. Alternative 2 – TSP**

#### **5.3.1.2.1. Project Construction**

**General Wave Climate.** The model results indicate that implementation of the TSP produces only slightly elevated peak water levels and wave conditions as compared with the baseline channel configuration and negligible changes in pre-storm tides. The largest simulated difference in maximum water surface elevation between the With- and Without-Project depths was 0.07 ft, which is well within the uncertainty of the model and would result in negligible changes in the wave climate. Further details of this analysis are provided in Attachment A-1, Appendix A.

**Ship Wake.** A vessel generated wave energy (VGWE) assessment was conducted to quantify the relative changes in wave energy due to future vessels calling at Mobile Harbor. The investigation included field data collection using a suite of five pressure sensors located north of Gaillard Island. A unique and efficient method of data processing was employed using a continuous wavelet transformation (CWT) to extract the vessel generated disturbances from a continuous time series by utilizing frequency modulation or “chirp” signal produced and shown to be valid within the context of large data sets where random errors can be averaged. Overall, the field data collection collected for this study proved to be valid when used for general trending.

Potential impacts of VGWE were evaluated by comparing the relative difference of with and Without-Project conditions using forecasted vessel calls for years 2025 and 2035. Vessel speed was obtained from a statistical summary of 2016 Automatic Information System data categorized by vessel length. Results of the analysis indicates a reduction in vessel generated wave energy for the future With-Project condition relative to the future Without-Project condition. This is the case because the demand for future commodities and goods will be the same, with or without a wider/deeper channel; therefore, less vessels are required to call Mobile Harbor to meet that demand if the project is implemented. In other words, fewer vessels will call Mobile Harbor in the future if the channel is deepened/widened than if it’s not. This reduced number of vessels anticipated to call Mobile Harbor results in less vessel generated wave energy affecting the study area. Further details on VGWE is located in Allen (2018) which is also provided as Attachment D to Appendix A.

#### **5.3.1.3. Future Maintenance**

Future maintenance and operations will be consistent with the current O&M dredging practices and would not be expected to cause any further impacts to the wave conditions in and around the project area.

### **5.3.2. Currents**

The modeling conducted by the ERDC as described in Section 6.1.2, Appendix A utilized the three-dimensional, baroclinic, multi-block hydrodynamic circulation model CH3D-MB to conduct hydrodynamic computations on a non-orthogonal curvilinear or boundary-fitted grid of the study area. The physical processes impacting circulation and vertical mixing that were modeled included tides, wind, wave radiation stress gradients, density effects (salinity and temperature), freshwater inflows, turbulence, and the effect of the earth's rotation. Further details of this analysis are provided in Attachment A-1, Appendix A.

#### **5.3.2.1. Alternative 1 – No Action**

Under the No Action Alternative, current channel and harbor maintenance operations would continue. Dredging operations would remain unchanged utilizing the current water quality certification for Mobile Harbor. Under this scenario, the currents in and around the project would be unchanged.

#### **5.3.2.2. Alternative 2 – TSP**

##### **5.3.2.2.1. Project Construction**

The model results indicate implementation of the TSP produces only slightly elevated peak water levels as compared with the baseline channel configuration and negligible changes in pre-storm tides and currents. The largest simulated difference in maximum water surface elevation between the With- and Without-Project depths was 0.07 ft, which is well within the uncertainty of the model and would likely result in negligible changes to the currents in and around the project area. Further details of this analysis are provided in Attachment A-1, Appendix A.

##### **5.3.2.3. Future Maintenance**

Future maintenance and operations will be consistent with the current O&M dredging practices and would not be expected to cause any further impacts to the currents in and around the project area.

### **5.3.3. Sediment Transport**

In an effort to help better understand the system and improve the sediment transport modeling of Mobile Bay, remote monitoring stations were installed as part of this study. Data collection was used to help quantify sediment fluxes into the bay from riverine sources and measure the discharge of the primary rivers entering north Mobile Bay. Details of this data collection and analysis can be found within Ramierz, M. et. al (2018). These stations were equipped with physical samplers, optical turbidity sensors, and acoustic instruments for measuring water velocity and acoustic backscatter. Long-term

datasets were augmented with local, boat-based measurements of the same quantities to calibrate the remote records. The combined datasets were used to derive calibrated, continuous time series of water discharge and suspended sediment concentrations at each of the remote sites.

Sediment transport modeling of Mobile Bay was conducted to assess the relative changes in sedimentation rates within the navigation channel, dredged material placement sites, and surrounding areas as a result of channel modifications within the bay. As described in Section 2.9, Appendix A, the sediment transport model was built upon previous modeling conducted in 2012 to evaluate thin-layer placement of maintenance dredged material as described in Appendix A. Additional details of the estuarine sediment transport modeling effort are provided in Section 6.3.1, Appendix A.

Coastal sediment modeling was used to assess the relative changes in sediment pathways and morphological response on the ebb tidal shoal and adjacent coastal areas. This modeling work built upon the ongoing collaborative data collection and modeling efforts being conducted as part of the National Fish and Wildlife Foundation (NFWF) Alabama Barrier Island Restoration Assessment utilizing field experiments conducted as part of the study which included bathymetric, current, wave and sediment measurements. Additional details of the coastal sediment transport modeling effort are provided in Section 6.3.2, Appendix A.

#### **5.3.3.1. Alternative 1 – No Action**

Under the No Action Alternative, current channel and harbor maintenance operations would continue. Generally, dredging and disposal operations would remain unchanged utilizing the current water quality certification for Mobile Harbor. It is anticipated, however, that expansion of the SIBUA will extend its boundaries to include areas within the Sand Island-Pelican Island complex. The expansion would be to the north and west which follows the shoal and pathway of sediment transport towards Dauphin Island. Doing so provides an effective means of continued bypassing of sand dredged from the Bar Channel to the downdrift littoral system. At that time, the necessary analysis and coordination actions will be conducted under the O&M program. Under this scenario, it is expected that sediment transport in and around the SIBUA would be modified to return sandy material to the local littoral system.

#### **5.3.3.2. Alternative 2 – TSP**

Sediment transport modeling of Mobile Bay and the ebb tidal delta was conducted to assess the relative changes in sedimentation rates within the navigation channel, dredged material placement sites, and surrounding areas. As a result, channel modifications within the bay were built upon previous modeling conducted in 2012 to evaluate thin layer placement of maintenance dredged material as described in Appendix A. The results

from this effort indicated a minimal difference range of no greater than +/- 0.3 feet of erosion when compared to the existing conditions and indicates no discernable net erosion or net deposition. Additional details of the estuarine sediment transport modeling effort are provided in Section 6.3.1, Appendix A.

#### **5.3.3.2.1. Project Construction**

**Estuarine/Mobile Bay.** Channel modifications may change sedimentation rates and patterns, which directly impact maintenance dredging requirements. Field data collected in 2012 to parameterize cohesive sediment transport processes in the study area are documented in Gailani, J. Z. et al. (2014). The field experiments included Sedflume erosion and settling velocity measurements conducted using the Particle Imaging Camera System (PICS). Additional field studies were conducted in 2016 to more appropriately describe project boundary conditions. These consisted of measuring suspended sediment concentrations and discharges at the seven stations in the delta and upper bay (Ramirez et al. 2018). Cohesive sediment process descriptions were formulated from the data collection efforts and utilized in the development of the estuarine sediment transport model (GSMB-SEDZLJ).

GSMB-SEDZLJ is an advanced sediment bed model. This model accounts for the following coastal dynamic erosional processes: bed load transport, bed sorting, armoring, consolidation of fine-grain sediment dominated beds, settling of flocculated cohesive sediment, settling of individual non-cohesive sediment particles, and deposition which are further discussed in in Section 6.3, Appendix A. The model accounts for the effect of bottom slope in predicting bed load transport of the non-cohesive sediment size classes as well as in the equation (developed from the analysis of the Sedflume data) used to predict the re-suspension of mixed grain sediments. Also added was the capability to simulate the formation of a fluff layer on top of an existing sediment bed. Being able to represent the resuspension of this layer during the early stages of the accelerating flow following slack water is essential to accurately simulating sediment transport, in particular within stratified estuaries such as Mobile Bay.

Results from the one year model simulation with the TSP condition show a minimum difference range of no greater than +/- 0.3 ft of erosion when compared to the No Action Alternative. Subsequently, these results indicate that there is no discernable net erosion or net deposition throughout the bay. Similar results and conclusions were found for the future With- and Without- Project Conditions when accounting for mean sea level change. With no discernable impacts associated with waves, currents, and sediment transport throughout the project area, there would be no expected erosion or changes to the position of the Mobile Bay shorelines resulting from the TSP. Additional details of the estuarine sediment transport modeling effort are provided in Attachment A-1, Appendix A.

**Ebb Tidal Delta.** The purpose of the coastal sediment transport modeling was to assess the relative changes in sediment pathways and morphological response on the ebb tidal shoal and adjacent coastal areas as a result of the proposed channel modifications to deepen the existing Bar Channel by 5 ft. Details of these data collection efforts are contained within USACE and USGS (2017) *Alabama Barrier Island Restoration Assessment Interim Report*. Descriptions were formulated from these data sets and utilized in the development of the coastal sediment transport model (Delft-3D) as discussed further in Attachment A-2, Appendix A.

The model domain was expanded to include probable effects on shoreline changes with the minimum extent per USACE EM 1110-2-1613 guidance of 10 miles east and west of the channel and adequately represented the deep navigation channel, associated modifications, and irregular shoreline configurations of the flow system. Scenarios were also evaluated for climate, with the only difference being the With-Project Condition incorporated annual dredged material placement in the SIBUA as part of the 10-year simulations. The modeling results indicate minimal difference in bed level changes between the TSP and Existing Conditions in the bay and on the ebb tidal shoal. Similar results and conclusions were found for the future With- and Without-Project Conditions (i.e., accounting for mean sea level change).

Results of the modeling conducted by the USGS (2018) indicate minimal differences in morphologic change in the nearshore areas of Dauphin Island and Pelican Island as a result of the channel modifications. This suggests that sediment delivery away from the ebb tidal shoal to these areas is similar under these two scenarios and that shoreline positions are unlikely to be impacted as a result of the modified channel. Although comparison of the two simulations shows some spatial shifting of sand offshore of the Morgan Peninsula, the patterns of erosion/deposition in the two simulations are quite similar. Based on these results, it also appears unlikely that these changes would alter sediment delivery to the peninsula and only minor impacts to the terminal end of the peninsula closest to the channel could occur. Additional details of the coastal sediment transport modeling effort are provided in Attachment A-2, Appendix A.

#### **5.3.3.3. Future Maintenance**

Future maintenance and operations will be consistent with the current O&M dredging practices including the SIBUA expansion and would not be expected to cause any perceivable change to wave and current conditions which would not result in additional impacts to sediment transport processes in and around the project area.

#### **5.3.4. Sea Level Change**

Based on an extrapolation of the high curve values, sea level in the project area would be approximately 5 ft higher in the year 2115 relative to North American Vertical Datum



1988. The NOAA Digital Coast Sea Level Rise Viewer (NOAA Office for Coastal Management, 2011) was utilized to visualize the first estimate of the vertical and horizontal extents of the potential sea level change impacts.

A detailed description on the effects of sea level change in relation to the navigation project can be found Section 2.10.1, Appendix A. Generally, neither the No Action Alternative nor the TSP or future maintenance activities would have an effect on the rates of sea level change.

However, it is predicted that the future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters and consequently result in impact to wetland assemblages and distributions as the SLR occurs (Kirwan and Megonigal, 2013). In many regions the predominant impact of long-term SLR will be excessive inundation leading to a conversion of wetland features to open water areas, especially in landscapes where landward retreat is restricted (USGS, others). Similarly, changes from Without-Project conditions to With-Project conditions with SLR show an increase in relative salinity tolerance thresholds for the SAV species as they exist today ranging from -1 to 5 ppt. A larger proportion of SAV habitat will be exposed to higher salinities due to SLR impacts than that from implementation of the TSP.

#### **5.4. Geology, Soils, and Sediments**

The significance criterion for geology, soils, and sediment would be a permanent change in underlying bedrock or sediment stratigraphy that interferes with the natural movement and deposition of sediments in the Mobile Bay and nearshore Gulf of Mexico.

##### **5.4.1. Geological Setting**

The significance criterion for geology would be a permanent change in underlying bedrock that interferes with the natural movement and deposition of sediments in the vicinity of the project. No activities from project construction, sediment placement, or future maintenance and operations will have an impact on the underlying geological framework.

##### **5.4.2. Soils**

###### **5.4.2.1. Alternative 1 – No Action**

Under the No Action Alternative, there would be no change in existing conditions and no impacts on soils. A Draft Section 404(b)(1) Evaluation Report has been prepared for this study which describes the existing sediment characterizations in the navigation channel

and disposal areas. A copy of the Draft 404(b)(1) is included in Attachment C-2, Appendix C.

#### **5.4.2.2. Alternative 2 – TSP**

##### **5.4.2.2.1. Project Construction**

The sediment profile in the new work dredging areas would be altered as the sediment would be removed and placed in the disposal areas. Sediments placed within the relic shell mined area would result in a change of the surface sediments to be similar to the new work material. Underlying sediments will remain unchanged. More information pertaining to soils can be found in the Draft 404(b)(1) Report located in Attachment C-2, Appendix C

#### **5.4.2.3. Future Maintenance**

Other than the effects of the dredging operations, future maintenance practices will be consistent with the current O&M dredging practices and would not be expected to cause any further impacts to the underlying soil conditions.

#### **5.4.3. Geotechnical Conditions**

##### **5.4.3.1. Alternative 1 – No Action**

Under the No Action Alternative, current channel and harbor maintenance operations would continue. Dredging operations would remain unchanged utilizing the current water quality certification for Mobile Harbor. Under this scenario, there would be no change to the subsurface geotechnical properties and conditions associated with the existing navigation channel.

##### **5.4.3.2. Alternative 2 – TSP**

###### **5.4.3.2.1. Project Construction**

The existing channel side slopes were achieved by making a box cut to the excavation beyond the horizontal extents of the channel bottom. As this is done, the material falls to its angle of repose which creates side slopes at approximately 1V:5H. The slopes for the deepening and the widening will be cut in a similar manner. Slope stability is a concern where the Choctaw Pass Turning Basin will be expanded. The turning basin was initially constructed by creating slopes on the north, east, and south sides of Choctaw Pass, between Pinto Island and Little Sand Island. Slope stability analyses, performed during the design of the turning basin, informed the decision to design the basin slopes at a 1V:4H. Slopes of 1V:5H were also analyzed; however, it showed that flatter slopes would

require excavation far enough back toward Pinto and Little Sand Island that it would, in effect, remove resisting material that supports nearshore portions of the Pinto Island upland disposal area. The expansion of the turning basin will require excavation in either the north or south directions to accommodate longer ships and will likely be towards the southern side of the basin into Little Sand Island. As such, slope stability analyses are necessary to account for the design of both submarine and upland slopes to avoid slope failure and subsequent deposition of material into the turning basin. The channel slopes will be excavated as has been done under other construction action for the channel and turning basin. It is not anticipated that the excavating the new slide slopes would have an effect on soil types or underlying stratigraphy. However, additional slope stability analyses will be performed during Planning, Engineering, and Design (PED) Phase of this project. Flatter slopes will be considered at that time in a suite of slope stability analyses.

#### **5.4.3.3. Future Maintenance**

Other than the effects of the dredging operations, future maintenance practices will be consistent with the current O&M dredging practices and would not be expected to cause any further impacts to the underlying geotechnical conditions

#### **5.4.4. Sediment Quality**

##### **5.4.4.1. Alternative 1 – No Action**

Under the No Action Alternative, there would be no change from existing conditions and no additional impacts on sediment quality from continued maintenance practices.

##### **5.4.4.2. Alternative 2 – TSP**

###### **5.4.4.2.1. Project Construction**

During the PED phase of the Mobile Harbor GRR/SEIS, sediment testing and evaluation will be required for all material proposed for placement in the Mobile ODMDs. Material dredged as part of routine O&M along with the proposed new work dredged material must comply with guidelines in accordance with the MPRSA of 1972, CWA, and the EPA ocean dumping criteria (40 Code of Federal Regulation (CFR) §227).

Sediment sampling will be required to obtain a MPRSA Section 103 concurrence from the EPA for placement in the Mobile ODMDs. Sampling will include physical sediment analyses, bulk sediment analysis, standard and modified elutriate testing (full Tier III testing), water column bioassays, whole sediment bioassays, and bioaccumulation studies of dredged material samples. These tests will follow guidance in the: *Inland Testing Manual* (EPA 1998); *Ocean Testing Manual* (USACE/EPA 1991); and the *Regional Implementation Manual, Requirements and Procedures for Evaluation of the*

*Ocean Disposal of Dredged Material in Southeastern Atlantic and Gulf Coastal Waters (SERIM) (USACE/EPA 2008).*

Sediment core samples are proposed to be taken at 14 locations in the Mobile Bay (to a depth of 54 ft MLLW) and the Bar Channel (to a depth of 56 ft MLLW). Ten sample locations in the Bay Channel will be similar to past O&M locations. Additionally, four samples to be taken in the Bar Channel will be new locations. One additional sample will be taken in the Choctaw Pass Turning Basin (to a depth of 54 ft MLLW).

The upper northeastern quadrant of the bay contains relic shell mined areas (highly hypoxic micro-environments) which were used for harvesting of relic shell material and have since left large voids/holes in the sediment. These holes could potentially be filled with new work dredged material associated with the GRR. To that end, grab samples from within the relic mines will be taken to assess the physical and chemical characteristics of the material in compliance with the Inland Testing Manual. These results will be compared to the physical and chemical characteristics of the dredged material from the channel prior to placement in the relic shell mined areas.

At this time, specific impacts associated with the new work sediment testing and evaluation during the PED phase of the study are not known. All current presumptions are that the new work material associated with project sampling would be similar to that already tested and should be suitable for placement within the identified placement areas. However, testing is still required to ensure compliance with the MPRSA and CWA material suitability determinations. Based on the results of new sediment testing for the turning basin and LRR, presented in Section 2.3.4, it is anticipated that no contaminants will be detected..

#### **5.4.4.3. Future Maintenance**

It is believed that the shoaling and characteristics of future maintenance material within the modified channel will be similar to current maintenance sediments. Future maintenance and placement practices will be consistent with the current O&M dredging practices with the addition of the expanded SIBUA and ODMS. The sediment testing and evaluation requirements will continue as required for all future maintenance material as described above.

### **5.5. Water Quality**

The output from the modeling efforts were analyzed to assess relative differences in DO, salinity, temperature, total suspended solids, and nutrients. A more detailed discussion on the modeling effort is included in Section 6.2, Appendix A.

#### **5.5.1. Dissolved Oxygen**

### **5.5.1.1. Alternative 1 – No Action**

Under the No Action Alternative, there would be no change from existing conditions and no impacts on DO.

### **5.5.1.2. Alternative 2 - TSP**

#### **5.5.1.2.1. Project Construction**

Hydrographic and water quality modeling performed by the ERDC is documented in the Appendix A. Results of simulations comparing the Without- and With-Project conditions of the bay and river characterizes changes in DO conditions were assessed. DO results for surface waters show that during the first period of the year, tributary inflows and their associated water quality provide more significant roles in many locations in the system. Stations located in rivers, channels or even the upper bay were dominated by the riverine flows and riverine water quality. In many instances the waters at these locations were completely mixed with there being little DO variation from surface to bottom. As tributary inflows decreased, tidal flushing and coastal processes dominated flow conditions with offshore waters imparting in larger influences in DO and water quality conditions. Bottom DO results on the Mobile River indicated that DO levels fluctuated with frequent swings of several mg/l of daily average DO which varied from 8 or greater mg/L to 3 mg/L. These swings were due to fluctuating inflows enabling an influx of bay waters with high salinities and lower DO. The model simulations showed DO levels decreased in response to a combination of factors including increasing temperature and salinity which decreased DO saturation levels. Simulated DO levels in the bottom waters are sensitive to several issues in which circulation and flushing are primary factors. Water column conditions in regards to oxygen demanding substances, temperature, and salinity all continually impact DO levels in the water column. External impacts include benthic fluxes, sediment oxygen demand, and boundary loads.

**Error! Reference source not found.** and **Error! Reference source not found.**, Appendix C show a time series of the daily average surface and bottom DO concentrations for the Without and With Project conditions. As the figures indicate, there are very minor differences in the DO concentrations. The same patterns, trends, and behavior exist after the channel widening and deepening. There are no changes in duration or exposure to any level of DO at any of the locations shown.

Since DO levels represent the end product of numerous water quality processes, changes in any of those processes can have an impact on DO levels. Values presented for January/February time period represents high water flow conditions, those values for the mid-year period represents typical or average flows, and the values for the fall (October) period represent low flow conditions.



The simulated results indicate very little change in DO resulting from implementation of the TSP. Differences in the monthly DO at the bottom between With-Project and Without-Project (existing condition) results indicate maximum differences of 0.3 milligrams per liter over the low flow/hot conditions. This in essence indicates no discernable DO changes, as this is well within the uncertainty of the water quality model. The results of the modeling analyses show that no impact from the project is predicted for DO levels in the surface or bottom waters at these locations and that the daily average DO conditions With-Project are the same as the Without-Project.

The same modeling approach and setup was used to evaluate the potential impact of a proposed SLR. For comparison purposes the Without-Project case was simulated using hydrodynamics incorporating SLR to generate a Future Without-Project condition. Surface and bottom time series comparisons of daily average model output for the same locations used for the Existing and With-Project cases were evaluated for the Existing and With-Project with SLR cases. The same patterns, trends, and behavior exist after the channel widening and deepening are incorporated in the model and no impacts to DO concentrations are expected as a result in future sea level change. The simulated results for the existing and project condition are nearly identical, indicating very little change in DO resulting from implementation of the TSP. Differences in the monthly DO at the bottom between With-Project and Without-Project (existing condition) results indicate maximum differences of 0.3 mg/L over the low flow/hot conditions. This indicates no discernable DO changes, as this is well within the uncertainty of the water quality model. The results of the modeling analyses show that no impact from the project is predicted for DO levels in the surface or bottom waters at these locations and that the daily average DO conditions With-Project are the same as the Without-Project.

The same modeling approach and setup was used to evaluate the potential impact of a proposed SLR. For comparison purposes the Without-Project case was simulated using hydrodynamics incorporating SLR to generate a future Without-Project condition. Surface and bottom time series comparisons of daily average model output for the same locations used for the Existing and With-Project cases were evaluated for the Without-and With-Project with SLR cases. The same patterns, trends, and behavior exist after the channel widening and deepening are incorporated in the model and no impacts to DO concentrations are expected as a result in future sea level change.

As presented in Section 3.8.8, Appendix C, almost 1,200 measurements of salinity and DO were taken during fish collections by both MRD and the ERDC. Mean DO was approximately 7.0 mg/l at all zones. However, hypoxia (minimum DO) was measured at all zones except for the transition and freshwater zones. Higher DO in the two latter zones may have been due to the low sample size compared to Mobile Bay. Specific predicted changes in DO as related to the various aquatic resources evaluated for this study such as wetlands, SAV, benthic communities, oysters, and fish can be found in Attachment C-1.

### **5.5.1.3. Future Maintenance**

Other than the effects of implementing the TSP, future maintenance practices will be consistent with the current O&M dredging practices and would not be expected to cause any further changes to the overall DO conditions in the bay and river.

## **5.5.2. Nutrients**

### **5.5.2.1. Alternative 1 – No Action**

Under the No Action Alternative, there would be no change from existing conditions and no impacts on nutrient loads in the project area.

### **5.5.2.2. Alternative 2 – TSP**

#### **5.5.2.2.1. Project Construction**

Model predictions for ammonium and nitrate were conducted in the water quality as presented in the Appendix A. Results indicate that the simulated nutrient levels are consistent with measured nutrient observations. Increases in ammonium at the mouths of the Mobile and Tensaw River correspond to changes in flow conditions. When very low flow conditions are specified, ammonium levels at the river mouths decrease correspondingly. Results of the water quality modeling also reveal that nitrate levels are consistent with observed values. Subsequently, increases in nutrient levels would not be expected resulting from implementation of the TSP.

### **5.5.2.3. Future Maintenance**

Other than the effects of implementing the TSP, dredging operations, future maintenance and disposal practices will be consistent with the current O&M dredging practices and would not be expected to cause any further changes to the overall nutrient concentrations in the bay and river.

### **5.5.3. Salinity**

#### **5.5.3.1. Alternative 1 – No Action**

Under the No Action Alternative, there would be no change from existing conditions and no impacts on salinity.

#### **5.5.3.2. Alternative 2 – TSP**

##### **5.5.3.2.1. Project Construction**

Hydrographic and water quality modeling performed by ERDC is documented in the Appendix A. Results of simulations comparing the Without- and With-Project conditions of the bay and river characterizes changes in conditions were assessed. In order to assess the changes in salinity distribution as a result of the project, model results were processed for monthly statistics. Monthly statistics shows long-term response of salinity distribution. First the results are analyzed for depth-averaged salinity, surface salinity, and bottom salinity. The monthly statistical parameters include mean, standard deviation, minimum, maximum, and percentiles (1, 5, 10, 25, and 50 percentiles) representing the varying flow conditions. These statistics were provided to the habitat assessment teams for further analysis of potential effects specific to different aquatic resources considered.

Differences in the monthly mean of depth-averaged salinity between results of the With-Project and Without-Project (existing condition) show changes ranging between 0 to 2 ppt. The figures presented in Section 2.4.3, Appendix C show the distributions for mean depth-averaged salinity for February (wet condition) and October (dry condition). The channel generally exhibits higher salinities than shoals. As shown for the Without-Project conditions, dry conditions typically experienced in the fall allows for more salt intrusion through the navigation channel to Mobile River than wet conditions of the winter months. As presented in Appendix C, the largest changes in salinities are located on the western side of the bay with the largest differences located closest to the channel in the vicinity of Gaillard Island and the turning basin. The results of the modeling indicate that the differences in the monthly mean depth-averaged salinity between the With-Project and Without-Project (existing condition) ranges between 0 to 2 ppt and that changes throughout the project area are considered minimal. Specific predicted changes in salinity as related to the various aquatic resources evaluated for this study such as wetlands, submerged aquatic vegetation, benthic communities, oysters, and fish can be found in Attachment C-1 and presented later in this report.

##### **5.5.3.3. Future Maintenance**

Future maintenance practices will be consistent with the current O&M dredging practices and would not be expected to cause any further changes to the overall salinity conditions in the bay and river.

## **5.5.4. Turbidity and Suspended Solids**

### **5.5.4.1. Alternative 1 – No Action**

Turbidity in the Mobile Bay and surrounding waterbodies would remain similar to existing conditions due to continued disturbance processes of sediments in the shallow areas. These impacts would be temporary and not increase turbidity levels above that of the existing conditions..

### **5.5.4.2. Alternative 2 – TSP**

#### **5.5.4.2.1. Project Construction**

Dredging operations are likely to have a temporary and minor impact to water quality nearby the dredging and placement areas. The proposed project construction activities would have dredges operating in various areas of the channel for extended periods. Hopper dredges are also often associated with increased turbidity mostly at the discharge areas. The suction drag arms of the hopper dredge hydraulically remove sediment from the dredged site and discharge the material into storage hoppers on the dredge. During operations within the Bar Channel, fine sediments (primarily silt, clays, and fine sands) are allowed to wash overboard (overflow) to maximize the load of sediment for transport to the placement area. This overflow process if used during the construction activities is one source of turbidity plumes and sedimentation generated by the hopper dredge. The distance that sediment plumes may extend is dependent upon the type of dredge, how it is operated, currents, and the nature of the sediments within the dredged area. A study performed by Newell and Siederer (2003) (high current velocities) showed that, in most cases, coarse material up to sand-size particles settles within 650 to 1,970 ft of the point source of discharge, depending on depth of water, tidal velocity, and the velocity of flow from the discharge pipe. During hopper dredging operations in the Baltic, Gajewski and Uscinowicz (1993) noted that the main deposition of sand from hopper dredge overflow was confined to distances within 490 ft on each side of the dredge.

For cutterhead suction dredges, turbidity is only generated at the seafloor by the cutterhead where sediment suspension occurs during the process of removing sediments. However, sediments are usually confined to the immediate vicinity of the cutterhead and not widely dispersed into the water column (LaSalle et al., 1991). Impacts resulting from placement activities are presented in Section 3.7

Results of the water quality modeling indicate that the predicted levels of total suspended solids are representative of the observed data. Subsequently, there would be no expected increase in the concentrations of the turbidity as a result of the implementation of the TSP. The USACE is required to implement appropriate best management practices (BMPs) to minimize turbidity impacts to the maximum extent practicable under the ADEM

Section 401 Water Quality Certification conditions. Turbidity generated by the activity must not cause substantial visible contrast nor result in an increase of more than 50 Nephelometric Turbidity Units (NTU) above background turbidity levels in state waters. As part of the water quality certification by the ADEM, the USACE is required to conduct daily inspections of the sediment placement activities during the life of the project to ensure that in-stream turbidity resulting from active dredging and placement activities will not cause the discharge of sediment into wetlands, substantial visible contrast with the receiving waters greater than 400 feet from the activity or result in an increase of 50 NTUs above background turbidity levels in the receiving waters. Should these conditions be exceeded, the USACE must suspend operations and immediately notify the ADEM of any resultant work stoppages. Work will not be resumed until turbidity levels return to compliance conditions.

#### **5.5.4.3. Future Maintenance**

Future maintenance and operations will be much as they exist currently. Turbidity in the Mobile Bay and surrounding waterbodies would remain similar to existing conditions due to continued disturbance processes of sediments in the shallow areas. These impacts would be temporary and localized and would not increase turbidity levels above that of the existing conditions. The USACE will continue to implement BMP and turbidity compliance measures as required by the ADEM's water quality certification for the Mobile Harbor project.

#### **5.5.5. Water Temperature**

##### **5.5.5.1. Alternative 1 – No Action**

Under the No Action Alternative, there would be no change from existing conditions and no impacts on temperature would occur.

##### **5.5.5.2. Alternative 2 – TSP**

###### **5.5.5.2.1. Project Construction**

Hydrographic and water quality modeling performed by the ERDC is documented in Appendix A. Results of simulations compared the existing and With-Project conditions of the bay to characterize Mobile Bay's water temperatures. Figure 3-5, Appendix C illustrates the comparison between the simulated existing and With-Project daily average surface and bottom water temperatures for Mobile Bay. Values for January/February time period represents high water flow conditions, those values for the mid-year period represents typical or average flows, and the values for the fall (October) period represent low flow conditions.



The simulated results for the existing and project condition are nearly identical, indicating very little change in surface and bottom temperatures resulting from implementation of the TSP.

#### **5.5.5.3. Future Maintenance**

The future maintenance practices will be consistent with the current O&M dredging practices and would not be expected to cause any further changes to the overall water temperatures conditions in the bay and river systems.

### **5.6. Groundwater**

As also described in Section 5.4.2, Appendix A, there are two major aquifers in Mobile and Baldwin Counties that act as recharge areas (Gillet et al., 2000). These aquifers are referred to the Miocene-Pliocene Aquifer and the Watercourse Aquifer (Chandler et al., 1985). The Watercourse Aquifer is located in the Pleistocene and Holocene alluvial deposits, and the Miocene-Pliocene Aquifer lies within the underlying series of the same name. Clay deposits are present in both of these series, especially in the Miocene-Pliocene. These clay layers act as aquitards within the Miocene-Pliocene, allowing for multiple aquifers, which are hydraulically connected. The recharge areas for the Watercourse Aquifer are in close proximity to the bay, rivers, and other low-lying tributaries and waterways that are hydraulically connected to the bay. This aquifer is unconfined and also hydraulically connected to the Miocene-Pliocene Aquifer, making the two aquifers relatively subject to natural and manmade contaminants. Chandler et al. (1985) state that even though the Miocene-Pliocene Aquifer has a high yield, only a fraction of this groundwater can be used as there are many concerns with saltwater intrusion. Additionally, the Watercourse Aquifer is susceptible to contaminants via land source (Gillet et al., 2000), resulting in very few water supply wells that rely on the Watercourse Aquifer for potable water. A detailed discussion on these aquifers can be found in Section 5.4.2 of Appendix A.

#### **5.6.1. Alternative 1 – No Action**

Under the No Action Alternative, current channel and harbor maintenance operations would continue for Mobile Harbor. The aquifers and groundwater in the vicinity of the navigation channel have already been exposed during previous channel modifications. Since the aquifers and groundwater are not used as water supplies for the area, the No Action Alternative would have no impacts to the local groundwater supplies.

#### **5.6.2. Alternative 2 – TSP**

##### **5.6.2.1. Project Construction**

It is not anticipated that the deepening of the channel would result in adverse effects to these aquifers or associated groundwater used by the surrounding communities. The sediments that connect the aquifers have already been exposed since the 1991 deepening with no perceived effects. The upper portions of the Watercourse aquifer that has been directly exposed is not considered a source for water supply. Since the aquifers and groundwater are not used as water supplies for the area, the implementation of the TSP would have no impacts to the local groundwater supplies.

#### **5.6.2.2. Future Maintenance**

Future maintenance and operations disposal practices will not further expose the aquifers during maintenance dredging activities. Since it would not be expected that the channel modifications would have additional impacts to the aquifers and groundwater, future maintenance would also not be expected to cause additional impacts.

### **5.7. Dredging and Placement Areas**

**Dredging Areas.** As described in detail in Section 4.1 of the Main Report, modifications to the channel features, as recommended in the TSP, are as follows:

- Deepen the existing Bar, Bay, and River Channels (below Station 226+16) by 5 feet to project depths of 52, 50, and 50 feet, respectively, with an additional 2 feet for advanced maintenance plus 2 feet of allowable overdepth for dredging (total depths of 56, 54, and 54 feet, respectively).
- Incorporate minor bend easings at the double bends (at Stations 1857+00 and 1775+26) in the Bar Channel approach to the Bay Channel.
- Widen the Bay Channel to 500 feet from the mouth of Mobile Bay northward for 3 nautical miles to provide a two-way traffic area for passing.
- Expand the Choctaw Pass Turning Basin 250 feet to the south to better accommodate safe turning of the design vessel and other large vessels.

Approximately 24.6 mcy of “new work” material will need to be dredged to construct the TSP for the Mobile Harbor Federal Navigation Project. In addition, increases of 5 to 15% in maintenance dredging volumes are anticipated post-implementation.

**Placement Areas.** Several sites were evaluated for potential placement of new work material for the TSP. These included six relic shell mining areas, the ODMDS, and the SIBUA (if new work sand sources are found within the Bar Channel). Details of these areas are provided in Section 4.11 of Appendix A.

Relic Shell Mined Area. The Relic Shell Mined Area is located to the northeast of Gaillard Island on the eastern side of the ship channel as shown in Figure 3.6. The proposed placement within this site is the result of beneficial use discussions with the cooperating

agencies. The agencies suggested that the USACE, Mobile District conduct open bay placement of the dredged material in strategic areas of the bay in an effort to improve bay bottom conditions. One of the primary concerns expressed by the group pertained to the conditions of the bay bottom in the northeastern portion of the bay where shell dredging operations were conducted prior to 1982. These operations resulted in an overall deepening of the bay bottom and are believed to be the cause of decreased ecological productivity resulting from hypoxia during certain times of the year.

Approximately 5.5 mcy of new work material are anticipated to be placed in the relic shell mined areas. Site selection and volume estimates for the six relic shell mined areas were based on NOAA compiled bathymetric surveys within the area between 1960 to 1961 and 1984 to 1987. The potential placement areas were laid out in sections where there were disturbances with 15-foot depths or greater based on those combined surveys. These areas encompass approximately 4,100 acres and, assuming a layered placement in these areas, they have capacity to accommodate approximately 5.5 mcy of new work material.

Placement is anticipated to be accomplished with a maximum thickness of approximately 3 ft due to the non-uniform and clumping characteristics of the new work material; however, the volume of material planned to be placed in the sites is based on an average material thickness of 1.5 ft throughout. The quantity of material planned for placement in each area is detailed in Section 4.11.1.1, Appendix A.

SIBUA. In Section 302 of the 1996 WRDA, Congress gave the USACE authority to modify placement practices for beneficial use of dredged material for Mobile Harbor. The USACE, Mobile District then coordinated with the ADEM to designate an area west of the Bar Channel in which suitable material could be placed when any opportunity arose. Designation of the SIBUA was completed in 1998 and this site became the preferred placement option of the sandy maintenance material from the Bar Channel.

As part of this study, hydrodynamic and coastal sediment transport modeling found that SIBUA material moves out at a slower rate than needed to ensure adequate placement capacity for maintenance material from the Bar Channel. An analysis was conducted to determine the location and size to ensure future capacity in the site. As such, the USACE, Mobile District is pursuing modifications to extend the site beyond the existing SIBUA boundaries to provide sufficient movement of material and capacity for new work and maintenance material. It is anticipated that the expansion of the SIBUA will extend its boundaries to include areas within the Sand Island-Pelican Island complex. It should be understood that the proposed expansion is being conducted under O&M and not as part of this study.

Currently, no new work material is anticipated to be placed in the SIBUA or the northwest extension as part of the TSP. The new work material is predominately clays and silts with

some intermixed sands. The geotechnical information indicates to-date, none of this material meets the suitability criteria for placement in the SIBUA.

Material dredged as part of maintenance operations for the future With-Project conditions will continue to be placed in a combination of upland sites adjacent to the River Channel: open-water placement sites within the bay; the SIBUA on the ebb tidal shoal, including a proposed northwestward expansion of the site; and, the ODMDS in both the current limits and a future expansion area.

ODMDS. The WRDA 1986 authorization for the Mobile Harbor Project required that, all dredged material from the project shall be disposed of in open-water in the Gulf of Mexico in accordance with all provisions of Federal law. Since that time, the 1994 and 1996 WRDA authorizations included language that allowed placement options of suitable material in the SIBUA as well as open water (thin layer) placement within the bay adjacent to the channel. The remaining approximately 19.1 mcy of new work material (24.6 mcy total volume minus the 5.5 mcy going in the relic shell mined areas) are anticipated to be placed in the expanded ODMDS. The EPA Region 4 is pursuing the proposed ODMDS expansion pursuant to Section 102 of the MPRSA. As shown, an available/remaining capacity of approximately 52 mcy is expected after 20 years of future placement of maintenance material in the site. This volume is more than adequate to handle the anticipated 19.1 mcy of new work material that will be placed in the site during construction of the TSP. The boundaries of the current and expanded area is described in detail in Section 4.11.1.2, Appendix A.

### **5.7.1. Alternative 1 – No Action**

Under the No Action Alternative, current channel and harbor maintenance operations would continue utilizing the authorized placement areas identified under the current water quality certification for Mobile Harbor. The current placement of O&M material consists of using several authorized upland sites, the ODMDS, open-water thin-layer placement area, and the SIBUA. Gaillard Island is also authorized for use under emergency conditions. The USACE, Mobile District will continue to implement BMP and turbidity measures in compliance with the current ADEM water quality certification for the Mobile Harbor project.

### **5.7.2. Alternative 2 – TSP**

#### **5.7.2.1. Project Construction**

The USACE, Mobile District is required to implement appropriate BMP for all dredging and placement activities (including current, new work, and future maintenance) to minimize turbidity impacts as per the ADEM Section 401 Water Quality Certification conditions. Turbidity generated by the activity must not cause substantial visible contrast

nor result in an increase of more than 50 NTU above background turbidity levels in state waters. As part of the water quality certification by the ADEM, the USACE, Mobile District is required to conduct daily inspections of the sediment placement activities during the life of the project to ensure that in-stream turbidity resulting from active dredging and placement activities will not cause the discharge of sediment into wetlands, substantial visible contrast with the receiving waters greater than 400 feet from the activity or result in an increase of 50 NTUs above background turbidity levels in the receiving waters. Should these conditions be exceeded, the USACE must suspend operations and immediately notify the ADEM of any resultant work stoppages. Work will not be resumed until turbidity levels return to compliance conditions.

### **Dredging Areas.**

Channel Deepening. When conducting dredging activities, the USACE implements protective measures to reduce and avoid potential impacts to aquatic habitats such as wetlands, SAV, oysters, benthic communities, and fish as well as other significant area resources. Adverse impacts to wetlands, oyster reefs, or SAV from dredging activities associated with the implementation of the TSP would be minimal and temporary. Most of the motile benthic and pelagic fauna, such as crab, shrimp, and fish, should be able to avoid the areas where dredging will occur and should return shortly after the activity is completed. No long-term direct impacts to managed species of finfish or shellfish populations are anticipated as the deepening is taking place where maintenance dredging operations regularly occur. However, it is reasonable to anticipate some non-motile and motile invertebrate species will be physically affected by the dredging process. These species are expected to recover rapidly soon after the operations are complete. No significant long-term impacts are expected as result of dredging within the existing navigation channel. Increased water column turbidity during dredging would be temporary and localized. No change is anticipated to occur to the existing habitat types. Overall, dredging impacts to existing resources would be temporary and localized in nature and would be no greater than the maintenance dredging operations regularly occurring within the navigation channel. Based on the minimal abundances of aquatic resources within and around the navigation channel and the temporary nature of the impact, the overall impact to resources is considered negligible. The potential effects to water quality and sediment transport resulting from channel deepening are addressed in Section 3.5 and Section 3.3.3, Appendix C, respectively.

Widener and Bend Easing. As with the proposed channel deepening activities, implement protective environmental measures to reduce and avoid impacts to those previously identified aquatic habitats. Adverse impacts would minimal and temporary. Based on the limited aquatic resources within and around the navigation channel and the temporary nature of the impact, the overall impact to resources is considered negligible. Potential effects to water quality and sediment transport resulting from channel widening and bend



easing activities are addressed in Section 3.5 and Section 3.3.3, Appendix C, respectively.

Choctaw Pass Turning Basin. As shown in Figure 4-5, expansion of the Choctaw Pass Turning Basin involves removing a small portion of the northern shoreline of Little Sand Island, a man-made island located in a highly disturbed area. Berkowitz et al. (2018), mapped the existing wetlands as described in Section 2.6.2, Appendix C. Figure 2-20 and Figure 2-21, Appendix C show the wetland communities that exist on and around Little Sand Island. Berkowitz et al. (2018) indicates these wetlands are typical of those found in disturbed areas. Additionally, Berkowitz et al., (2018) mapped existing SAV in the area which includes areas adjacent to Little Sand Island. SAV, shown in Figure 2-23, Section 2.5.6.3, do not exist in the area where material is to be excavated for modification of the turning basin. Based on Berkowitz et al., (2018), presentation of baseline conditions on and around Little Sand Island, no significant losses to wetland communities and SAV would occur from the proposed modification of the Choctaw Pass Turning Basin.

### **Placement Areas.**

Relic Shell Mined Area. The relic shell mined area serves as habitat for prey species such as gulf menhaden, shad, croaker, and spot. These species are consumed by other Federally managed species including Spanish and king mackerel, various snappers and groupers, bluefish, dolphin and cobia found in Mobile Bay and/or the Gulf of Mexico that may be temporarily impacted by placement operations. Other recreational and commercial species that have been documented in the area are spotted sea trout, southern flounder, and blue crab. The proposed action will not fill or destroy habitat considered necessary to sustain these species.

Placement of new work material in the Relic Shell Mined area would result in some unavoidable impacts. While most of the immobile organisms within the upper reaches of Mobile Bay area are quite adaptable to seasonal changes in temperature, salinity, DO, water clarity and water level fluctuations due to the tidal cycle and weather conditions, the direct placement of the dredged material would destroy some sediment dwelling organisms. Although there would be some destruction of benthos, disturbance of aquatic organisms, reduced aesthetics, and increase in turbidity, the adverse impacts would be minimal and temporary in nature.

An example used to exhibit the effects to the relic shell mined placement area is a similar project in upper Mobile Bay that was conducted and monitored. The area, known as Brookley Hole, was a demonstration project in 2012 to illustrate this concept for using dredged material to fill holes created by past dredging and borrow actions. Brookley Hole is an historic borrow pit, used decades ago for the construction of the Brookley Airfield. This site is located in the western upper portion of Mobile Bay in close proximity to the

Mobile Bay channel as illustrated in Figure 3 7, Appendix C. Baseline surveys indicate that the deepest portion of Brookley Hole, at approximately 23 feet, exhibited hypoxic conditions resulting in degraded environmental productivity. Dredged material from the upper Mobile Bay channel was used to partially fill the basin to historic bathymetric conditions to improve environmental productivity of the bay bottom. Subsequent monitoring efforts included a combination of fisheries acoustic techniques to determine fish density and spatial and temporary distribution patterns, as well as conventional fisheries to determine species composition, fish length, water quality, and sediment grain size analysis. Benthic macro-invertebrates were sampled seasonally to evaluate recruitment and community structure.

The post-restoration study conducted by Reine et al. (2014) indicated a significant improvement in water quality conditions. From an ecological perspective, the partial filling of Brookley Hole resulted in benefits to fishery resources through elimination of hypoxic zones common to these features. The partial filling of the hole rapidly restored the degraded habitat, while avoiding impacts to the upper portion of the water column utilized by a variety of fish and shellfish species. In addition to the ecological benefits, filling the Brookley Hole basin provided a partial restoration of the bay bottom to historical bathymetric conditions. Since the depth of placement in the relic shell mined areas are shallower than the placement in Brookley Hole as described above, a rapid recovery of fishery resources and degraded habitat would be expected

Discussions with local fisherman have indicated that at certain times of the year, an area to the south of the Relic Shell Mined area where sediments are known to be predominantly shell hash, can be productive fishing grounds for some species of finfish such as sheephead. As discussed above in Section 3.3.3, Appendix C, sediment transport modeling of Mobile Bay was conducted to assess the relative changes in sedimentation rates within the navigation channel, dredged material placement sites, and surrounding areas from channel modifications within the bay. This modeling was built upon previous modeling conducted in 2012 to evaluate thin layer placement of maintenance dredged material as described in the Section 6.3, Appendix A. The modeling conducted specifically for the open water thin-layer disposal sites indicates that once the material was placed, with the cohesive nature of the material, it rapidly consolidated and stabilized. The placement material was not transported along the bottom and any remobilization of the material was directly into the water column. Given the nature of the new work material, which is more consolidated and cohesive than maintenance dredged material, it would not be expected to remobilize along the bay bottom into the fishing areas.

SIBUA. Currently, no new work material from the Bar Channel is anticipated to be placed in the SIBUA or the northwest extension as part of the TSP. The new work material in

the Bar Channel is predominately clays and silts with some intermixed sands. The geotechnical information obtained to-date, indicates that this material does not meet the suitability criteria for placement in SIBUA. Placement of new work material in SIBUA will be considered in the future if sandy material is identified during additional geotechnical investigations of the Bar Channel. Beneficial use of sandy material dredged from the modification other channel segments, if found suitable will be coordinated with the Cooperating Agencies and the interested public.

Under a separate O&M action to increase the long term capacity of maintenance dredged material, the SIBUA will be expanded to the north and west which follows the shoal and pathway of sediment transport towards Dauphin Island. Doing so provides an effective means of continued bypassing of sand dredged from the Bar Channel to the downdrift littoral system.

ODMDS. The implementation of the TSP would not result in additional impacts to the affected environment within the ODMDS. The ODMDS is a historically utilized site and overlaps the existing EPA Section 102 Mobile ODMDS. As this is primarily an administrative change to expand the aerial footprint of the EPA Section 102 Mobile ODMDS, no aspects of the local environment should experience adverse impacts from implementation of the TSP, since the areas have been used extensively in the past. All further discussion of effected resources will be compared back to the Without-Project conditions of continuing with the currently sized EPA Section 102 Mobile ODMDS.

There will, however, likely be some unavoidable and temporary and localized impacts resulting from the ODMDS placement. Placement operations will result in the temporary increase of suspended sediments and nutrients, loss of benthic organisms, and bathymetric changes in the ocean bottom. The increase in turbidity will reduce light penetration through the water column, thereby reducing photosynthesis, surface water temperatures, and aesthetics. These conditions could potentially alter visual predator-prey relations in the immediate project vicinity. In addition, sediment adheres to fish gills resulting in respiratory stresses and, natural movement of eggs and larvae could be potentially altered as a result of sediment adherence. However, the salinity of water associated with the Mobile ODMDS is high enough to promote rapid settling of finer particles. All of these described impacts are temporary and are anticipated to return to previous conditions shortly after placement operations. Based on recent sediment evaluations (EA Engineering 2011) and ODMDS surveys (Anamar, 2010) of dredged material from Mobile Bay and native ODMDS material, the sediment quality and texture of the dredged material is expected to be homogenous to that existing in the Mobile ODMDS. This is due to the proximity of the Federal Navigation Channel to the ODMDS and the fact that the area has historically received dredged material from the Mobile Harbor area.

The aquatic community would be temporarily disrupted by placement of dredged materials within the proposed Mobile ODMDS. Non-motile benthic fauna within the area would be destroyed by ocean placement operations, but should repopulate after completion. Some motile benthic and pelagic fauna, such as crabs, shrimp, and fishes, are able to avoid the disturbed area and should return shortly after the activity is completed. Larval and juvenile stages of these forms may not be able to avoid the activity due to limited mobility.

Rates of benthic community recovery observed after dredged material placement ranged from a few months to several years. The relatively low species diversity of benthic assemblages associated with low salinity estuarine sediments can recover in periods of time ranging from a few months to approximately one year (Leathem *et al.*, 1973; McCauley *et al.*, 1976 and 1977; Van Dolah *et al.* 1979 and 1984; Clarke and Miller-Way, 1992), while the more diverse communities of high salinity estuarine sediments may require a year or longer.

Ocean placement activities will result in the mounding of dredged material after release from the hopper dredge in a relatively thick layer. Deposits greater than 20-30 cm (8-12 inches) generally eliminate all but the largest and most vigorous burrowers (Maurer *et al.*, 1978). The sediment quality and texture of dredged material are expected to be homogenous to that existing in the Mobile ODMDS. Placement of material similar to ambient sediments (e.g., sand on sand, etc.) has been shown to produce less severe, long-term impacts (Maurer *et al.* 1978, 1986). Temporary loss of benthic invertebrate populations would occur within the Mobile ODMDS during disposal operations but are expected to return to pre-placement conditions within six to nine months (Bolam & Rees 2003).

The proposed Mobile ODMDS does not provide habitat that is not abundant in other areas of the Gulf of Mexico. There is no significant resource at this site that is essential for the continued survival of any particular species. This site has historically been utilized for placement of dredged material from the Mobile Harbor project area. These operations have not resulted in long-term adverse impacts to benthos, motile invertebrates, and fishes (Shipp 1983) (Froese & Pauly 2007) (Anamar 2010). Therefore, it was determined that no long-term adverse impacts are expected to the aquatic community from the continued use of the Mobile ODMDS.

### **5.7.3. Future Maintenance**

Future maintenance and operations disposal practices will be consistent with the current O&M disposal areas. The main navigation channel in the bay typically requires the annual removal of about 5.9 mcy of material to maintain the channel dimensions. However, due to the increased dimensions it is predicted that there is likely to be an increase volume of maintenance material. Material dredged as part of maintenance operations for the future

with-project conditions will continue to be placed in a combination of upland sites adjacent to the River Channel; open-water placement sites within the bay; the SIBUA on the ebb tidal shoal, including a proposed northwestward expansion of the site; and the ODMDS in both the current limits and a future expansion area. Details of these areas are provided in Section 4.11.2 of Appendix A. Material dredged as part of the routine maintenance of the Bar Channel (primarily sandy sediments) is placed in the SIBUA. The SIBUA, was evaluated to determine whether capacity exists to accommodate projected increases in maintenance dredged material associated with implementation of the TSP. In an effort to ensure adequate placement capacity for maintenance dredging of the Bar Channel, the Mobile District is currently pursuing modifications to extend the SIBUA beyond its existing boundaries which is discussed further in Section 4.11.2 of Appendix A. The site will be expanded to the northwest, following the shoal and pathway of sediment transport towards Dauphin Island and no adverse impacts to Dauphin Island are expected.

Future maintenance activities of the navigation channel and material placement will result in temporary increases of suspended sediments, the loss of benthic organisms, increases in nutrients, and bathymetry changes in open water placement sites. The increase in turbidity will reduce light penetration through the water column, thereby reducing photosynthesis, surface water temperatures, and aesthetics. Once construction of the project is complete, the effects will be similar to the no action conditions and no additional long term impacts are expected.

## **5.8. Biological Resources**

### **5.8.1. Upland Communities**

This section addresses potential impacts on upland biological communities resulting from the considered alternatives. Existing data on specific species occurrences in the project area are limited, and the discussion of impacts is based on the presence of (and changes in) habitat within the project area combined with reasonably foreseeable impacts from the alternatives. The discussion of potential impacts is descriptive in nature rather than relying on quantitative data. Upland communities may be affected in three ways: temporary displacement of individuals, habitat alteration, and exposure to contaminants. Each of these areas of potential impact is discussed.

#### **5.8.1.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no disturbance from dredging and placement of sediments and no associated displacement of upland species during such operations.



### **5.8.1.2. Alternative 2- TSP**

The actions associated with navigational modifications and subsequent placement of new work sediments will be conducted totally within the openwaters of the Gulf of Mexico and Mobile Bay.

### **5.8.1.3. Future Maintenance**

Future maintenance of the project will utilize already existing and certified dredged material placement sites. Therefore, there would be no disturbance from dredging and placement of sediments and no associated displacement of any additional upland species during such operations.

## **5.8.2. Wetlands**

In order to determine potential wetland effects within the project area, a characterization of baseline wetland community assemblages and distribution in estuarine, transitional, and freshwater habitats throughout Mobile Bay and the associated Delta region was conducted (Berkowitz et al., 2018). Salinity tolerance classes were established for each wetland community using existing literature sources; including thresholds for decreased productivity and mortality. The study area focused on the central and southern portions of the Mobile-Tensaw River Delta region. These areas were identified as having the highest likelihood of potential impacts associated with the proposed channel modifications as described in Section 2.5.2. The study area included the portions of the delta south of the I-65 Bridge, where freshwater communities are dominant. The southern extent of the sampling included wetlands dominated by wetland communities adapted to saline conditions. As a result, the study area encompasses the entire salinity gradient occurring within the Mobile Bay region, ranging from salt-intolerant bottomland hardwood forest species assemblages in the north to the halophytic plant communities common throughout coastal wetlands of the northern Gulf of Mexico.

The proposed channel modifications pose potential environmental concerns because the possible influx of saltwater into upstream areas may alter wetland habitat assemblages, distribution, or productivity. Salinity in Mobile Bay is affected by river inflow, wind, and tides as well as periodic storm surges resulting from hurricanes and other weather events (Park et al. 2014). These natural patterns of spatial and temporal salinity fluctuations resulted in the development of diverse and resilient wetland community types within Mobile Bay. However, potential changes in water quality resulting from proposed channel modifications were evaluated to determine if post-project water quality conditions will impact wetland resources. The analysis also considered the effects of sea level change over the life of the project.

Quantitative species composition data were collected at over 800 field locations to document the distribution and community assemblages of wetlands within the potential area of influence (AOI) of the harbor modification project. Sample locations were selected at representative locations within specific wetland communities to characterize wetland community classes and support the large scale mapping objectives using a targeted sampling approach (Environmental Laboratory 1987). Field work occurred during a seasonal low rainfall, low discharge period (late summer-fall), limiting the availability of surface waters within many sample locations. The field measurements were linked with aerial imagery and other resources to map the location and extent of each wetland community observed in the study area. Salinity tolerance classes were established for each wetland community using existing literature sources which includes thresholds for decreased productivity and mortality. Salinity thresholds as related to wetland species productivity is listed in (**Error! Reference source not found.**). The salinity mortality thresholds are documented in the United States Department of Agriculture (USDA) PLANTS database (<https://plants.usda.gov>). Hydrodynamic and water quality model results conducted by ERDC (see Attachment A-1, Appendix A) were evaluated to determine if post project conditions would increase salinity values beyond the established salinity thresholds to a degree that would alter wetland community productivity or distribution within Mobile Bay. The ground based wetland sampling was conducted during November 2017 as this is considered representative when the full cohort of species has undergone the annual growth cycle (USDA-NRCS 2006). During that period, data from 802 distinct locations within the Bay were evaluated to enable development of a comprehensive map of wetland features within the study area as described in Section 2.6.2, Appendix C. At each sample location, the species composition of each vegetation community was documented using established measurement techniques including determinations of percent groundcover, establishment of species dominance, and other factors according to the guidance provided for the Gulf and Coastal Plain regions as outlined in USACE (2010). As a result of the climatic and hydrodynamic conditions, in-channel and wetland community surface water salinities likely remained at or near its annual maximum.

Wetland features within the study area were digitized based on direct observations, aerial imagery interpretation, topographic maps, National Wetland Inventory data, high-resolution ortho-imagery, light detection and ranging (LiDAR) analysis, data layers available in the geospatial data gateway (<https://datagateway.nrcs.usda.gov/>) and other resources (USFWS 2016). Digitization efforts resulted in the high resolution mapping of over 77000 acres of wetlands within the study area. Each mapped wetland feature was uploaded to an ARC-GIS database in which each feature was given a unique identifier and wetland classification code within the database attribute table.

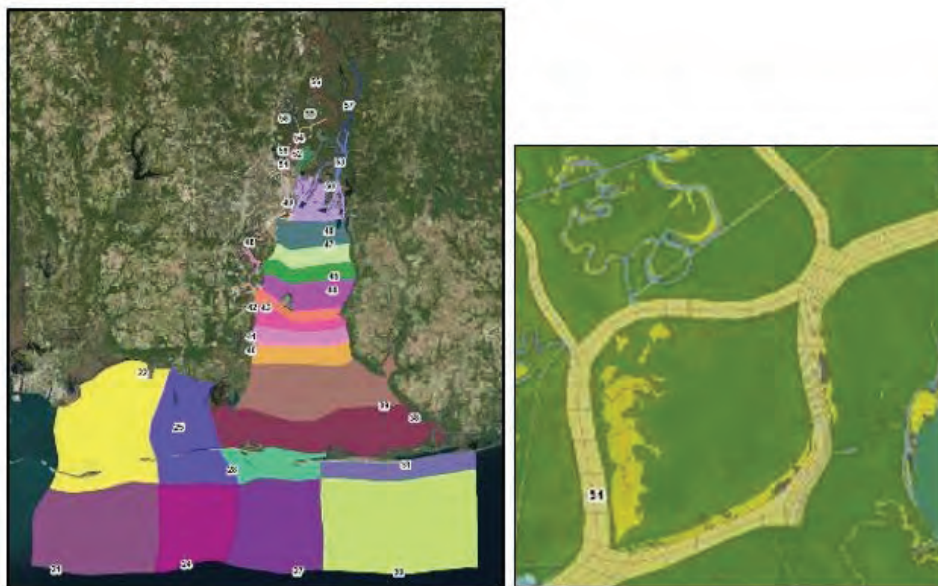
**Table 5-1. Salinity tolerance ranges for each wetland plant community. Salinity thresholds are based upon ideal growth conditions and do not reflect mortality (USDA plants database).**

Class name	ppt	Class name	ppt
Baldcypress – black willow – Chinese tallow	2.6-6.4	Pine flatwoods	0-1.30
Baldcypress – tupelo	1.31-2.59	Saltmeadow cordgrass	2.6-6.4
Baldcypress – tupelo – bottomland mix (Maple, Hickory, Ash, Oak, Elm)	0-1.30	Sawgrass	2.6-6.4
Baldcypress – tupelo – slash pine	1.31-2.59	Sawgrass – tidal shrub mix	2.6-6.4
Baldcypress – tupelo – slash pine – Atlantic white cedar	1.31-2.59	Slash pine – live oak – tidal shrub mix	1.31-2.59
Baldcypress – tupelo – swamp bay – palmetto – shrub mix	2.6-6.4	Smooth cordgrass	>6.4
Big cordgrass	>6.4	Sweetbay – swampbay – yellow-poplar – netted chainfern	0-1.30
Big cordgrass – switchgrass	2.6-6.4	Tidal shrub mix	2.6-6.4
Big cordgrass – switchgrass – bagpod	2.6-6.4	Torpedograss	2.6-6.4
Big cordgrass – switchgrass – sawgrass	2.6-6.4	Typha	1.31-2.59
Black needlerush	>6.4	Typha – arrowhead – alligatorweed	1.31-2.59
Black needlerush – Big cordgrass	>6.4	Typha – bulltongue	1.31-2.59
Black needlerush – Big cordgrass – switchgrass	>6.4	Typha – bulltongue – three-square – alligatorweed	1.31-2.59
Bottomland mix (Maple, Hickory, Ash, Oak, Elm)	0-1.30	Typha – bulltongue – wild-rice	1.31-2.59
Bulrush	1.31-2.59	Typha – bulrush	1.31-2.59
Chinese tallow – Black willow – tidal shrub mix	2.6-6.4	Water hyacinth – water spangles – Cuban bulrush	0-1.30
Giant cutgrass	1.31-2.59	Water lotus	0-1.30
Live oak – Magnolia – Pine (Hammock)	0-1.30	Wild-rice	0-1.30
Mexican water-lily	1.31-2.59	Yellow pond-lily	0-1.30
Phragmites	>6.4		

Salinity tolerance thresholds (**Error! Reference source not found.**) for each wetland community type were obtained from peer reviewed journal publications and salinity classes documented within the USDA PLANTS database (<https://plants.usda.gov>). Two sets of species salinity thresholds were established for evaluation. First, plant species were evaluated to determine if changes in salinity would impact productivity and growth pattern as defined as a reduction in plant productivity (i.e., growth) of more than ten percent. Second, plant species were evaluated to determine if changes in salinity would exceed available mortality thresholds. For example, Crain et al. (2004) documented that *Spartina patens* (a halophyte) displayed significant mortality at very high salinity values (>60 ppt). However, the species tolerates salinities of 2.6 - 6.4 ppt (USDA; **Error! Reference source not found.**) and up to 35 ppt (Hester et al., 2005) without decreasing productivity. Many of the plant communities examined contained a mixture of species.

When mixed species communities were evaluated, the dominant species with the lowest established salinity threshold was applied. This approach ensured that the assessment of potential wetland impacts provided a conservative estimate throughout the analysis. Once established the salinity thresholds were input into a database for each mapped wetland feature. Detailed descriptions of each the wetland community classes found in Section 3, Attachment C-1, Appendix C.

The water quality data included baseline condition and estimated post product conditions for greater than 48,000 individual cells organized into 30 blocks (or groups of cells) encompassing the entire area of Mobile Bay (Figure 5-1). Within each individual cell, surface water quality data was generated for three scenarios 1) baseline conditions, 2) post project implementation condition, and 3) post project condition with an estimated 0.5 m sea level projection. Scenario 3 was included in the analysis based upon current USACE guidance which requires incorporation of estimated SLR implications. A 0.5 m SLR projection was selected for analysis because it represents the intermediate projection for the study area.



Note: Each individual block was comprised of hundreds of smaller individual cells (right) each of which contained unique water quality data under the three scenarios: baseline, post project, and SLR.

**Figure 5-1. Overview of the area evaluated for potential changes in water quality consisting of 30 blocks (left).**

In order to conduct the wetland assessment, the difference in monthly mean salinity values was determined between the three scenarios examined. For example, within each individual cell, the difference between future Without-Project and estimated future With-Project conditions were determined ( $\text{scenario 2}_{\text{SALINITY}} - \text{scenario 1}_{\text{SALINITY}}$ ). Similarly, the difference between the baseline condition and estimated SLR values was determined

(scenario 3<sub>SALINITY</sub> – scenario 1<sub>SALINITY</sub>). Following the determination of anticipated salinity differences between model scenarios, all cells with estimated changes in salinity  $\geq 0.5$  ppt for any month during the year were extracted from the grid and identified for further analysis. Once each wetland feature was linked with the appropriate cell, estimated changes in monthly salinity data were evaluated under the baseline condition, as well as under the TSP condition, and the post project condition plus 0.5 m SLR projection scenarios outlined above. The scenario results associated with each wetland feature were compared to the established salinity thresholds in order to identify potential impacts.

The water quality models utilized for the wetland assessment assessed riverine and tidal inputs, providing data for each individual cell in 10 equally spaced depth intervals. For example, if the water depth in a given cell is 33 feet, water quality data is generated in 33-foot increments. Similarly, if the water depth is 3.3 feet, the water quality outputs are generated in 33 – 0.33-foot increments. As a result, an analysis was conducted to evaluate differences between surface water salinities (i.e., upper increment of water quality outputs only) and the integrated upper third of the water column (i.e., top three water quality outputs) which confirmed that water quality cells adjacent to wetland features displayed little or no differences in salinity between the two approaches. The close association of the two depth intervals results from the location of wetland features in predominately shallow shoreline geomorphic positions. Where present, differences between depth intervals were associated with the navigation channel itself and other deep water areas of Mobile Bay that lack wetlands. As a result, surface water salinities were selected for all further wetland analysis.



### **5.8.2.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. However, it is predicted that future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters, and consequently result in impact to wetland assemblages and distributions as SLR occurs (Kirwan and Megonigal, 2013). In many regions, the predominant impact of long-term SLR will be excessive inundation leading to a conversion of wetland features to open water areas, especially in landscapes where landward retreat is restricted.

The modeling efforts suggest that as many as 930 wetland features may be inundated as a result of the 0.5 m SLR projection, representing an area of 8,440 acres. This includes forested areas dominated by freshwater communities (e.g., bottomland hardwoods), salt-tolerant halophytic communities (e.g., black needle rush, big cordgrass), and transitional communities (e.g., tidal shrub mix, Typha). Increases in sea level inundation may not result in the loss of wetlands but may lead to a shift of wetland types. Such changes have the potential to alter both species composition and structure, occurring over multi-years to multi-decadal timescales.

### **5.8.2.2. Alternative 2 – TSP**

#### **5.8.2.2.1. Project Construction**

Within the study area, species richness generally increased as salinity decreased (Gough 1994). As a result, tidally influenced freshwater marshes ( $\leq 0.5$  ppt salt) in the northern portion of the study area exhibit the highest species richness found within tidal continuum. Polyhaline (18-30 ppt salt) and mesohaline (5-18 ppt salt) communities tend to have lower species richness, with several characteristic species (e.g., black needlerush, smooth cordgrass) forming predictable, abruptly zoned, monotypic stands. Oligohaline communities (0.5-5 ppt salt; “brackish”) may contain a variety of species that are representative of both saline and freshwater environments (Tiner, 1993; Cowardin et al., 1979). These observations hold true within both baseline and post project conditions, as anticipated shifts in salinity are limited. For example, within the study area most wetland features are anticipated to experience negligible increases in salinity, with only 636 (17%) of the 3,525 wetland features identified displaying potential salinity increases  $> 0.5$  ppt (herein referred to as the “potential impact area”). This represents an area of 7,153 acres, or 9.8% of the 72,505-acre study area. As a result, the post project conditions are not anticipated to have any potential impacts on the majority ( $>90$  %) of wetland resources within the study area. Examining only the communities with a potential to display salinity changes  $> 0.5$  ppt, the mean monthly surface salinity increase across all months and wetland communities was  $0.68 \pm 0.38$  ppt (mean  $\pm$  standard deviation) with monthly minimum and maximum values of 0.2 and 1.1 ppt respectively. The text, Table 3-3, Table

3-4, Figure 3-9, Figure 3-10, and Figure 3-11, Appendix C provide data on the post project salinity conditions of wetland communities within the potential impact area, evaluating potential exceedance of mortality and productivity thresholds.

**Wetland Mortality Analysis.** The study conducted by Berkowitz et al. (2018) evaluated wetland features using mortality threshold data available in the published literature. It should be noted that species specific mortality data was not available for many of the species observed. However, available mortality thresholds are provided for the wetland species and associated community assemblages for which data was available. Because wetlands are adapted to the conditions within the study area, the analysis evaluated potential changes in water quality as opposed to absolute water quality values. This approach accounts for local variation in salinity tolerance ranges which differ regionally and genetically across a given species or vegetation assemblage (Kozlowski 1997; Munns 2008).

The analysis linked each wetland feature with an adjacent water quality cell as described above to determine if the estimated changes in salinity between Without- and With-Project conditions would exceed published mortality thresholds. To provide a conservative approach the mortality analysis utilized the maximum estimated increase in salinity for each vegetative community. Results indicate that maximum estimated increases would not exceed salinity thresholds for the vegetation communities examined. For example, across all vegetation communities containing baldcypress the maximum estimated salinity increase was 2.0 ppt (average increase of 0.7 ppt). No cases were identified where a 2.0 ppt increase in salinity above baseline conditions would surpass the 10 ppt required to induce mortality. Similarly, the understory species, wax myrtle, was associated with Live oak - Magnolia - Pine (Hammock) and Pine flatwoods communities and those communities exhibited a maximum estimated salinity increase was 1.5 ppt (average 0.53 ppt) and 1.3 ppt (average 0.39 ppt) respectively, below the 8.7 ppt increase required to induce mortality. This analysis suggests no wetland feature mortality thresholds would be surpassed based upon With-Project conditions. While the number of species with specific mortality thresholds is limited, the available species occur in a number of common wetland community types within the study area. As a result the mortality analysis accounts for 3,108 ac (43%) of the 7,153 potential impact area. Therefore the analysis provides supporting evidence that no mortality is anticipated under the post project scenario across the study area.

**Wetland Productivity Assessment.** In addition to the mortality threshold study presented above, an analysis was conducted utilizing the ideal growth tolerances developed by USDA (2000). Ideal growth tolerances are available for all wetland community types occurring within the potential impact area, while only a subset of wetland plants have mortality thresholds available in published literature. These salinity ranges are not associated with mortality, but represent salinity levels required to induce an estimated 10% reduction in plant productivity. As a result, the assessment represents a

conservative approach to evaluating potential wetland impacts. Each wetland feature within the potential impact area was assessed to determine if growth salinity tolerance ranges were exceeded. This was conducted on a monthly and seasonal basis. For example, the Baldcypress - Black Willow - Chinese Tallow wetland community has an estimated growth salinity tolerance range of 2.6 - 6.4 ppt. Estimated salinity increases are limited to 0.11, 0, 0.25, and 0.44 during winter, spring, summer and fall, respectively. As a result, no negative impacts to wetland productivity are anticipated in that community. None of the estimated salinity increases within the potential impact area exceed the salinity tolerance threshold ranges, suggesting no impacts to wetland productivity. In areas where salinity increases may occur in the upper Bay, wetland communities are adapted to predicted conditions. Within the central (transitional) portion of areas containing wetlands display salinity increases of 0.0, or <0.5 during the summer and 0.0, <0.5, or <1.0 ppt during the winter, summer, and fall periods. In areas where wetland salinity increases may occur across the central portion of the study area, wetland communities are adapted to predicted conditions. During winter and spring, higher increases in salinity (e.g., >2 ppt) may occur adjacent to the navigation channel, but no wetlands are located in those areas. These areas currently experience significant salinity and as a result, wetland communities are adapted to predicted conditions. During the fall period, higher salinity values (>3.0 ppt) may occur adjacent to the navigation channel, but no wetlands are located in those areas.

**SLR.** Changes in salinity and other water quality parameters are expected to impact wetland assemblages and distributions as SLR occurs (Kirwan and Megonigal, 2013). However, in many regions the predominant impact of long-term SLR will be excessive inundation leading to a conversion of wetland features to open water areas, especially in landscapes where landward retreat is restricted (USGS, others). As a result, the wetland assessment conducted as part of the proposed navigation channel expansion focuses on increased inundation, with an emphasis on determining wetland features that would become submerged following the 0.5 meter SLR scenario. To conduct the analysis, the water elevation provided in hydrodynamic models was appended to the wetland mapping and classification attribute table for each wetland feature. The projected elevation change in the nearest model cell was compared with the current elevation of each wetland feature. Features were considered impacted (i.e., inundated) when the projected elevation differences exceeded the current wetland feature elevation.

As many as 930 wetland features may be inundated as a result of the 0.5 m SLR projection (which affects about 8,440 acres). This includes forested areas predominantly dominated by freshwater communities (e.g., bottomland hardwoods), salt-tolerant halophytic communities (e.g., black needle rush, big cordgrass), and transitional communities (e.g., tidal shrub mix, Typha). Incorporating With-Project conditions into the assessment, a potential exists for inundation of four additional wetland features occupying an area of 10 acres. Notably, the inundation assessment does not account for the potential landward migration of wetlands into adjacent areas which may offset SLR

impacts. Additionally, increased inundation may not result in the loss of wetlands but may lead to a shift of wetland types. For example, seasonally inundated wetlands may convert to more permanently saturated conditions. These changes have the potential to alter both species composition and structure, occurring over multi-years to multi-decadal timescales. Given the limited estimated extent of potential project-induced impacts (10 acres) in the context of much larger potential SLR implications (>8,000 acres) occurring over a 50 year interval suggests that any wetland impacts related to implementation of the project remain negligible within the larger SLR rise context. Additional research into SLR implications for wetlands in the region are needed to further account for future conditions, but remains beyond the scope of the current assessment which focuses on the proposed navigation channel expansion only.

### **5.8.2.3. Future Maintenance**

The future maintenance dredging of the navigation channel and placement of material in the approved placement sites will result in temporary increases of suspended sediments, the loss of benthic organisms, increases in nutrients, and bathymetry changes in open water placement sites. However, these temporary and local conditions will be far removed from existing wetlands and no long term impacts are expected.

### **5.8.3. Submerged Aquatic Vegetation (SAV)**

This discussion of potential impacts on SAV communities resulting from implementation of the TSP is a summary of the SAV assessment conducted by ERDC (2018). The detailed report is included in Section 4, Attachment C-1, Appendix C.

In order to determine potential effects of the proposed project modifications on the SAV environments, baseline conditions were assessed by groundtruthing and utilizing baseline maps of SAV habitat within the system, identifying variation in SAV distribution across several years and seasons. Baseline data from existing maps of SAV distribution were field verified to check accuracy and temporal variation in order to establish baseline distribution, within Mobile Bay. Salinity tolerance thresholds were identified for local SAV species through a review of published literature. Following establishment of salinity thresholds and ranges, outputs from hydrodynamic and water quality model results were used to 1) estimate salinity values for SAV polygons outside of model domain, 2) assess change in depth averaged mean and 75<sup>th</sup> percentile (as defined in Section 4, Attachment C-1, Appendix C) monthly salinity during 2015 due to project implementation (With/Without Project salinity), and 3) identify SAV patches that would be impacted with above threshold salinity values due to project implementation. The impact of salinity changes With- and Without-Project under a SLR scenario were also assessed. Finally, predicted DO changes and impacts were assessed as a result of the TSP.

Salinity tolerances of SAV were estimated using a literature review of published salinity thresholds for local SAV species. In cases in which salinity threshold data were not available, reports of species distribution coupled with known salinity conditions were used to estimate the salinity range. Salinity range refers to the expected salinity conditions a species is exposed to within a given location, whereas salinity threshold tolerance refers to the lowest and highest salinity values a species can withstand. For most species, even when a salinity threshold has been identified, the impact of duration or length of time of exposure to that threshold value is not known. Where more than one tolerance threshold was published, the report with the closest geographic proximity (i.e., nearest study sites to Mobile Bay) and the lowest reported maximum threshold value in an effort to provide conservative estimates of tolerance were used. October was selected for comparisons as a conservative approach because it has the highest salinity values, and represents the month in which plants are exposed to the most saline conditions in the year.

Hydrodynamic and water quality data were modeled for Mobile Bay, estimating baseline (i.e., existing, Without-Project) conditions as well as conditions post-project implementation using the Geophysical Scale Multi-Block (GSMB) system, the Curvilinear Hydrodynamic in three-dimension Waterways Experiment Station (CH3D-WES) approach, and the CE-QUAL-ICM water quality component developed and maintained by the ERDC (Cercio and Cole 1995), as described earlier in this report. The hydrodynamic and water quality models were used to predict baseline conditions, conditions following project implementation, and baseline and project conditions under a 0.5m SLR projection scenario. Specifically, the monthly depth averaged mean salinity value was calculated for each individual model cell, under baseline and post project conditions and with and without SLR. SAV occurs in shallow water, therefore, the depth averaged model outputs for parameters of interest were used as this provided the most relevant conditions to what the entire plant, roots to shoots, would experience. To estimate the changes, Without-Project salinity values were compared to With-Project salinity values. This process was completed on a cell by cell basis, so that salinity change could be determined for the entire model domain. Once predicted salinity change was estimated for the whole model domain, the mapped SAV beds within the domain using ArcGIS software were intersected to isolate salinity output to regions where SAV were present. A comparison was made to the change in mean, depth averaged salinity from baseline to project as predicted by the hydrodynamic model to the relative salinity threshold values established for local SAV species and reported any predicted increases. In cases where an SAV bed contained multiple species, the salinity tolerance of the species most intolerant of increased salinity (i.e., the species with the lowest salinity tolerance values) was used to evaluate impacts. In addition to the mean monthly salinity values, the 75<sup>th</sup> percentile hydrodynamic model outputs for salinity was investigated, following the same methodology. As described in other chapters, an analysis of the 75<sup>th</sup> percentile was included to provide an indication



and assessment of the variation in modeled salinity that were similar, but more conservative than a standard deviation approach. Note that extreme salinity values predicted using the 75<sup>th</sup> percentile have very short durations and small geospatial footprints. The same approach was used in determining the potential impacts of salinity change due to project implementation in combination with 0.5m modeled SLR scenario. In addition to salinity, DO outputs were assessed from the Water Quality model to determine whether a prediction could be made of any impact of decreased DO on submerged plants from baseline to post project conditions..

Species specific salinity tolerance thresholds and range estimates are detailed in Section 3.8.3, Appendix C. As is expected in a geographic region that encompasses freshwater, brackish, and estuarine conditions, SAV species have tolerance ranges that vary considerably on whether the plant is adapted to variable salinity exposure or not.

#### **5.8.3.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the navigation project. However, it is predicted that future SLR scenarios over the next 50 years would cause salinity changes and other water quality parameters which could impact SAV communities and distributions (Kirwan and Megonigal, 2013). As sea level continues to rise, a larger proportion of SAV habitat will be exposed to higher salinities due to increased depths resulting in impacts greater than project implementation impacts.

#### **5.8.3.2. Alternative 2 – TSP**

##### **5.8.3.2.1. Project Construction**

The predicted impact assessment is based on the results of hydrodynamic and water quality modeling results. A detailed discussion of the potential impacts is included in Section 3.8.3.2, Appendix C.

**Salinity.** Predicted depth averaged salinity changes due to project implementation are less than 2 ppt during the months of January-June. An increased range in predicted depth averaged mean salinity occurs starting in July, and peaking in October, with a range above 5 ppt. These results indicate that October is the most critical month in terms of potential salinity impact. Thus, the majority of SAV habitat was not predicted to experience an increased salinity regime or be impacted by salinity changes due to the proposed channel modifications. Over 94% of the mapped fall 2015 SAV habitat is predicted to experience a negligible ( $\leq 0$  ppt) monthly mean change in salinity. Similar patterns were seen when evaluating the monthly 75<sup>th</sup> percentile hydrodynamic model output.

Salinity threshold values increased following the TSP implementation at a total of 421 (mean) and 510 (75<sup>th</sup> percentile) acres of SAV habitat in October. Fifty percent of this potentially impacted SAV acreage was exposed to 1-2 ppt (mean) or 2-3 ppt (75<sup>th</sup> percentile) above threshold values, subsequently, a species specific analysis for potential impacts to those species with low salinity thresholds was conducted. These species include Water Star Grass, Eurasian Watermilfoil, Southern Naiad, Widgeon Grass, Sago Pondweed, Wild Celery, Carolina Fanwort and Coon's Tail. Of these, only three species, Eurasian Watermilfoil, Wild Celery and Coon's tail were predicted to experience an increase in salinity.

T The majority of the potentially impacted SAV habitat is made up of Widgeon Grass, followed by Southern Naiad. Widgeon Grass can tolerate hypersaline conditions up to 100ppt, so an increase in salinity of 1.5 ppt of up to 22 acres of Widgeon Grass does not represent an impact to this species. Southern Naiad has a salinity range up to 10ppt, with best growth occurring in a salinity range of 0-5 ppt and decreasing growth up to salinities of 10 ppt (Moore 2012). However, mortality does not occur until plants experience an exposure duration of 10 ppt for a month or more (Moore 2012). Therefore, the duration of high salinities is critical. An increase of 1.5 ppt above relative threshold values is unlikely to impact the 21 acres of Southern Naiad in question, unless these increased salinities have extended (i.e. multiple weeks) duration.

**SLR.** Results from the hydrodynamic model indicate that a 0.5 m SLR projection will contribute to salinity changes in the Mobile Bay region. Changes from existing baseline condition to baseline conditions with SLR (i.e., future Without-Project) show an increase in relative salinity tolerance thresholds for mapped SAV species ranging from -1 to 3 ppt. Although this is the same range of change seen post-project without SLR conditions, the distribution of change is different. A larger proportion of SAV habitat will be exposed to higher salinities due to SLR impacts than project implementation impacts. To illustrate this point further, the increase in salinity above relative SAV salinity thresholds due to project implementation under a 0.5 m SLR scenario shows the same range in salinity increases and distribution as those with SLR under baseline conditions, therefore, no additional changes to salinity is expected to occur as a result of SLR.

**Dissolved Oxygen.** While low levels of DO in the water column can cause mortality, and can impact the bay system, SAV, like all vascular plants, produce oxygen and some release oxygen from their roots under low oxygen conditions (Sand-Jensen et al, 1984). In order for DO conditions to create stressful condition for SAV, the DO conditions would need to be persistently very low. As reported in other sections, the lowest post-project DO levels predicted in the water quality model were minimal summer (June-September) DO concentrations ranging from 6.7-7.1 mg/L. These concentrations of DO would not have an impact on the SAV species present.

#### **5.8.3.3. Future Maintenance**

Future maintenance dredging of the navigation channel and placement of material in the approved placement sites will result in temporary increases of suspended sediments, the loss of benthic organisms, increases in nutrients, and bathymetry changes in open water placement sites. The increase in turbidity will reduce light penetration through the water column, thereby reducing photosynthesis, surface water temperatures, and aesthetics. However, these conditions will be no greater than existing conditions and are far removed from existing SAV areas considered in the study. No additional impacts are expected.

#### **5.8.4. Hard Bottom Habitat and Structural Habitats**

##### **5.8.4.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the navigation project. Additionally, the modeling and impact assessments conducted for the various aquatic resources throughout the study area indicate no appreciable changes in water quality parameters such as salinity and DO. Thus, no impacts to the hardbottom and structural biological resources would be expected. Future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters. As sea level continues to rise, the manmade hardbottom and structural habitats will be exposed to higher salinities and increased depths.

##### **5.8.4.2. Alternative 2 – TSP**

###### **5.8.4.2.1. Project Construction**

Indirect impacts to the manmade hardbottom habitats, as described in Section 2.6.4, Appendix C, associated with dredging and placement activities are expected to be minimal and short term. These impacts from turbidity resulting from the dredging and placement operations of material from the Bay and Bar Channels and any subsequent sedimentation that could occur on these reefs and structures. Additionally, the modeling and impact assessments conducted for the various aquatic resources throughout the

study area indicate that there would be no appreciable changes in water quality parameters such as salinity and DO. These same parameters apply to the hardbottom and structural resources, therefore, no impacts to the hardbottom and structural biological resources would result from implementation of the TSP.

#### **5.8.4.3. Future Maintenance**

Future maintenance of the navigation channel will result in temporary increases of suspended sediments and nutrients. However, these conditions will be far removed from the existing manmade hard bottoms and structures considered in the study and no long term impacts are expected. The USACE, Mobile District will continue to implement BMP and turbidity compliance measures as required under the current ADEM water quality certification for the Mobile Harbor project.

#### **5.8.5. Plankton and Algae**

##### **5.8.5.1. Alternative 1 – No Action.**

Under the No-Action Alternative, background conditions would not result in overall increases in turbidity or salinity within Mobile Bay and surrounding waterbodies, which would not have a negative impact on plankton in the area..

##### **5.8.5.2. Alternative 2 – TSP**

###### **5.8.5.2.1. Project Construction**

Elevated turbidity levels and decreased light transmission during construction which could result in a temporary localized reduction in phytoplankton and zooplankton abundance.

Turbidity and suspended solids were measured as part of a 1975 USACE study. The study included an evaluation of water quality and plankton in dredging and placement areas over a 40-square-mile grid centered on the Gulfport Shipping Channel in the Mississippi Sound. Sediment plumes of silts, clays, and sands were identified in localized areas that had solids tended to settle rapidly. Levels of turbidity and suspended solids, even from sediments with a high percentage of fines, returned to background levels at placement sites within two to three hours. No observable effects on the resident plankton community were observed in terms of stimulatory effects, species composition, or community structure (USACE, 1975).

Nutrients released during placement could indirectly support a localized temporary increase in phytoplankton. Planktonic organisms would be carried into and out of the project area during construction. Water quality modeling has predicted that salinity and

nutrient levels in the project area would not be affected by the expansion of the navigation channel. Impacts would be restricted to localized areas of plankton, therefore, any impacts would not be significant.

#### **5.8.5.3. Future Maintenance**

Future maintenance would be conducted similar to existing O&M activities. Thus, no negative impact on plankton in the area is anticipated.

#### **5.8.6. Benthic Invertebrates**

Berkowitz et al. (2018), forecasted potential salinity intrusion using a predictive analysis to identify benthic communities impacts (Section 3.8.7, Appendix C). Berkowitz et al. (2018) examined the benthic macroinvertebrates and established how benthic communities transition from estuarine to freshwater habitat, which largely reflected a change from relatively high abundances of polychaetes to insects, respectively. Channel dredging can affect this relationship, for instance, saltwater intrusion increased in the Pearl River estuary (Yuan and Zhu 2015), Tampa (Zhu et al. 2014), and Lake Pontchartrain (Junot et al. 1983) following dredging. Other factors affecting habitat quality and the salinity balance within an estuary include severe storms, sediment changes, and development; therefore, understanding the influence of a single factor, such as channel dredging, is challenging. Alterations to freshwater inputs (e.g., droughts, floods, flood control levees) or saltwater (e.g., channel deepening) can affect biotic communities adapted to particular salinity zones by changing their taxonomic composition and distributions. Important estuarine biota includes benthic invertebrates, which are relatively stationary. Their abundances and distributions serve as an indicator of environmental conditions in an area as they are important prey items for bottom-feeding fishes and crustaceans. Changes to invertebrate distributions and abundances could affect these higher trophic organisms.

Channel modification is an environmental concern because the possible influx of saltwater into upstream habitats may affect benthic invertebrates and their fish predators. Salinity in Mobile Bay is affected by river inflow, wind, and tides. Commercially and recreationally important estuarine fish that feed on benthic invertebrates in these estuarine and freshwater habitats include Atlantic croaker, southern kingfish, spot, and hardhead catfish.

Benthic macroinvertebrates were sampled in October 2016 and May 2017. A total of 240 benthic samples were collected, 120 samples in each season. Samples were collected at 40 stations within each zone (freshwater, brackish and estuarine (upper bay)). The field data collection procedures and the statistical approach used to analyze the data are described in detail in Section 2.6.7, Appendix C.



Water quality parameters were collected during both the fall (October 2016) and spring (May 2017). A total of 1,789 individual benthic macrofauna from 54 taxa was collected during baseline (October 2016) with the highest number of taxa and individuals collected in freshwater habitat. A total of 2,165 individual benthic macrofauna from 44 taxa were collected during spring (May 2017) with the highest number of individuals collected in estuarine habitat. A detailed summary of the water quality information, species distributions and abundances, and the taxonomic composition of the macroinvertebrate assemblages is presented in Appendix C.

#### **5.8.6.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. Future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters which result in impact to the benthic invertebrate communities and distributions. As sea level continues to rise, benthic habitat will be exposed to higher salinities due to increased depths.

#### **5.8.6.2. Alternative 2 – TSP**

##### **5.8.6.2.1. Project Construction**

In the fall, when salinities were relatively high, the extent of saltwater influence on benthic macroinvertebrates was evident well into the freshwater zones located south of Bucks, Alabama. At this location, the Mobile River takes two sharp 90 degree bends, first east, then north, which may contribute to the abrupt salinity decline if tidal forces were weaker than the opposing conditions created by flow and river sinuosity. These results indicate that under the environmental conditions present in the fall of 2016, a clear break in the upstream influence of estuarine waters occurred near Bucks, Alabama. Downstream from this location, fall benthic macroinvertebrate assemblages were similar through the transitional habitat and into the estuary.

In the spring, salinities were less than 1 ppt throughout all transitional and freshwater stations, therefore, a clear break in benthic macroinvertebrate composition related to salinity change was not evident.

**Salinity.** Model results were used for the bottom strata to characterize projected salinities following the proposed channel deepening. To evaluate a worst case scenario, the maximum salinity difference projected by the model under TSP deepening conditions was considered for each month for cells within the aforementioned buffer. In the fall, maximum projected salinity differences ranged from 1.9 to 3.6 ppt and the greatest salinity changes were projected for the estuarine habitat where benthic macrofauna are well-adapted to

salinity fluctuations of this magnitude. In the winter, maximum salinity changes ranged from 2.5 to 3.2 ppt. In the spring, maximum salinity changes were projected to be 2.2 to 3.2 ppt, whereas summer maximum changes ranged from 1.6 to 2.9 ppt. These most extreme projected salinity changes occurred within the transitional and estuarine zones where benthic macrofaunal assemblages are dominated by polychaete worms that experience greater salinity fluctuations during tidal exchanges. Differences in benthic macrofaunal assemblages occur where freshwater habitat begins, which in the fall, was further upstream than the water quality grid extended. There is no indication that the location of the freshwater transition point will be affected by the TSP. Impacts to higher trophic levels, such as fish, will be negligible because prey availability and distributions are unlikely to be affected.

**SLR.** Maximum potential salinity changes projected did not predict more extreme conditions than reported above. For instance, fall maximum salinity changes could be as small as 1.2 ppt instead of 1.9 ppt, whereas spring maximum salinity predictions were as low as 0 ppt. Based on these model predictions, there is no indication that SLR will substantially affect benthic macrofaunal assemblage distribution.

**Dissolved Oxygen.** Estuarine organisms respond to decreasing DO in various ways depending on their life stage and mobility. In general, however, a consistent pattern of response occurs at very low DO concentrations, i.e., below 2 mg/L. Mobile fish and crustaceans avoid benthic habitats with oxygen concentrations below 2 mg/L. Less mobile benthic invertebrates, such as burrowing species, exhibit stress behaviors (e.g., emerging from sediments) at oxygen concentrations from 1.5-1 mg/L, with mortality occurring if durations of low DO concentrations are extensive (Rabalais et al., 2001). A worst case scenario of deepening impacts on DO concentrations was evaluated by determining the minimum concentrations predicted under project conditions in the summer. High temperatures combined with low DO concentrations create the most deleterious biological impacts. Minimum summer (June – September) DO concentrations ranged from 6.7 -7.1 mg/L, which is a concentration well above hypoxic levels that would induce stress responses or mortality in benthic macroinvertebrates.

**Relic Shell Mined Area.** As discussed in Section 2.6.7, Appendix C, sampling within the oyster shell mining area was conducted in the fall of 2016 and spring of 2017 at 90 benthic stations comprised of four types:

- Baseline: randomly selected stations spaced equidistance across the study area,
- Control: stations selected as most probable to be undisturbed by oyster shell mining,
- Placement: stations located at previous thin-layer placement sites, and

- Impact: stations in areas of known disturbance from oyster shell mining.

Monitoring of a beneficial use site in Mobile Bay was conducted to determine the status of benthic habitat in areas known to have been mined for oyster shell compared to control areas. “Impact” stations (where oyster shell dredging had occurred) were significantly deeper than other station types and at the time of sampling, water quality was favorable, i.e., DO concentrations were well above hypoxic levels. However, total organic content was elevated throughout the study area and highest at the impact stations, reaching a maximum value of 8.9%. Sediment grain size distributions were similar among station types and characterized by fine grained sediments, with sandier sediments present at stations close to the southern and eastern borders of the study area. Low salinities during the spring indicate sampling coincided with a freshet.

Benthic macrofauna were numerically dominated by polychaetes and biomass was dominated by mussels. Fall macrobenthic assemblage composition differed among station types, primarily because abundances of nematodes, some polychaetes (*Pilargiidae*), gastropods, and dwarf clams were higher at stations located at previous thin-layer sites (placement stations). In the spring, placement stations had lower Capitellid polychaete abundances and higher gastropod *Acetocina canaliculata* (*Cyclichnidae*), and Orbiniid, Spionid, and Pilargiid polychaete abundances. The lower salinities in the spring influenced the benthic community as evidenced by the presence of insects (*Chaoberidae* and *Chironomidae*), which are indicative of low salinity environments.

**Sediment Placement.** Benthic organisms occurring in the bay bottom sediments may be destroyed or severely impacted by the physical placement of sediment. However, affected areas are small in relation to surrounding areas and would rapidly recover within 12 to 18 months to pre-project conditions. Several studies have been conducted pertaining to the effects of benthic communities in response to thin-layer placement activities (Wilbur et al. 2008, Wilbur et al. 2007, USACE 1999, Wilbur and Clarke 1998, and USACE 1994). The response of benthic communities to thin-layer placement of dredged material was assessed at three sites in Mississippi Sound in 2006. The findings indicated adults re-colonized newly deposited sediments either through vertical migration or lateral immigration from adjacent areas within a period of 3 to 10 months.

A major parameter influencing benthic recovery rates is the prior disturbance history of a particular area. Studies indicate that benthic recovery occurs more rapidly in shallow areas, such as Mobile Bay, where the resident benthic communities are already adapted to dynamic conditions and shifting sediments. Being that Mobile Bay is a depositional shallow waterbody with dynamic sediment processes, it would be expected that benthic recovery would be consistent with that shown by previous studies.

### **5.8.6.3. Future Maintenance**

Future maintenance would result in similar environmental conditions as current O&M activities. Thus, no additional environmental changes are anticipated. However, it is predicted that the future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters which result in impact to the benthic invertebrate communities and distributions as the SLR occurs. As sea level continues to rise benthic habitat will be exposed to higher salinities due to increased depths.

### **5.8.7. Fish**

This discussion of the fisheries assessment and potential impacts resulting from implementation of the TSP is a summary of the study conducted by Berkowitz et al. (2018). The detailed fisheries assessment report is included in Section 6, Attachment C-1.

Study outputs for the fisheries assessment included baseline conditions, With-Project conditions and the numerical difference (change) between baseline and project values. Basic summary statistics were generated (i.e., mean, minimum, maximum, standard deviation, percentile) for each modeled cell within the grid and for each respective condition as described in the Section 3.8.8, Appendix C. Physical and water quality habitat measurements were collected in conjunction with fishery collections at each site that included depth, temperature, pH, conductivity, salinity, and DO. Substrate type (i.e., sand or mud/silt) was visually assessed from otter boards or using a stadia rod to probe the bottom.

All data, including FAMP (2000-2005) and the ERDC (2016-2017) were analyzed using the Statistical Analysis System 9.4. Salinity tolerance for project alternatives was the principal focus of the analysis. Salinity tolerance guilds of the fish community in Mobile Bay study areas were identified according to the Gulf Coastal Research Laboratory publication by Christmas (1973) following the recommendations by Elliott et al (2007). Guilds included: freshwater only, freshwater entering estuary, resident estuary, marine entering estuary, and marine only. Guilds representing species that are anadromous, catadromous, and freshwater introduced were not included.

#### **5.8.7.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue with no expected environmental changes in association with maintaining the navigation project. However, it is predicted that future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters which may result in impacts to the benthic invertebrate communities and distributions as well the fish communities that

prey upon them. As sea level continues to rise benthic and fish habitats will be exposed to higher salinities and increased depths, however, the No Action Alternative would not be expected to impact the Mobile Bay fishery as they would be able to tolerate the conditions resulting from future SLR.

### **5.8.7.2. Alternative 2 – TSP**

#### **5.8.7.2.1. Project Construction**

**Salinity.** The overwhelming majority of the values for mean salinity are below the 2 ppt threshold suggesting little concern for impact. Those values exceeding 3 ppt were projected for January – May were associated primarily with Little Sand Island adjacent to the current shipping channel. A similar pattern was exhibited for bottom salinity (without SLR). Salinity changes evaluated under the “with SLR” condition exhibited a narrower range in values for both mean and bottom salinity conditions. There was a slight reduction in central tendencies of the dataset for both mean and bottom salinity when considering comparisons to values generated under both project conditions (with/without SLR). However, the distribution of extracted model values from each condition was not significantly different indicating no appreciable differences in salinity values between current conditions and those projected under the SLR scenario (Section 6, Appendix C).

**Dissolved Oxygen.** Conditions for DO (without SLR) showed a smaller range in variability in the extracted values for both mean and bottom conditions compared to responses of salinity under similar conditions. The distribution of extracted values for DO were significantly different between mean water column and bottom conditions. Bottom conditions experienced less variability with 98% of the values occurring between -0.5 and 0.5 indicating little projected change in DO levels for benthic oriented fishes. In contrast, 70% of the values for mean water conditions occurred between -0.5 and 0.5. Nearly 29% of the values exceeded the 0.05 mg/L condition with 1% exceeding the 2.0 mg/L condition. These results suggest overall changes in DO are likely to occur, but the extent of change would likely be minimal and expressed in reduced spatial and/or temporal basis.

A total of 2,097,836 individuals representing 162 species were recorded and used in the analysis. Species were classified according to the salinity tolerance guilds. The relationship between guild abundance and salinity is portrayed in Section 3.8.7, Appendix C. Two of the guilds showed a narrow range of salinity tolerance: marine only between approximately 20-33 ppt and freshwater only less than 5 ppt. However, both of these guilds were rarely collected in the Mobile Bay. The three other guilds had a much wider range of salinity utilization suggesting that major changes in salinity were necessary to impact these groups of species.

The mean abundance of freshwater entering estuary guild was negatively correlated to salinity, whereas the marine entering estuary and marine only were positively correlated.



The resident estuarine model suggested little to no correlation with salinity indicating their overall tolerance and ability to osmoregulate as they move between salinity gradients. Given these relationships, and the physical model results presented, impacts to the Mobile Bay fishery are not expected. The freshwater entering estuary guild is likely the most susceptible to changes in salinity due to project construction, but the range they occupy suggests that differences between baseline and project alternative With- and Without-SLR would have to be much greater than the physical model suggests.

#### **5.8.7.3. Future Maintenance**

Future maintenance will continue similar to existing dredging and placement practices. Dredging and placement will result in temporary and localized increases of suspended sediments, the some loss of benthic organisms, and minor bathymetry changes in open water placement sites. These conditions will be no greater than current conditions. No additional to impacts to the Mobile Bay fishery are expected from future maintenance operations.

#### **5.8.8. Mollusks**

Important bivalves in the project area include the Eastern oyster (*Crassostrea virginica*), and hard clam (*Mercenaria sp.*). These species typically inhabit nearshore coastal areas where they feed on phytoplankton and detritus (Pattillo et al., 1997). These species are among the bivalves identified in estuaries around the northern Gulf and barrier islands (Cake, 1983). The Eastern oyster is one of the more valuable shellfish resources of the Gulf coast and is addressed in Section 2.6.2.1, Appendix C. Other abundant mollusks found in the Mobile Bay include various gastropods including snails, limpets, nudibranchs, and sea slugs as well as cephalopods including octopods and squids.

### **5.8.8.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. However, predicted future the future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters and consequently result in some effects to existing mollusk resources and their distributions as the SLR occurs. In many regions the predominant impact of long term SLR will cause increased depth and salinities in the areas where mollusks are abundant. Under current conditions, there would be no changes to salinity and DO levels that would cause any impacts to mollusks in the project area.

### **5.8.8.2. Alternative 2 – TSP**

#### **5.8.8.2.1. Project Construction**

In general, the mollusks require conditions similar to that of the oysters which is described in detail in Section 3.8.9, Appendix C. These organisms live within the sediments and in the water column. Berkowitz et al. (2018) conducted field studies and analyses looking at changes in water quality and hydrodynamics to evaluate the potential for impacts to benthic macroinvertebrates, wetlands, SAV, oysters, and fish. The assessment included extensive characterization of baseline conditions, followed by evaluation of estimated post project conditions related to aquatic resource habitat (e.g., changes in salinity, DO). Additionally, an analysis of potential impacts related to a 0.5 m SLR scenario were evaluated. No substantial impacts to aquatic resources within the study area are anticipated due to project implementation, as the area of greatest potential changes to environmental conditions are already adapted to natural shifts in salinity and other factors as well as conditions resulting from the existing navigation channel. Although SLR has the potential to alter aquatic resource habitats in Mobile Bay, additional impacts related to project implementation remain negligible.

### **5.8.8.3. Future Maintenance**

Future maintenance dredging and placement of material will be similar to current O&M activities. There would be no additional changes in salinity and DO levels as they would stay well above the minimum thresholds during future maintenance activities. These conditions will be no greater than those existing after project construction and no additional impacts to mollusks would be expected to occur.

### **5.8.8.4. Oysters**

This section includes a summary discussion of potential impacts study on oysters and oyster larvae conducted by Berkowitz et al. (2018). The detailed report is included in Section 3.8.9, Appendix C.

Oyster recruitment is the key driver for maintaining oyster population over time. However, this process is poorly understood due to the difficulty in tracking oyster larva over time. Recruitment occurs through the settlement of larval from their natal reef (intra-reef recruitment), or from other reefs within the system (inter-reef recruitment). Intra-reef recruitment has been shown to be relatively low, indicating that inter-reef recruitment is crucial for sustaining oyster populations in hydrodynamically-driven systems.

Oyster larvae have limited swimming abilities so their movement is controlled in large part by hydrodynamic transport. Oyster larvae have a maximum swim speed on the order of 2 to 3 millimeters per second (North et al., 2006, 2008), which is negligible in comparison to the horizontal velocities typically observed in most estuarine systems. However, vertical velocities are much lower, and larvae, also referred to as veligers, are able to overcome vertical velocity gradients to change their vertical position in the water column. In addition to hydrodynamic forcings, oyster veligers also respond to changes in water quality (e.g. temperature, salinity, DO). Understanding the oyster larvae movement and reef recruitment dynamic is critical towards understanding how potential project actions will impact oyster populations within a project footprint.

Using information provided by the ADCNR, MRD, 13 adult oyster reefs were assessed (>3,600 acres) for salinity and DO potential impacts based on juvenile and adult oyster tolerance thresholds. The locations of the known oyster reefs used in this assessment are included in Section 2.6.2, Appendix C. Specifically, if oyster recruitment within the Mobile Bay area is altered so that a higher percentage of oyster larvae are flushed out of the bay due to hydrodynamic changes caused by modifications to the navigation channel, this could affect the local oyster recruitment (Berkowitz et al., 2018).

### **5.8.8.5. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions would continue. No expected environmental changes would occur in association with maintaining the navigation project. However, predicted future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters and consequently result in some effects to existing oyster reefs and their distributions as SLR occurs. In many regions the predominant impact of long-term SLR will cause increased depth and salinities in the areas where there are existing oyster resources.

#### **5.8.8.6. Alternative 2 – TSP**

##### **5.8.8.6.1. Project Construction**

For analyzing differences in larval transport and survival, the release locations were randomized or located at the Brookley Reef. Sensitivity analyses were conducted by adjusting the environmental parameter survival thresholds or exposure times. Exposure time consisted of the cumulative time that oyster larvae could be exposed before mortality occurred. Based on the tolerance threshold values from Kjelland et al. (2015), the minimum tolerance threshold for oyster survival is  $\geq 2.4$  ppm and the minimum DO values did not drop below 2.4 ppm indicating no impact. Salinity was also within the tolerance ranges for the TSP, based on tolerance thresholds. Based on salinity and DO survival tolerance thresholds of juvenile and adult oysters, Environmental conditions stay well above the minimum oyster tolerance threshold for simulated scenarios.

Oyster larvae particle tracking resulted in 100% survivorship under all scenarios when particles were released using a randomized location. However, the scenarios with SLR resulted in a much higher mortality of oyster larvae when released at Brookley Reef, although that was not the case for the scenarios without SLR. Importantly, the oyster model results do not project an increase in larvae flushing out of Mobile Bay under the with channel modification project scenarios (i.e., Scenarios 2 & 4). A detailed description of the analysis performed for the oyster larvae particle tracking is presented in Section 3.8.10, Appendix C.

##### **5.8.8.7. Future Maintenance**

Future maintenance will be similar to current O&M activities. The existing oyster reefs which are able to handle turbid water conditions will not experience additional impacts. The USACE, Mobile District will continue to avoid dredging and placement of material in areas that would impact existing reefs.

#### **5.8.9. Crustaceans**

Abundant crustaceans in Mobile Bay and its vicinity include a variety of amphipods, isopods, shrimps, and crabs. Four commercially important species found in Alabama

coastal waters are: the brown shrimp (*Penaeus aztecus*), the pink shrimp (*Penaeus duorarum*), the white shrimp (*Penaeus setiferus*), and the blue crab (*Callinectes sapidus*). The life histories of these important species are discussed in detail in Section 2.6.3, Appendix C.

#### **5.8.9.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. Future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters and consequently result in some effects to existing crustacean resources and their distributions as SLR occurs.

#### **5.8.9.2. Alternative 2 – TSP**

##### **5.8.9.2.1. Project Construction**

In general, crustaceans require conditions similar to fish and mollusks which are described in detail below. These organisms live on the bay bottom and in the water column. Berkowitz et al. (2018) conducted field studies and analyses looking at changes in water quality and hydrodynamics to evaluate the potential for impacts to benthic macroinvertebrates, wetlands, SAV, oysters, and fish. The assessment included extensive characterization of baseline conditions, followed by evaluation of estimated post project conditions related to aquatic resource habitat (e.g., changes in salinity, DO). Additionally, an analysis of potential impacts related to a 0.5 m SLR scenario were evaluated. Results of the detailed analyses suggest that no substantial impacts in aquatic resources within the study area are anticipated due to project implementation, as the area of greatest potential changes to environmental conditions are already adapted to natural shifts in salinity (and other factors) as well as conditions resulting from the existing navigation channel. Although SLR has the potential to alter aquatic resource habitats with Mobile Bay, additional impacts related to project implementation remain negligible under the 0.5 m SLR scenario.

Occupying much of the same habitats as finfish, a fisheries assessment was conducted by Berkowitz et al., 2018 and is discussed in Section 3.8.8, Appendix C. Shrimp and crabs generally prey on bottom detritus and benthic invertebrates. The benthic macroinvertebrate assessment indicate post project conditions suggest mean bottom salinity increases of 1-3 ppt. The greatest salinity increases are projected within the transitional and estuarine zones where benthic macrofaunal assemblages are dominated by polychaete worms. Impacts of harbor modifications on benthic macrofauna due to salinity intrusion are predicted to be negligible, with no effects on higher trophic levels, such as fish, shrimp, and crabs because prey availability and distributions are unlikely to be affected.



Shrimp and crabs utilize the wetlands and SAV areas as nursery grounds. Results of the impact assessments for these resources indicate those areas would not be negatively impacted such as discussed in Sections 3.8.2 and 3.8.3. Considering the habitats widely used by the crustaceans, no negative impacts to these species would be expected by the implementation of the TSP.

#### **5.8.9.3. Future Maintenance**

Future maintenance dredging of the navigation channel and placement of material in the approved placement sites will result in temporary increases of suspended sediments, the loss of benthic organisms, increases in nutrients, and bathymetry changes in open water placement sites. The increase in turbidity will reduce light penetration through the water column, thereby reducing photosynthesis, surface water temperatures, and aesthetics. There would be no additional changes in salinity and DO levels as they would stay well above the minimum thresholds during future maintenance activities. These conditions will be no greater than what exists after project construction and no additional impacts to crustacean in the project area would be expected to occur.

#### **5.8.10. Essential Fish Habitat**

##### **5.8.10.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. However, it is predicted that the future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters and may result in impacts to distribution of benthic communities and distributions as the SLR occurs. As sea level continues to rise benthic habitat will be exposed to higher salinities due to increased depths. Based on the model predictions, however, there is no indication that SLR will substantially affect benthic macrofaunal assemblage distribution. Impacts to higher trophic levels, such as fish, will be negligible because prey availability and distributions are unlikely to be affected. Subsequently, there not be no expected impacts to EFH

##### **5.8.10.2. Alternative 2 – TSP**

###### **5.8.10.2.1. Project Construction**

Potential impacts of the channel modifications on biological resources in Mobile Bay are a concern to natural resource managers because changes in saltwater – freshwater exchanges in the estuary could affect the distribution of biotic communities, including benthic macroinvertebrates and the fish that feed on them.

Mobile Bay contains a variety of natural resources. An assessment of aquatic resources was conducted by an interagency team to evaluate potential changes in salinity and water quality as a result of the proposed project implementation and those impacts on habitat related to five aquatic resource categories including: benthic macroinvertebrates, wetlands, SAV, oysters, and fish. The assessment described baseline characterization and distribution of existing resources, followed by analysis of projected post-project conditions (e.g., salinity, DO) with the potential to impact the presence and productivity of each target aquatic resource. A 0.5 m SLR scenario was also evaluated. The results of the hydrodynamic and water quality modeling indicate that minimal changes in salinity and water quality are expected between the existing and with project conditions for the 0 and 0.5 m SLR cases.

The wetland assessment identified >40 habitat types occurring across a wide range of salinity regimes. Projected changes in water quality will not exceed wetland plant community mortality or productivity thresholds within the study area, suggesting that impacts to wetlands are not expected. While the 0.5 m SLR scenario will increase wetland inundation within portions of Mobile Bay, implementation of the project is expected to have limited additional impacts on wetlands.

SAV assessments identified > 600 acres encompassing 55 community types. Expected post project conditions suggest > 93% of SAV communities will not experience substantial salinity increases. Where potential salinity thresholds may be exceeded, affected species are dominated by invasive species (Eurasian watermilfoil) or occur during short duration (<7 day) events. DO levels remain within SAV tolerance limits across all scenarios examined.

Simulated oyster larvae movement through integrated hydrodynamic, water quality, and larval tracking modeling. DO levels stay well above the minimum oyster tolerance threshold for with and without SLR. Similarly, salinity stays within oyster tolerance survival threshold for all scenarios. Importantly, the oyster model results do not project an increase in larvae flushing out of Mobile Bay due to project implementation.

The fisheries assessment included five salinity tolerance guilds ranging from freshwater to marine habitat conditions. The mean abundance of freshwater entering estuary guild was negatively correlated to salinity, whereas the marine entering estuary and marine only were positively correlated. The resident estuarine model suggested little to no correlation with salinity indicating their overall tolerance and ability to osmoregulate as they move between salinity gradients. Given these relationships, impacts to the Mobile Bay fishery are not expected.

The benthic macroinvertebrate assessment results indicate a benthic assemblage transition from polychaete-rich assemblages in the estuary to being dominated by insects in freshwater habitat. Expected With-Project conditions suggest mean bottom salinity

increases 1 - 3 ppt. The greatest salinity increases are projected in the transitional and estuarine zones where benthic macrofaunal assemblages are dominated by polychaete worms that are well adapted to experiencing salinity fluctuations that occur during tidal exchanges. Impacts of implementing the TSP on benthic macrofauna due to salinity intrusion are predicted to be negligible, with no effects on higher trophic levels, such as fish, because prey availability and distributions are unlikely to be affected.

The USACE, Mobile District implements environmental protection measures to reduce and avoid potential impacts to EFH as well as other significant area resources. No adverse impacts to wetlands, oyster reefs, or SAV from the implementation of the project would be anticipated. Most of the motile benthic and pelagic fauna, such as crab, shrimp, and fish, should be able to avoid the disturbed area and should return shortly after the activity is completed. No long-term direct impacts to managed species of finfish or shellfish populations are anticipated. However, it is reasonable to anticipate some non-motile and motile invertebrate species will be physically affected through dredging and placement operations. These species are expected to recover rapidly soon after the operations are complete. No significant long-term impacts to this resource are expected as result of this action. Increased water column turbidity during dredging would be temporary and localized. No change is anticipated to occur to the habitat types. Overall, Impacts to EFH would be temporary and localized in nature associated with the dredging and placement activities in Mobile Harbor. The proposed activities would not significantly affect coastal habitat identified as EFH in the project area. Based on the limited occurrence of this habitat in the general vicinity of the project and the temporary and localized in nature of the impact, the overall impact to fisheries resources is considered negligible.

Beneficial impacts would occur from the use of dredged material to fill in relic mined shell areas. The excavation of these oyster holes which created depressions in the bay bottom that were associated with poor water quality conditions, such as high organic content and low dissolved oxygen (DO) concentrations. The Mobile GRR/SEIS cooperating agencies and the USACE Mobile District recognized the potential for beneficial use of dredged material from the Mobile Bay navigation channel to restore these areas to the pre-mining bathymetry. Studies indicate that benthic recovery occurs more rapidly in shallow areas, such as Mobile Bay, where resident benthic communities are already adapted to dynamic conditions and shifting sediments. Being that Mobile Bay is a depositional shallow water body with dynamic sediment processes, it would be expected that benthic recovery would be consistent with that shown by previous studies. Placing new work material in shell mined impact areas would aid in returning the bay bottom to historic characteristics by increasing environmental productivity.

Consultation has been initiated with NMFS, Habitat Conservation Division (HCD) as required under MSFCMA. It is expected that this consulted will be completed prior to

release of the Final GRR/SEIS Report. A copy of the consultation letter sent to NMFS is included in Attachment C-4, Appendix C.

### **5.8.10.3. Future Maintenance**

Other than the impacts discussed above for the implementation of the TSP, future maintenance will utilize already existing and certified placement sites. Therefore, no additional disturbance from future dredging and placement of sediments and no associated disturbance of EFH would be expected.

## **5.9. Threatened and/or Endangered Species**

This section addresses potential impacts on species listed as threatened or endangered by the USFWS and NMFS, PRD. Discussion of impacts is based on the presence of and potential changes in habitat within the project area resulting from implementation of the TSP. The discussion of potential impacts on listed species is descriptive in nature rather than relying on quantitative data. All protected species with known or historical occurrences near the project area were considered in this evaluation.

### **5.9.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. However, it is predicted that future SLR scenarios over the next 50 years would cause changes in water depth and salinity. In many areas the predominant impact of long term SLR will be excessive inundation leading to a possible conversion of some areas exhibiting upland characteristics to wetland features and consequently inundation of existing wetland features to open water areas, especially in landscapes where landward retreat is restricted (USGS).

The modeling efforts conducted for this study suggest that as many as 930 wetland features may be inundated as a result of the 0.5 m SLR projection, representing an area of 8,440 acres. This includes forested areas predominantly dominated by freshwater communities (e.g., bottomland hardwoods), salt-tolerant halophytic communities (e.g., black needle rush, big cordgrass), and transitional communities (e.g., tidal shrub mix, *Typha*). Increases in sea level inundation may not result in the loss of wetlands but may lead to a shift of wetland and habitat types. Such changes have the potential to alter both species composition and structure, occurring over multi-years to multi-decadal timescales. It would be reasonable to expect that there would be some effects resulting from SLR to those protected species dependent on the effected habitats.

### **5.9.2. Alternative 2 – TSP**

#### **5.9.2.1. Project Construction**

The USFWS lists the following species as either threatened and/or endangered that may occur within the project area for Baldwin and Mobile Counties: dusky gopher frog, Mississippi sandhill crane, saltmarsh topminnow, tanrifle shell, wood stork, piping plover, red knot, Alabama heelsplitter, Atlantic sturgeon (Gulf subspecies), loggerhead sea turtle, Eastern indigo snake, black pine snake, gopher tortoise, southern clubshell, Alabama sturgeon, West Indian manatee, hawksbill sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, American chaffseed, Maui remya, Alabama beach mouse, Perdido Key beach mouse, and the Alabama red-bellied turtle (Section 2.5.7). The NMFS-PRD lists the following species as either threatened and/or endangered in the State of Alabama: fin, sei, Bryde's (candidate species soon to be listed) and sperm whales, green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, Gulf sturgeon, oceanic whitetip shark, and giant manta ray. Critical habitats are designated for loggerhead sea turtles (nearshore reproductive and nesting habitats), and piping plovers in the counties but outside the project footprint. Bald eagles are no longer federally listed as threatened or endangered but are still protected under the Bald and Golden Eagle Protection Act. NMFS-PRD determined impacts from hopper dredging operations are "not likely to adversely affect" (NLAA) listed whales species (NMFS, 2003, and amended 2005 and 2007). NMFS-PRD announced in the Federal Register (81 FR 88639), dated December 8, 2016, its effort to conduct a 12-month finding and listing determination on a petition to list the Gulf of Mexico Bryde's whale (*Balaenoptera edeni*) as threatened or endangered under the ESA. Based upon scientific and commercial data available, the Gulf of Mexico Bryde's whale is taxonomically a subspecies thus meeting the ESA's definition of a species. Less than 100 individuals of this subspecies exist in a limited habitat range in the northeastern Gulf of Mexico making it extremely vulnerable to existing threats, such as vessel collisions. NMFS-PRD concluded the Gulf of Mexico Bryde's whale is in danger of extinction throughout all of its range and meets the definition of an endangered species. Currently, the agency is pursuing a final endangered species listing determination and designation of critical habitat. The Bryde's whale is protected under the MMPA.

Of these identified listed species above, those of particular concern for the Mobile Harbor Federal Navigation modification project include the Alabama red-bellied turtle, Gulf sturgeon, sea turtles and the West Indian manatee. Potential impacts to the Bryde's whale will also be discussed given its anticipated endangered listing.

Byrde's whale sightings have been documented along the continental shelf break in an area known as the DeSoto Canyon. The northern Gulf of Mexico is an area of considerably high amount of ship traffic in addition several important commercial shipping lanes pass through the whale's habitat, particularly vessel traffic from ports in Mobile, Pensacola, Panama City, and Tampa. In general, hazards from vessel collisions due to large vessel traffic in the world fleet would continue. Increased number of Post Panamax vessels and the forecasted transition to larger vessels in the Gulf of Mexico are



anticipated to occur with or without the proposed channel improvements. These improvements would allow for those vessels to move more efficiently through Mobile Harbor, and carry more cargo per call. Thus, the total number of vessels required to meet the demand at the port would decrease. Therefore, the proposed channel improvements are not expected to increase the risk of vessel collisions to the Bryde's whale.

Proposed channel improvements are within the congressionally authorized project dimensions; therefore, the USACE, Mobile District will implement terms and conditions for sea turtles and Gulf sturgeon identified in NMFS-PRD's *Gulf Regional Biological Opinion for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287)* (GRBO) dated November 19, 2003 (amended 2005 and 2007). These protective measures will be utilized if a hydraulic hopper dredge constructs the improvement features or performs routine future maintenance of the navigation channel. The project area is outside of designated Gulf sturgeon critical habitat and placement of material will not breach the water surface. Thus, based upon this previous coordination, NMFS-PRD concluded these activities will not likely jeopardize the continued existence of these species.

Based upon the USFWS, Daphne Field Office's Planning Aid Letter (PAL) dated December 9, 2016, the Alabama red-bellied turtle is known to inhabit streams, lakes, and sloughs associated with the lower part of the Mobile-Tensaw Delta estuary and streams adjacent to Mobile Bay. Extensive beds of submerged and emergent aquatic vegetation are considered to be the principal habitats of these species. Destruction of nesting habitat, sand banks and beaches, is the primary cause for the decline in species numbers. Other threats are disturbances from human activities, loss of aquatic vegetation, and collection for food and pets. The Alabama red-bellied turtle is known to inhabit the River Channel and the upper channel reaches. Past maintenance dredging of the navigation channels and placement operations in existing upland/open-water placement areas have not been identified as actions that would be threatening to this species. Improvements proposed in this Draft GRR/SEIS study are limited to those identified navigational features with subsequent placement of new work material in open-water areas (i.e. relic shell mined areas, ODMDS, and if applicable, SIBUA). The USACE, Mobile District anticipates any impacts from constructing the TSP and maintaining future channel dimensions would be similar in nature to those previously coordinated maintenance activities.

West Indian manatees are known to exist throughout the entire project area as they move during warmer periods of the year. Manatees are frequently reported in Dog River, a river emptying into Mobile Bay. A group of manatees were most recently sighted in Dog River in June 2018. Although unlikely given the project location occurs mostly in the Bay and Bar Channels, a West Indian manatee could be possibly encountered during the project construction. Given this possibility, the USACE has historically agreed to implement "Standard Manatee Construction Conditions" during maintenance dredging and



placement operations in Alabama. The USACE recommends these conditions be implemented during the construction activities and associated future maintenance so no adverse impact to West Indian manatees are anticipated.

Based on this information, the USACE, Mobile District finds that the proposed modification activity is not likely to adversely affect any listed endangered and/or threatened species or their associated critical habitat. The USACE, Mobile District has initiated consultation with the USFWS under Section 7 coordination of the ESA. It is expected that this consultation will be completed prior to the release of the Final GRR/SEIS Report. A copy of the consultation letter sent to the USFWS is included in Attachment C-4, Appendix C. .

### **5.9.3. Future Maintenance**

The future maintenance of the navigation channel and placement of material in the approved placement sites would be similar to existing practices. There would be no expected additional environmental changes above that described for the construction activities. The USACE, Mobile District will continue to implement all conservation measures for future maintenance activities as required by the GRBO and consultations with the USFWS. However, as with all future scenarios, it is predicted that future SLR scenarios over the next 50 years would cause changes in water depth and salinity as described under the No Action Alternative.

## **5.10. Marine Mammals**

Marine mammals are covered under the MMPA, regardless of their status under the ESA. There are a total of six threatened or endangered whale species (i.e., whale species protected under both the ESA and MMPA) in the Gulf of Mexico, with only two whale species that may occur in the project area. The West Indian manatee is also listed as endangered and, therefore, is protected under the ESA. A more detailed discussion of marine mammals, their habitats, and status is included in Section 2.8.1, Appendix C.

### **5.10.1. Alternative 1 – No Action**

Under the No Action Alternative, marine mammals would continue to utilize the area without additional disruption from localized temporary impacts.

### **5.10.2. Alternative 2 – TSP**

#### **5.10.2.1. Project Construction**

A dredge transiting to the offshore ODMS could encounter a marine mammal but such interactions are rare. Noise generated from dredging equipment has the potential to harm

marine mammals, including large whales. Although behavioral impacts are possible (i.e., a whale changing course to move away from a vessel), the number and frequency of vessels present within a given project area is small and any behavioral impacts would be expected to be minor. Furthermore, for hopper dredging activities, endangered species observers (ESOs) would be on board and would record all large whale sightings and note any potential behavioral impacts.

**West Indian Manatee.** The proposed project may affect, but is not likely to adversely affect the manatee. The dredging contractors would adhere to the standard manatee conditions during construction in order to avoid vessel strikes. The standard manatee conditions apply annually from 1 June to 30 September. The dredging contractors will be instructed to take the necessary precautions to avoid contact with manatees. If manatees are sighted within 100 yards of the dredging activity, all appropriate precautions would be implemented to insure protection of the manatee. The Contractor would stop, alter course, or maneuver as necessary to avoid operating moving equipment (including watercraft) any closer than 100 yards of the manatee. Operation of equipment closer than 50 ft to a manatee shall necessitate immediate shutdown of that equipment.

### **5.10.3. Future Maintenance**

The future maintenance of the navigation channel and placement of material in the approved placement sites will continue and use the same placement areas as with the current maintenance practices. As with project construction, the USACE, Mobile District, does not anticipate sperm, blue, fin, humpback, sei, or Byrde's whales would be adversely affected by the sediment placement activities within the proposed disposal areas. The possibility of collision with the dredge or pipelines will be remote since these are deepwater species and very low likelihood of interaction. The USACE, Mobile District does not anticipate the proposed actions identified in this study will affect these species. Additionally, future maintenance operations will continue to implement the manatee precautions to avoid animal within the dredging and placement areas.

### **5.11. Other Wildlife Communities**

The Gulf coast, including Alabama, Mobile Bay, and associated watershed is host to wildlife communities discussed in more detail in Section 2.9, Appendix C. The coastal marshes, islands, and beaches of Alabama are utilized by large populations of waterfowl, passerines, wading birds, and shorebirds. The area provides feeding, nesting, resting, and wintering habitat for numerous resident and migratory bird species (MDMR, 2010d). Over 300 species of birds have been reported as migratory or permanent residents within the area, including several species that breed here. Shorebirds found in the area include osprey, great blue heron, great egret, piping plover, sandpiper, gulls, brown and white pelicans, American oystercatcher, and terns (USACE, 2009a).

Species likely to be found in the project area are common throughout Mobile and Baldwin Counties, and are somewhat opportunistic species such as the nine-banded armadillo (*Dasypus novemcinctus*), opossum (*Didelphis marsupialis*), and raccoon (*Procyon lotor varius*) (U.S. Navy, 1986). Fox (*Vulpes sp.*) have been spotted in the area. The swamp rabbit (*Sylvilagus aquaticus littoralis*) may also be found throughout the coastal marshes of Alabama.

The Alabama red-bellied turtle (*Pseudemys alabamensis*), a Federally listed endangered species, has been sighted in the brackish marshes within the project area but generally prefers freshwater habitats and potential impacts to this species is covered above in Section 3.9, Appendix C. The only snake to habitually occupy the salt marsh habitat in Alabama is the Gulf salt marsh water snake.

#### **5.11.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. However, predicted future SLR scenarios over the next 50 years would cause changes in water depth and salinity. In many areas the predominant impact of long-term SLR will be excessive inundation leading to a possible conversion of some areas exhibiting upland characteristics to wetland features and consequently inundation of existing wetland features to open water areas, especially in landscapes where landward retreat is restricted (USGS, others).

The modeling efforts conducted for this study suggest as many as 930 wetland features may be inundated due to the 0.5 m SLR projection, representing an area of 8,440 acres. This includes forested areas predominantly dominated by freshwater communities (e.g., bottomland hardwoods), salt-tolerant halophytic communities (e.g., black needle rush, big cordgrass), and transitional communities (e.g., tidal shrub mix, Typha). Increases in sea level inundation may not result in the loss of wetlands but may lead to a shift of wetland and habitat types. Such changes have the potential to alter both species composition and structure, occurring over multi-years to multi-decadal timescales.

## **5.11.2. Alternative 2 – TSP**

### **5.11.2.1. Project Construction**

With the exception of Little Sand Island's highly disturbed shoreline, the TSP will be implemented in submerged areas. The upland communities will not be subjected to the potential impacts as presented for the numerous aquatic resources. As discussed in Berkowitz et al. (2018), evaluations looking at changes in water quality and hydrodynamics for potential impacts to benthic macroinvertebrates, wetlands, SAV, oysters, and fish were conducted. The assessment included extensive characterization of baseline conditions, followed by evaluation of estimated post project conditions related to aquatic resource habitat (e.g., changes in salinity, DO). Additionally, an analysis of potential impacts related to a 0.5m SLR scenario were evaluated. Results of the detailed analyses suggest that no substantial impacts in aquatic resources within the study area are anticipated due to project implementation, as the area of greatest potential changes to environmental conditions are already adapted to natural shifts in salinity (and other factors) as well as conditions resulting from the existing navigation channel. Although SLR has the potential to alter aquatic resource habitats with Mobile Bay, impacts to upland wildlife communities related to project implementation would not be expected and would likely be negligible under the 0.5 m SLR scenario.

### **5.11.3. Future Maintenance**

The future maintenance dredging of the navigation channel and placement of material in the approved dredged material placement sites will result in temporary increases of suspended sediments, the loss of benthic organisms, increases in nutrients, and bathymetry changes in open water placement sites. The increase in turbidity will reduce light penetration through the water column, thereby reducing photosynthesis, surface water temperatures, and aesthetics. There would be no additional changes in salinity and DO levels as they would stay well above the minimum thresholds during future maintenance and operational activities. These conditions will be no greater than what exists after project construction and no additional impacts to crustacean in the project area would be expected to occur.

Future maintenance practices will be consistent with the current O&M dredging practices and would not be expected to cause any further impacts to upland communities. However, future SLR scenarios over the next 50 years would cause changes similar to those described in the No Action Alternative.

## **5.12. Fisheries Resources**

Commercial and recreational fishing is a vital part of both the economy and quality of life in south Alabama. In fact, fisheries have been an integral part of Mobile Bay's culture and surrounding area for an amazing 10,000 years (MBNEP, 2001). The MBNEP (2001)

in their Comprehensive Conservation and Management Plan credits the Alabama commercial seafood industry and its related support industries, such as shipbuilding and marine supply, to account for employment of nearly 4,000 workers and generating somewhere around \$450 million annually in related products. Historically, the seafood fisheries have been a major contribution to the seafood economy since the 1880s. Blue crab, shrimp, oysters, and finfish landings have historically experienced a relatively stable harvest but has declined somewhat in recent years. The most recent summary of the most valuable commercial fisheries and their harvest values as provided by the MRD (2018) are presented in Section 2.5.10. The commercial fisheries included in that section include the brown and white shrimp, oysters, crab, and finfish.

The significance criteria for commercial and recreational fishing in the project area would be an effect to the species or a change to the habitat structure leading to a change in species composition or long-term changes in revenue for fisheries within Mobile Bay.

#### **5.12.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. However, predicted future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters and consequently result in some effects to existing fisheries resources and their distributions as SLR occurs. In many regions the predominant impact of long-term SLR will cause increased depth and salinities in the areas where resources are abundant. Under current conditions, there would be no changes to salinity and DO levels that would cause any impacts to valuable fisheries resources in the project area.

#### **5.12.2. Alternative 2 – TSP**

##### **5.12.2.1. Project Construction**

**Dredging Activities.** In general, the commercial species require similar conditions presented for the fish, crustaceans, and mollusks which is described in Sections 3.8.8, 3.8.9, 3.8.10, and 3.8.11, Appendix C. Results of the detailed analyses suggest no substantial impacts in aquatic resources within the study area are anticipated due to project implementation, as the area of greatest potential changes to environmental conditions are already adapted to natural shifts in salinity (and other factors) as well as conditions resulting from the existing navigation channel. Although SLR has the potential to alter aquatic resource habitats with Mobile Bay, additional impacts related to project implementation remain negligible under the 0.5 m SLR scenario.

Shrimp and crabs generally prey on bottom detritus and benthic invertebrates. The benthic macroinvertebrate assessment results indicate that expected With-Project

conditions suggest mean bottom salinity increases of 1-3 ppt. The greatest salinity increases are projected to occur within the transitional and estuarine zones where benthic macrofaunal assemblages are dominated by polychaete worms are well adapted to experiencing salinity fluctuations that occur during tidal exchanges. Impacts of harbor deepening on benthic macrofauna due to salinity intrusion are predicted to be negligible, with no effects on higher trophic levels, such as fish, shrimp, and crabs because prey availability and distributions are unlikely to be affected.

Shrimp and crabs utilize the wetlands and SAV areas as nursery grounds. Results of the impact assessments for these resources indicate areas such as the wetlands and SAV are not expected to be negatively impacted by the implementation of the TSP as discussed in Sections 3.8.2 and 3.8.3, Appendix C. Considering that the habitats widely used by the shrimp and crabs considered in this section are unlikely to be affected by the implementation of TSP, no negative impacts to these species due to changes in water quality would be expected by the implementation of the TSP..

**Placement Activities.** *Relic Shell Mined Areas.* The effects of placement activities of the new work material is described previously in Section 3.7. Activities associated with placement of new work material in the Relic Shell Mined Areas would result in a number of unavoidable but minor and temporary impacts to the immediate project area as previously described. The adverse impacts are minimal and temporary in nature and include destruction of benthos, increased turbidity, and aquatic organism disturbance. Compliance with the State of Alabama's water quality standards would not be adhered to and water clarity would return to ambient conditions shortly after sediment placement at the dredge and placement sites.

Studies of similar actions have indicated that recovery of the benthos will rapidly approach the same levels that exist in the adjacent bay bottom areas, especially after the basin transitions to surrounding bay bottom characteristics. Restoring the bay bottom to more closely resemble previous conditions will have beneficial effects by improving ecological productivity in the area. In doing so, no long-term impacts would be expected to occur to commercial fishing activities. The USACE, Mobile District will notify the commercial fleet on the times and locations of placement activities in this area.

**SIBUA.** Sandy material from deepening the Bar Channel may be placed in the SIBUA. However, it is believed that there will be not be a significant amount of sandy material from this channel section to warrant the SIBUA placement. Should placement occur from deepening this reach of channel, temporary perturbations in water quality would be expected. Ninety-eight percent of discharged sediments from hydraulic dredging have been observed to settle out within 200 ft of discharge points during similar operations in the project vicinity (USACE 1978). Heaviest concentrations observed during this study occurred near the bottom and extended approximately 1,800 ft from the discharge point. Placement at the SIBUA is conducted on a regular basis as part of the current



maintenance activities. There would be no expected impacts to commercial fishing activities above what already exists from normal maintenance operations.

**ODMDS.** The ODMDS is frequently used for placement of fine grained sediments for the current maintenance dredging of the existing navigation channel. There would be no expected impacts to commercial fishing activities above what already exists from normal maintenance operations.

### **5.12.3. Future Maintenance**

Future maintenance of the navigation channel would be similar to the current O&M practices. These conditions will be no greater than what currently exists after project construction and no additional impacts to the dredging and placement areas would be expected to occur.

### **5.13. Invasive Species**

Nutria and cattle egret, inhabit wetland and upland areas, respectively. The plants, Eurasian watermilfoil and water hyacinth are freshwater species known to occur in the Mobile Delta and Mobile Bay areas (USGS 2018a).

#### **5.13.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. However, predicted future SLR scenarios over the next 50 years would cause changes in salinity and other water quality parameters and consequently impact invasive species communities and distributions as SLR occurs (Kirwan and Megonigal, 2013). As sea level continues to rise, a larger proportion of vegetative invasive species habitat will be exposed to higher salinities due to increased depths and higher salinities resulting in impacts greater than project implementation impacts.

#### **5.13.2. Alternative 2 – TSP**

##### **5.13.2.1. Project Construction**

As indicated in Section 3.8.3, Appendix C, Eurasian watermilfoil composed the majority of the potentially impacted SAV habitat (and the majority of the SAV habitat itself). Due to its invasive status, impacts to this species are unlikely to require mitigation or have a negative impact on local SAV species. Water hyacinth also occurs in the Mobile-Tensaw River Delta in local coastal drainages (USGS 2018b) and is typically found in freshwaters, wetlands, and marshes.

#### **5.13.3. Future Maintenance**

Future maintenance will not result in additional impacts greater than current O&M activities.

## **5.14. Air Quality**

This section provides a summary of the potential impacts to air quality. The impact analysis is detailed in Attachment C-3, Appendix C.

### **5.14.1. Alternative 1 – No Action**

Under the No Action Alternative, the proposed project would not be constructed. Therefore, no air pollutants or GHGs would be generated from equipment or vehicles from construction of channel improvements. No air quality impacts from construction and enhanced channel improvements would occur. Maintenance operations would still continue.

Due to the anticipated economic growth in the future, it is anticipated that on-port vessel calls would increase approximately by 78% over the 2011 baseline condition in 2035. This ratio of increase due to economic growth in vessel traffic was applied to the 2011 emissions inventory and predicted the 2035 No Action Alternative emission inventory. It should be noted that this predicted inventory is considered to be conservatively high because future combustion engines used for vessels, trucks, locomotives, and non-road equipment would be cleaner as a result of implementation of emission control programs on both Federal and state levels. The use of cleaner engines would partially offset the adverse emission impacts from an increased demand of harbor operational activities in the future.

### **5.14.2. Alternative 2 – TSP**

#### **5.14.2.1. Project Construction**

The proposed deepening and widening of the Mobile Harbor Federal Navigation Project would be a major construction project requiring certain large dredges to be used over several years. Two dredges are currently used for channel maintenance dredging activities. One additional dredge would be required during the widening and deepening activities. Since the deepening activity emissions would not take place along the channel at the same location for a long duration, they are considered temporary resulting in less than significant air quality impacts to the community along the channel.

### **5.14.3. Future Maintenance**

Due to the upcoming increase of the number of Post Panamax vessels in the world fleet and the opening of the Panama Canal expansion, the transition of larger vessels in the Gulf of Mexico is anticipated to occur with or without the proposed channel deepening. Previous navigation analyses indicate that channel improvements alone will not have an impact on the forecasted demand of commodities handled at a particular port. The proposed channel improvements at Mobile Harbor would allow for those commodities that

are transported through the harbor to move more efficiently. With the ability of these vessels calling on the harbor to transit more efficiently (carrying additional cargo per call), the total number of vessels required to meet the anticipated demand at the port during the period of analysis will decrease compared to the current channel configuration (USACE 2017). As a result, it is predicted that the short-duration (e.g., worst-case) daily emissions at the port including vaporized volatile organic compounds released during the fueling process between larger ships and fuel farms could increase as a result of introducing large vessels, but the overall annual emissions associated with ship traffic would likely be less under the implementation of the TSP than the No Action Alternative.

Given the uncertainty of the mix and size of vessels using the port and the change in vessel travel time after channel deepening, a precise calculation of the annual emissions is not feasible. It is assumed that the widening associated with the implementation of the TSP and the associated reduction of demurrage fees currently associated with vessel delays may result in an increased volume of petroleum products passing through the port. However, the level of increased throughput at the various terminals will be limited by tank capacity, dock availability, and available land for expansion. Likewise, with the harbor deepening, it is anticipated that the overall count of ships would essentially remain the same, with a slight reduction of containerships, compared to the No Action Alternative. The deepening would also allow coal carrying vessels to load to full capacity and potentially increase the volume of coal products passing through the port. The increased volume would be limited by the availability of storage space at the coal terminal. In addition, the volume of the container terminal will continue to increase through the Phase III buildout of 1.5 million TEUs annually, with the potential for increased hazardous materials shipments.

According to the emissions forecasted for the Charleston Harbor deepening project, the alternative with the largest deepening from a No Action depth of 45/45 to the 2037 build alternative with a deepening of 52/48 depth would result in emission reduction ratios ranging from approximately 1 to 3% pending on individual criteria pollutant (USACE 2014). Given the similarity of the proposed harbor navigation improvement scheme, ratios were applied to roughly predict the overall changes in emissions that could be expected in 2035 as summarized in Table 5-2 under the TSP condition as compared to the No Action Alternative.

**Table 5-2. Projected Changes in 2035 Emissions under Channel Deepening Alternative**

Source Category	NO <sub>x</sub> (tons)	CO (tons)	SO <sub>2</sub> (tons)	PM <sub>2.5</sub> (tons)	PM <sub>10</sub> (tons)
Estimated Change from 2035 No Action Alternative to Build Alternative from Mobile Harbor Deepening Project	-65.3	-12.5	-10.7	-1.9	-2.1
Prevention of Significant Deterioration (PSD) Threshold	250	250	250	250	250

Reasonably foreseeable changes in emissions associated with the implementation of the TSP were estimated and compared to the 250 tons per year PSD threshold on an annual basis to determine potential air quality impacts. If the total emissions exceed the PSD threshold, a further evaluation of the emissions resulting from the proposed action should be conducted to assess the emissions impact on sensitive land uses to determine the potential significance of air quality impacts.

The modernized channel would deliver shipping efficiencies by allowing larger vessels, and by extension, more cargo per transit at the port, requiring more outbound transportation of the additional cargo by rail, cargo vessels, heavy-duty diesel trucks, and private automobiles. The widening associated with the implementation of the TSP and the associated reduction of demurrage fees currently associated with vessel delays will result in an increased volume of petroleum products passing through the port. Each terminal maintains its own air permit and any potential increase in air emissions would be addressed and mitigated, if appropriate, through the individual permits, resulting in minor impacts to air quality. Increased PM<sub>2.5</sub> and PM<sub>10</sub> emission could result from a potential increase in coal throughput through the McDuffie terminal. However, due to the overall reduction in coal demand and the limited storage capacity at the terminal, it is more likely that fewer ships (at larger capacities) would be the primary outcome. Based on the 2011 predicted baseline operational emissions, PM<sub>2.5</sub> and PM<sub>10</sub> emissions from the coal pile were less than 1% and 3.8%, respectively. Should an increased coal demand arise and the number of shipments increase, the overall increase in PM<sub>2.5</sub> and PM<sub>10</sub> emissions associated with the coal pile would still be minimal compared to the overall PM<sub>2.5</sub> and PM<sub>10</sub> emissions from port-wide operations. The increase in truck traffic associated with buildout of the container terminal would result in an approximate 25% increase in truck traffic. Therefore, truck traffic related emissions would likely increase by 25% on port. Based on the 2011 on-port emissions inventory as discussed in Attachment C-3, Appendix C, truck emissions would be approximately in a range of 1 to 2%, pending on individual pollutants, of total port-wide emissions and are not major emissions contributors. With an overall improvement in annual emissions at Mobile Harbor under the proposed action, such an increase in truck traffic would unlikely result in significant air quality impacts. Additionally, one additional dredge may be required for maintenance

of the deeper and wider harbor and channels. This mobile source of potential air emissions would not cause a significant impact to air quality.

As indicated in Table 5-2 the proposed action would result in a net emission reduction for each criteria pollutant and therefore, the proposed action would result in minor air quality impacts. A detailed report on Air Quality is located in Attachment C-3, Appendix C.

## **5.15. Hazardous and Toxic Materials**

### **5.15.1. Alternative 1 – No Action**

Under the No Action Alternative, current channel and harbor maintenance operations would continue. The levels of hazardous materials and petroleum products traveling through the channel and harbor would remain similar. Over the next 50 years, channel traffic may increase independently of a deepening and widening project. Therefore, under the No Action Alternative, hazardous materials in the channel may increase slightly, but would only be related to vessels traveling in the channel and would be insignificant. Hazardous materials trucks currently detoured over the Cochrane-Africatown Bridge would continue to travel that route. Overall, under the No Action Alternative, minor impacts associated with hazardous materials may occur over the next 50 years.

Indirect impacts associated with hazardous materials and petroleum products in Mobile Harbor and channel are possible. If the channel is not widened and deepened, it is possible that the larger container ships would choose another available harbor for loading and unloading. This would result in less maritime traffic and less rail and vehicular traffic associated with the port. This would result in a decrease in the amounts of hazardous materials and petroleum products traveling in the project vicinity, but this decrease would be insignificant.

### **5.15.2. Alternative 2 – TSP**

#### **5.15.2.1. Project Construction**

Under the TSP, no direct impacts to hazardous materials would occur. However, direct impacts associated with petroleum products would occur. During construction, petroleum product levels could increase in Mobile Harbor and channel area due to construction dredging and placement activities. Dredge equipment carrying fuels and other lubricants could be present in larger numbers, as only one additional dredge is proposed, these increases would be minimal. These impacts would also be temporary. Once implementation of the TSP is complete, the equipment would leave the area and/or continue to operate in a maintenance mode in other areas of the channel. Although petroleum product levels could temporarily increase, these increases would not be significant as levels would return to normal after dredging is complete. Additionally, all the Federal and state hazardous materials regulations would apply to the dredging



operations as they currently do, there could simply be more dredging occurring for a period of time. Although exposure risks may increase slightly due to the potential for more vessels in the channel and harbor during dredging operations, this increase would be minor. Petroleum product trucks currently detoured over the Cochrane-Africatown Bridge would continue to travel that route. Overall, under the TSP, minor impacts associated with hazardous materials and petroleum products may occur.

### **5.15.3. Future Maintenance**

With the widening associated with the implementation of the TSP and the associated reduction of demurrage fees currently associated with vessel delays, it is anticipated that volume of petroleum products passing through Mobile Harbor may increase. The level of increased throughput at the various terminals will be limited by tank capacity, dock availability, and available land for expansion. Likewise, with the harbor deepening, ships serving the McDuffie Coal Terminal should be able to load to greater capacities and potentially increase the volume of coal products passing through the port. The increased volume would be limited by the availability of storage space at the terminal. In addition, the volume of the container terminal will continue to increase through the Phase III buildout of 1.5 million TEUs annually, with the potential for increased hazardous materials shipments.

Using the AADT traffic counts for 2016 for the Cochrane-Africatown Bridge (Section 2.5.20), in addition to the FHWA and ALDOT estimates proprietary hazardous materials truck counts provided by the tenants of the port terminals, approximately one percent of the traffic crossing the Cochrane-Africatown Bridge is a direct result of hazardous materials associated with port activities. Since port activities account for approximately one percent of the hazardous materials traffic over the Cochrane-Africatown Bridge and the increase in total truck traffic associated with the TSP is only 25 percent (as discussed in Section 2.5.20), the hazardous materials detoured over the Cochrane-Africatown Bridge as a result of implementation of the TSP would still be less than 2.5 percent of the total bridge traffic.

All shipping and handling activities would require compliance with applicable Federal and state hazardous materials regulations. Petroleum product and hazardous materials trucks would continue to be detoured over the Cochrane-Africatown Bridge until completion of the new I-10 Bridge. Once the I-10 Bridge is completed, truckers would have the option to use the new bridge or continue to detour over the Cochrane-Africatown Bridge. With compliance of state and Federal regulations related to the transport and handling of hazardous materials and the eventual completion of the new I-10 Bridge, minor impacts would be associated with any additional volumes of hazardous materials associated with implementation of the TSP.

Direct impacts associated with hazardous materials and petroleum products due to future maintenance dredging required to maintain the new depth and width of the channel would be similar to those during construction operations and current maintenance activities. Typically two dredges would carry fuels and lubricants on board during dredging, and would then leave the channel and harbor once maintenance is complete. These temporary increases in petroleum products would be insignificant. Indirect impacts associated with hazardous materials and petroleum products are unlikely during maintenance dredging.

## **5.16. Noise**

This section describes the potential impacts to the airborne and underwater ambient sound environment.

### **5.16.1. Alternative 1 – No Action**

**Airborne Noise.** Under the No Action Alternative, current channel and harbor maintenance operations would continue. Traffic levels on I-10 and surface streets are projected to increase over the 50-year timeframe. Under the No Action Alternative, the projected port vessel calls would likely increase below 50% as compared to the baseline condition. According to the noise fundamentals, doubling source strength or traffic volume would result in a 3 dBA noise increase, which is a barely perceptible change to human hearing. Therefore the anticipated increase in noise levels would be less than significant.

**Underwater Noise.** Under the No Action Alternative, there would be no increased dredging in Mobile Bay. Maintenance activities would continue as they currently are. Under operational conditions, although the port process capacity would increase as compared to the With-Project condition, the underwater noise from individual vessels would remain the same since it is anticipated that similar types of vessels would be present in the harbor. Subsequently, under the No Action Alternative, no adverse underwater noise impacts would occur.

### **5.16.2. Alternative 2 – TSP**

#### **5.16.2.1. Project Construction**

**Airborne Noise.** Under the TSP, direct impacts to noise levels would occur. These impacts would only be felt at the portions of the project which are adjacent to Mobile Harbor. During construction, noise levels would increase in Mobile Harbor area due to dredging and dredged material placement activities. These noise levels would approximate current levels as there is only one additional dredge proposed for the construction activities. Sources of sound from dredging include machinery noise, propulsion noise, pumping noise and aggregate noise. Noise radiation depends on the type of dredging equipment used, and its operational mode (NPL 2015). The precise nature of the noise from construction activities is not known at this time. Once deepening of the harbor area was complete the equipment would leave the area and continue to operate in areas where there are no sensitive noise receptors. Although noise levels would temporarily increase, these increases would not be significant due to the existing high noise levels in the vicinity.

**Underwater Noise.** It is anticipated that the maintenance dredges presently being used in the harbor would also be used for harbor deepening and widening, with the addition of one dredge as necessary. The underwater noise levels for the TSP during the construction period would, therefore, be comparable to the No Action Alternative. Given the temporary nature of dredging activities, underwater noise impacts would be less than significant.

### **5.16.3. Future Maintenance**

**Airborne Noise.** Direct impacts to airborne noise levels during maintenance activities would only occur near the harbor area, as no sensitive noise receptors are located near the channel. Noise at the harbor would increase while dredging was actively occurring. The possible addition of another dredge to complete maintenance activities would have a minimal impact on noise levels. Once the harbor portions of the maintenance dredging were complete, noise levels would return to normal. Since maintenance dredging already occurs within Mobile Harbor, no additional impacts to airborne noise are anticipated. No indirect impacts to air noise are anticipated.

The future on-road traffic volumes along the truck routes used at the port were predicted to be slightly more than double the existing 2016 levels (see Section 5.21). Since a doubling of traffic volume would result in approximately a 3-dBA increase in traffic noise, it is anticipated that the future traffic noise increase along the truck routes would be slightly over 3 dBA but well below the ALDOT-adopted 15-dBA substantial traffic noise increase that requires noise abatement. The on-road traffic noise impacts under the TSP would not be significant.

**Underwater Noise.** The underwater noise conditions around Mobile Harbor would essentially remain the same under the TSP with an exception of the likely presence of some large ships as compared to the current ship mix. Based on the available levels measured for a variety of marine vessels in a range of 157 to 182 dB at a distance of 3 ft, the noise levels from large ships are still below the range of Permanent Threshold Shift and Temporary Threshold Shift thresholds developed by the NMFS resulting in less than significant underwater noise impacts.

## **5.17. Cultural and Historic Resources**

### **5.17.1. Alternative 1 – No Action**

Under the No Action Alternative, the proposed project would not be implemented. Dredging operations would remain unchanged utilizing the current water quality certification for Mobile Harbor. Under this scenario no additional historic resources would be disturbed or impacted.

## **5.17.2. Alternative 2 – TSP**

### **5.17.2.1. Project Construction**

As referenced in Section 2.15, Appendix C, the APE of the TSP has a very high potential for cultural resources, including prehistoric sites on now-submerged landforms as well as historic shipwrecks. Some portions of the TSP have been previously surveyed for cultural resources. Other portions of the TSP have been subject to a recent Phase I level maritime (to include shipwrecks and prehistoric landforms) survey. Phase II evaluations may be necessary, dependent upon the Phase I findings. Section 106 coordination and consultation with the Alabama SHPO and the USACE, Mobile District Tribal Partners will be necessary. If impacts to listed, eligible, or potentially eligible cultural resources cannot be avoided, a Memorandum of Agreement (MOA) will be necessary in order to mitigate adverse effects to historic properties. Shipwrecks identified as foreign vessels such as those of French, Spanish, or English origin would be property of that sovereign nation, if no direct title of ownership can be established. If ownership is identified as the Foreign Sovereign Nation, consultation with Foreign Sovereign Nation would be necessary. At this time, the following investigation recommendations have been made.

#### **Direct Effects**

Bay Channel. No survey is recommended for the portion of the existing Bay Channel that is proposed to be deepened. The channel was surveyed for submerged resources with a Phase I survey conducted based upon the authorized dimensions (Mistovich and Knight, 1983). Underwater archaeologists also investigated significant anomalies via diving (Phase II investigations) in 1986 (Irion). During the Phase II investigations, all anomalies were found to be modern harbor debris. Although the Phase I investigation is outdated, anomalies were physically investigated via diving by underwater archaeologists. The confidence in physical examination combined with the fact that ground disturbance proposed in deepening the channel would take place in soils below the depth of cultural resources had led to the recommendation of no additional investigations for this portion of the TSP.

Although the 1983 Phase I investigation is outdated, additional Phase I investigations area are very unlikely to identify previously unrecorded resources within the Bay Channel deepening corridor. Within this corridor, the potential for previously unrecorded shipwreck sites is quite low. Upon sinking, shipwrecks come to rest relatively upright on the surface of the seafloor and the depth of the current channel greatly exceeds the seabed of the historical sailing era, thus extremely limiting the potential for intact shipwrecks or partial shipwrecks. The potential for previously undiscovered submerged prehistoric resources is also quite low in the existing channel. The existing channel follows the deepest natural part of the relic river which has a low probability for occupation sites. It is the margins

and banks of the relic river, such as those areas included in the widening and bend easing portions of the TSP, that would have a higher probability for submerged prehistoric sites.

Choctaw Pass Turning Basin. The Choctaw Pass Turning Basin as described in Section 1.1.3, Appendix A, was not constructed with the other project improvements during the late 1980s/early 1990s at the request of the NFS (i.e., the ASPA). A GRR was later prepared (in May 2007), per the NFS's request, to re-evaluate the turning basin. The 2007 GRR recommended the turning basin be moved north to Choctaw Pass and deepened to 45 ft to match the adjacent channel dimensions. Construction to recommended dimensions was completed in 2011. The TSP calls for expanding the Choctaw Pass Turning Basin to the southeast, adding an additional 250' of width to the turning basin and matching the depth of the larger part of the turning basin (50' deep). The area proposed for widening was recently investigated for submerged resources (Hall 2007). No significant anomalies were recorded during the survey. No additional investigations are recommended.

Bay Channel Widening. The proposed 3 nautical mile stretch of the lower Bay Channel included in the TSP for channel widening will require a Phase I maritime survey. As referenced in Section 2.15, Appendix C, the Bay Channel has an extremely high potential for cultural resources. Although the areas to be widened fall within the survey parameters of 1983 Phase I survey (Mistovich and Knight, 1983), these soils have not been disturbed by dredging and advances in technology and maritime archaeological survey techniques combined with the dynamics of a maritime environment mean that there is a high potential for previously undiscovered intact cultural resources. The Phase I survey fieldwork has been completed but the report is forthcoming. The results and recommendations will of the survey will be reported in the Final GRR/SEIS as well as used in Section 106 consultation.

Bar Channel. The proposed Bar Channel deepening and bend easing as described in Section 1.1.1, Appendix A will require a Phase I maritime survey. As referenced in Section 2.15, Appendix C, the Bar Channel has an extremely high potential of cultural resources. Although the areas to be widened fall within the survey parameters of the 1983 Phase I survey (Mistovich and Knight, 1983), these soils have not been disturbed by dredging and advances in technology and maritime archaeological survey techniques combined with the dynamics of a maritime environment mean that there is a high potential for previously undiscovered intact cultural resources. The Phase I survey fieldwork has been completed but the report is forthcoming. The results and recommendations will of the survey will be reported in the Final GRR/SEIS as well as used in Section 106 consultation.

Relic Shell Mined Area. Selected as one of the new work placement areas, it is a concentration of fossilized shell which was mined for shell borrow material for roads, chemicals and poultry feed. The locations where material would be placed have been disturbed to a depth of 15 ft or greater. Due to the extreme disturbance by mining



operations this area lacks potential for cultural resources. No cultural resource survey is recommended.

SIBUA. The southernmost portion of the existing SIBUA area was recently investigated by USACE archaeologists (2009) for submerged resources. Although some anomalies were identified, none were significant anomalies associated with cultural resources. No additional investigations are recommended.

SIBUA Northwest Expansion. An area northwest of the existing SIBUA was identified for expansion to accommodate future maintenance capacity. As referenced in Section 2.15, Appendix C, the SIBU northwest expansion has an extremely high potential of cultural resources. The Phase I survey fieldwork has been completed but the report is forthcoming. The results and recommendations of the survey will be reported in the Final GRR/SEIS as well as used in Section 106 consultation.

ODMDS. In order to ensure compliance, cultural resources were evaluated via a literature review and through analysis of remote sensing data, focusing on archaeological resources. The information gathered from these sources was used to characterize and assess potential effects. The data search revealed there were several possible shipwrecks in the vicinity. In November 1985, the USACE, Mobile District prepared the "Final Supplemental EIS, Mobile Harbor, Alabama, Channel Improvements, Offshore Dredged Material Disposal." The following was extracted from that document: "The historical associations of the area range from the earliest explorers of this continent through more recent events in Alabama which include historical buildings, lighthouses, and existing forts, such as Fort Gaines (1818) on Dauphin Island and Fort Morgan (1833) at the Mobile Point lighthouse (lighthouse no longer extant) (Alabama Historical Commission, 1978). The Union ironclad, U.S.S. Tecumseh, is under 30 feet of water in Mobile Bay, north of Fort Morgan. The historical richness of the area is seen by the number of listings in historical site registers; over 50 listings in the National Park Service's National Register of Historic Places and nearly 20 listings in the Alabama Historical Commission's Alabama Register (USACE 1985)".

Historically, the USACE, Mobile District has consulted with the Alabama SHPO regarding placement of maintenance material in the Mobile ODMDS as described in Public Notice Numbers FP86-MH06-02, FP91-MH07-04, FP95-MH07-02, FP97-MH08-02, FP97-MH09-02, FP11-MH01-06, and FP14-MH01-10, and FP16-MH01-04. Additional coordination with the Alabama SHPO for placement of new work material has also been conducted with each navigation improvement.

In August 1982, the USACE, Mobile District conducted cultural resources investigations of the current project area. These studies, which have provided the basis for previous

consultation with the Alabama SHPO, included archival and historic research on the prehistory and history of the Mobile Bay area and remote sensing surveys (i.e. magnetometer side-scan sonar and shallow-seismic profiles) of all areas that could be affected. Survey methodologies for areas in Mobile Bay and in the Gulf (ODMDS) varied. The surveys within Mobile Bay were conducted at 50 meter intervals while survey of the Mobile ODMDS, including the current APE, was based on a sampling strategy designed to establish high and low probability zones, with lane spacing in the Gulf widened to 150 meter intervals. The 1982 report recommended three high probability zones in the placement areas in the Gulf, including much of the northern section of the current project area. The report recommended that the high probability zones should be avoided during placement operations, if possible. Although the survey of the roughly 4,000 acre Mobile ODMDS (current project area) focused on designating zones of high probability, the survey identified 33 magnetic anomalies. Of these, six anomalies were recommended for avoidance or additional evaluation. Given the passage of time, technological improvements, and possible changes in environmental conditions, additional surveys are being considered prior to site use of areas previously undisturbed. As part of that EPA Region 4's designation effort, the USACE, Mobile District will coordinate with the Alabama SHPO through the release of the Public Notice and via letter to discuss avoidance of any culturally sensitive resources in the Mobile ODMDS. If avoidance is not feasible, a mitigation plan will be developed in consultation with the Alabama SHPO and the Advisory Council on Historic Preservation (ACHP) prior to site usage of areas previously undisturbed. Additional stakeholders will also be identified during this process including interested tribes, local governments, and special interest groups in order that they might be allowed to participate in this process. The USACE, Mobile District will obtain Section 106 concurrence and that coordination documentation will be included in the ODMDS EA and the Mobile Harbor GRR/SEIS.

### **Indirect Effects**

Estuarine Sediment Transport. As channel modifications may change sedimentation rates and patterns, sediment transport modeling was conducted for the navigation channel, dredged material placement sites, and surrounding areas. The methodology and results of the estuarine sediment transport analysis are discussed in Section 6.3.1, Appendix A. No discernable net erosion or net deposition was indicated in the study results when compared to the future Without-Project conditions. As such, no investigations are recommended.

Coastal Sediment Transport. Since channel modifications might change sedimentation rates and patterns, sediment transport modeling was conducted to assess the relative changes in sediment pathways and morphological response on the ebb tidal shoal and adjacent coastal areas. The methodology and results of the coastal sediment transport analysis are discussed in Section 6.3.2, Appendix A. The modeling results indicate minimum difference in bed level changes between the With-Project and Existing

Conditions in the bay and on the ebb tidal shoal. As such, no investigations are recommended.

Vessel Generated Wave Energy. As making Mobile Harbor navigable by larger, deeper draft vessels is a primary goal of the project, the change in vessel generated wave energy and possible effects of that energy on the shoreline was assessed. The methodology and results of that vessel generated wave energy assessment are discussed in Section 6.4, Appendix A. The modeling results indicate minimum difference in bed level changes between the With-Project and Existing Conditions in the bay and on the ebb tidal shoal. As such, no investigations are recommended.

### **5.17.3. Future Maintenance**

Future maintenance placement practices will be consistent with the current O&M placement areas. Material dredged as part of maintenance operations for the future With-Project conditions will continue to be placed in a combination of upland sites adjacent to the River Channel; open water placement sites within the bay; the SIBUA on the ebb tidal shoal, including a proposed northwestward expansion of the site; and the ODMS in both the current limits and a future expansion area. The current O&M disposal areas have been previously reviewed and approved through the Section 106 process and will not require additional Section 106 review until those disposal areas require recertification. Future O&M use of new disposal areas proposed in this TSP, will be considered during Section 106 review of the TSP. The continued use of those disposal areas will be required to adhere to any avoidance plans, mitigation plans, MOA, or any other requirements and stipulations that result from the Section 106 process, as well as undergo Section 106 review during future recertification.

### **5.18. Protected and Managed Lands**

According to the ADCNR, Alabama is home to 11 national wildlife refuges that represent a cross-section of Alabama's diverse natural environment as well as state and privately managed areas. Alabama's protected lands and resources encompass the beaches and estuaries of the Gulf Coast, the waters of the Tensaw River, and the swamps and wetlands along the Tombigbee River. The ADCNR is the state agency responsible for the conservation and management of Alabama's natural resources, including state parks, state lands, wildlife, and aquatic resources. A summary of the Protected and Managed Lands considered in this report is provided in Section 2.17, Appendix C.

#### **5.18.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected environmental changes in association with maintaining the navigation project. It is predicted that future SLR scenarios would cause changes in

salinity and other water quality parameters that impact aquatic resources residing in these protected areas as the SLR occurs (Kirwan and Megonigal, 2013). In many regions the predominant impact of long term sea level rise will be excessive inundation leading to a conversion of wetland features to open water areas, especially in landscapes where landward retreat is restricted (USGS, others).

The modeling efforts conducted for the aquatic resources considered as characteristic to national wildlife refuges and Alabama's diverse natural environment as well as state and private managed areas suggest that some wetland features in these areas may be inundated as a result of the 0.5 m SLR projection. This includes forested areas predominantly dominated by freshwater communities (e.g., bottomland hardwoods), salt-tolerant halophytic communities (e.g., black needle rush, big cordgrass), and transitional communities (e.g., tidal shrub mix, *Typha*). Increases in sea level inundation may not result in the loss of wetlands but may lead to a shift of wetland types. Such changes have the potential to alter both species composition and structure, occurring over multi-years to multi-decadal timescales.

## **5.18.2. Alternative 2 – TSP**

### **5.18.2.1. Project Construction**

Field studies analyzed changes in water quality and hydrodynamics to evaluate the potential for impacts to benthic macroinvertebrates, wetlands, SAV, oysters, and fish were conducted by Berkowitz et al. (2018) which include the areas and habitats considered characteristic of the national wildlife refuges and Alabama's natural environments as well as those state and privately managed areas described in Section 2.17, Appendix C. Results of the detailed analyses suggest that no substantial impacts in aquatic resources within the Federal Reserves and other managed areas are anticipated due to project implementation, as the area of greatest potential changes to environmental conditions are already adapted to natural shifts in salinity (and other factors) as well as conditions resulting from the existing navigation channel. Although SLR has the potential to alter natural resources associated with the reserves and managed areas, additional impacts related to project implementation remain negligible under the 0.5 m SLR scenario.

### **5.18.3. Future Maintenance**

Future maintenance of the navigation channel would be no greater than current conditions after project construction and no additional impacts to national wildlife refuges and private managed areas in the project area would be expected to occur.

## **5.19. Recreation/Aesthetics**

As described in Section 2.18, Appendix C, coastal-based tourism and recreation account for a significant portion of Alabama's tourism and recreation industry. Opportunities for recreation include arts and entertainment, boating, golfing, sightseeing, picnicking, swimming, bird watching, and fishing. Alabama's Gulf Coast, located between Mississippi and the Florida Panhandle, includes just two counties: Mobile and Baldwin. These counties border Mobile Bay, the Mississippi Sound and the Gulf of Mexico, which provide ample opportunity for boating, swimming, fishing and relaxing on coast beaches. Alabama's coastline stretches 60 miles and is home to beaches along the Gulf and which provides quality of life for many Alabamians and plays a major role in the State's economy as well as being recognized as valuable environmental asset.

### **5.19.1. Alternative 1 – No Action**

Under the No Action Alternative, existing conditions in the project area would continue. There would be no expected changes to recreation and esthetics association with maintaining the navigation project.

### **5.19.2. Alternative 2 – TSP**

### **5.19.2.1. Project Construction**

The degree to which any adverse feature affects aesthetics is frequently based on scale, position, and proximity relative to the viewer. Commercial and recreational vessel traffic patterns, shoreline land uses, and natural resources that define the aesthetic characteristics of the area would not be adversely affected. Temporary impacts to aesthetics would occur in the immediate vicinity of placement activities during construction. Many people utilize Mobile Bay and vicinities within the project area and would likely be temporarily disturbed by the presence of dredges, pipelines, and other working vessels during construction activities. Subsequently, overall activities in any specific area would be short-term. Impacts would be minor, and therefore not significant.

Aesthetic resources in the majority of the project area include open water areas along the Bar and Bay Channels, and industrial settings in the River Channel. These are highly different visual areas, one consisting of a natural setting, occasionally disturbed by passing vessels and oil platforms, the other consisting of a densely industrial area with constantly operating large scale equipment and vessels and vehicles. The proposed project would not change the aesthetic resources of Mobile Harbor and surrounding areas, nor the numerous recreational opportunities. Commercial and recreational vessel traffic patterns, shoreline land uses, and natural resources that define the aesthetic characteristics of the area would not be adversely affected.

As a public safety measure, boating and fishing activities would be prohibited near the operating construction equipment (and sediment placement locations). Recreational access to these areas would return to pre-construction conditions following completion of the project. Although short-term impacts could occur, no long-term adverse effects are anticipated. Commercial shipping would continue in the Federal navigation channel. Information would be provided to the USCG so they could issue a "Notice to Mariners" prior to initiation of construction and for each major change in the construction activities. This would alert public boaters of areas to avoid and the possibility of limited and restricted access. No significant adverse impacts to public safety are expected from the proposed project.



### **5.19.3. Future Maintenance**

Future maintenance and operations have the potential to have minor impacts on recreational activities. Operational activities would remain much as they are today and it would be unlikely that Mobile Harbor and River Channel operations would be visible from recreational areas as these impacts would be minor and insignificant as they would not be present for long periods of time and would not completely block or severely disrupt the overall views and boating activities. Overall, although minor disturbances to recreational activities may occur during dredging and placement activities, these disturbances would be insignificant as they would be short in duration and small in effect.

### **5.20. Socioeconomics**

This section describes the potential impacts to socioeconomics should the TSP or No Action Alternative be implemented.

Components of socioeconomic resources that are analyzed include population, employment, and income. The Region of Interest (ROI) encompasses Alabama's two southernmost coastal counties - Mobile and Baldwin. It includes the developed urban area of the City of Mobile, the maritime facilities, and residential areas along the east and west banks of the Mobile River and Mobile Bay. Mobile and Baldwin Counties form the economic ROI, which is the geographic area in which the predominant social and economic impacts of the Proposed Action are likely to occur.

#### **5.20.1. Alternative 1 – No Action**

Under the No Action Alternative, the proposed project would not be implemented. Therefore, existing socioeconomic conditions would be expected to remain as they are at present for the short-term. However, medium to long-term detrimental economic impacts may result from the No Action Alternative. If improvements are not made to Mobile Harbor to meet the shipping industry's need for the port to accommodate larger shipping vessels coming online internationally, the port may not reach its full potential and Alabama's share of global trade may be negatively impacted. International trade could be limited, which may hinder long-term growth trends causing an indirect negative impact to employment levels, salary levels and tax collections in the ROI, surrounding counties and the state of Alabama.

#### **5.20.2. Alternative 2 – TSP**

##### **5.20.2.1. Project Construction**

There is an initial capital cost of approximately \$387 million associated with dredging operations. A minimal amount of materials and services (primarily fuel) may be purchased locally in Mobile and Baldwin Counties. The direct impact to the economy

associated with dredging activities, if any, would be short-term, minor and beneficial to the local economy.

The onsite construction workforce is estimated to be 34 workers during the construction period (estimated to be approximately three years). The majority of these workers would be transient workers residing outside of the ROI. Beneficial indirect impacts to the hospitality and service industries for accommodations, food and entertainment purchases by the temporary workers are likely, but minor. Changes to population levels in the area as a result of construction activities are not expected.

The adverse environmental impacts of implementation of the TSP during construction are minimal and temporary in nature and include reduced air quality, increased noise from dredging operations and increased traffic from workers. These environmental impacts can contribute to socioeconomic impacts. Air quality would be temporarily and insignificantly affected due to emissions resulting from dredge operations and other necessary equipment. The project area is currently in attainment with NAAQS, and the proposed action is not expected to affect the attainment status of the project area or region. Noise from the single additional dredge would be evident in the immediate vicinity of the work area, but would not be prolonged or atypical for the area, and would have a minimal impact on existing noise levels. While air quality and noise impacts may be experienced by persons in vessels on the water, in the vicinity of these construction activities, they would not be expected to be experienced by residents or communities on the shore due to the distance separating the dredging area from these receptors. Traffic would not be impacted due to the small amount of workers changing rotations on the dredge equipment such that air quality, noise and traffic impacts would not contribute to adverse socioeconomic impacts. Overall, socioeconomic impacts from implementation of the TSP are anticipated to be positive and short-term during construction although small relative to the total economy of the counties.

### **5.20.3. Future Maintenance**

The long-term socioeconomic impacts associated with implementation of the TSP are beneficial. As the world's shipping vessels continue their transition to larger ships, Mobile Harbor would maintain its competitive position as a center for international trade because of its ability to accommodate larger ships. It is anticipated that the number of vessels calling at Mobile Harbor would not increase based on implementation of the TSP, and the amount of cargo moving through Mobile Harbor would remain the same. The completion of the APM Terminals expected in 2019 would result in additional full-time longshoremen jobs and the increase in the volume of commodities would also put a larger demand on truck traffic, creating additional trucking jobs.

Additionally, over the long-term, implementation of the TSP may have a minor beneficial impact to air quality and noise. The proposed channel improvements would allow for

more efficient transport of commodities, which results in the ability of vessels to carry more cargo per trip, resulting in a decrease of the total number of vessels required to deliver the same throughput. Newer ships will replace older ships with less fuel efficiency, resulting in a minor beneficial impact to air quality of the region. In addition, newer ships would also likely have a different, probably lower noise profile. Overall, socioeconomic impacts from implementation of the TSP would have positive effects.

## **5.21. Transportation**

This section provides a summary of the potential impacts to transportation should the Proposed Action or No Action Alternative be implemented. The impact analysis is provided in more detail in Section 3.22, Appendix C.

### **5.21.1. Alternative 1 – No Action**

Under the No Action Alternative, no changes to the current transportation system would occur. Maintenance dredging of the harbor and channel would continue. Over the next 50 years, channel traffic and harbor operations will increase independently of a deepening and widening project. This could potentially lead to increased traffic on local roads, railroads and airports. Vehicular traffic volumes in the general area will also increase proportionally, but this increase would be insignificant. If proposed road improvements are made on the I-10, these impacts would be further reduced.

### **5.21.2. Alternative 2 – TSP**

#### **5.21.2.1. Project Construction**

During construction, harbor operations are expected to continue without construction related interruption. Dredge activity would be halted and moved to accommodate vessel traffic. Currently, two dredges operate in the harbor and the channels for maintenance activities. The construction of the TSP would only require one additional dredge. Therefore, no significant change to existing transit methods and routes of goods entering and exiting the harbor are anticipated. Only an additional 34 workers would be required, which would not impact existing road traffic characteristics in the area. No change in surface transportation routes used to and from the harbor are anticipated as a result of construction. Under the proposed action, direct impacts to harbor traffic and surrounding transportation systems would be minor.

Indirect impacts to transportation as a result of construction activity in the harbor would be insignificant. Dredging equipment would yield to vessel traffic, minimizing any associated change in the water or land transportation patterns. The increase of approximately 34 workers travelling to and from dredge crew boat landing spots would not increase traffic on roads in the area.

### **5.21.3. Future Maintenance**

Port traffic, including a 25% increase in truck traffic associated with build-out of the container terminal, is included in the existing traffic volumes and in the 1.5% growth rate applied to the future volumes and includes the expected increase in truck traffic associated with the build-out of the container terminal.

Direct impacts to transportation over the long-term are possible. Although the harbor and channel enlargement is not predicted to increase the volume of products being shipped through the harbor, the method of transportation (in larger vessels) could change. The larger container ships would transport larger volumes at once. This may lead to a minor increase in traffic on local roads during loading/unloading operations as more longshoremen may be required loading/unloading of the larger vessels. Fewer unloadings would occur, but each unloading would require more transportation vehicles than currently needed; however, this increase in vehicles is accounted for in the 1.5% growth rate applied to future volumes.

Overall, changes to transportation could occur under the proposed alternative, such as short-term increased traffic during loading/unloading operations. With proper management by the ASPA, these impacts would be minimized and would result in the same level of service currently available in the area. As stated above, possible local and interstate roadway improvements would also decrease the possible negative impacts to transportation in the port area.

Indirect impacts to transportation could occur under the proposed action over the long-term. A general reduction in the number of large shipping vessels could occur over time as shipping larger volumes at once is more efficient. Shipping companies may elect to retire their existing vessels in favor of larger ones. Overall, switching from a higher number of smaller vessels to fewer larger vessels would not be considered a significant indirect impact to transportation.

## **5.22. Utilities and Infrastructure**

### **5.22.1. Alternative 1 – No Action**

This section provides a summary of the potential impacts to the area's utilities and infrastructure should the Proposed Action or No Action Alternative be implemented. The impact analysis is included in greater detail in Section 3.23, Appendix C.

### **5.22.2. Alternative 2 – TSP**

The minimum depth necessary for any utility line crossing would be 64 ft below Mean Lower Low Water (MLLW) for the Upper and Lower Bay, and 66 ft below MLLW for the Bar Channel, taking into consideration two ft for advanced maintenance and two ft for allowable overdepth.

There are existing utilities in the Mobile River area that are outside the area of impact of the TSP. There are no facility or utility relocations within the limits of the proposed harbor channel widening or deepening. No roads, highways, railroads, pipelines or utilities would be impacted by the proposed project (USACE 2018). No direct or indirect adverse impacts to utilities are anticipated as a result of implementation of the TSP, and future maintenance and operations activities. Any possible future installation of utilities would require coordination with the USACE, Mobile District.

## **5.23. Environmental Justice**

This section provides a summary of the potential impacts to the Environmental Justice communities in the project's area of influence should the Proposed Action or No Action Alternative be implemented. A more detailed analysis concerning Environmental Justice is presented in Section 4, Appendix C.

### **5.23.1. Alternative 1 – No Action**

Under the No Action Alternative, the TSP would not be implemented and no channel improvements would be made. Shippers would not be able to load their vessels more efficiently or use larger vessels with greater capacity. For the short-term, cargo volumes at port would continue to increase, driven by export demand for steel, coal and other commodities, as well as recent and on-going port-side infrastructure upgrades that meet shipper's needs for efficiency and productivity. Increased shipping volumes would necessitate the use of more ships to transport cargo, since the new Super Panamax vessels would not be able to load to capacity due to inadequate channel depths. Increased number of ships and transportation related traffic would increase the opportunities for accidents in the channel and on the roads. Truck and rail traffic in the area would increase to support the transport of goods. As a result, total air emissions are expected to increase over time, but not in significant amounts; thus no violation to National

Ambient Air Quality Standards (NAAQS) would be anticipated. For the short-term, current employment trends in the area would likely continue with most of the employment in the existing economic sectors of government and health care. There would be little or no new job creation.

The cargo volume of commodities, including petroleum, coal as well as hazardous materials passing through the port is expected to increase with or without the implementation of the TSP. As described in Section 2.5.13 (Hazardous Materials) the transportation of hazardous materials is subject to a variety of regulations. With the buildout of the container terminal, increased shipments of hazardous materials are expected to increase. Currently, trucks transporting hazardous materials are re-routed on local roads through the CBD and use the Cochrane-Africatown Bridge to cross the Mobile River. It was estimated that 257 hazardous material trucks traveled this route in 2005, 280 in 210, and a projected 396 trucks by 2030 (FHA and ALDOT 2014). The areas surrounding the Cochrane-Africatown Bridge is considered an environmental justice community and since hazardous materials are specifically detoured through this area (via urban principal arterial roads, collector roads, and local roads and side streets) the impacts of increased traffic and specifically traffic related to hazardous materials movement have been evaluated to determine if there is disproportionate impact on environmental justice communities.

Using the 2016 AADT traffic counts for the Cochrane-Africatown Bridge (Appendix C), in addition to the FHWA and ALDOT estimates above and confidential hazardous materials truck counts provided by the operators of the port terminals, approximately one percent of the traffic crossing the Cochrane-Africatown Bridge is a direct result of hazardous materials associated with port activities. Since port activities account for approximately one percent of the hazardous materials traffic over the Cochrane-Africatown Bridge and the increase in total truck traffic associated with the build-out of the container terminal is only 25 percent, as discussed in Section 5.21., the hazardous materials detoured over the Cochrane-Africatown Bridge would still be less than 2.5 percent of the total bridge traffic. Unless there is an unavoidable accident or other unforeseeable conditions, the transportation of increased volumes of hazardous materials and petroleum products should not harm human health or the environment.

With compliance with state and Federal regulations related to the transport and handling of hazardous materials and the eventual completion of the new I-10 Bridge, minor impacts would be associated with any additional volumes of hazardous materials truck traffic associated with the build-out of the container terminal. After build-out of the container terminal, impacts associated with hazardous materials truck traffic over the Cochrane-Africatown Bridge could increase by 25 percent, but would still be less than 2.5 percent of overall traffic crossing the bridge and impacts associated with hazardous materials traffic would be minor. These impacts would be disproportionate to Africatown and other environmental justice communities along the existing detoured truck route. Once the new



I-10 Bridge is completed, these impacts would be mitigated because trucks carrying hazardous materials will no longer be forced to detour through these communities. Most likely, the majority of truckers will utilize the I-10 Bridge as it is associated with the predominant east-west highway in this area. The new route via the I-10 Bridge would transverse other environmental justice communities south of the CBD. Overall, there would be minor, disproportionate impacts to environmental justice communities due to the transport of hazardous materials. The ASPA utilizes a Port-Wide Mass Notification System to alert ASPA employees, tenants, visitors and interested stakeholders in the event of an emergency within the ASPA's seaport facilities (ASPA 2018). Once the I-10 Bridge is completed, truckers would have the option to use the new I-10 Bridge or continue to use the Cochrane-Africatown Bridge.

In addition, over the long-term, detrimental economic impacts may result from the No Action Alternative, as the Port may not reach its full potential; resulting in loss of trade causing an indirect negative impact to employment levels, salary levels and tax collections, which could reduce funding for schools and other state supported services.

Under the No Action Alternative, there would be no impact to subsistence consumption.

Under the No Action Alternative, there would be minor long-term impacts to low-income or minority populations, with respect to the potential for accidents, decreased air quality and increased traffic. Over the medium to long-term, indirect detrimental economic impacts may occur. The general absence of significant adverse impacts to human health, environmental health risks, subsistence consumption patterns and safety risk indicates the proposed project would not have disproportionately high and adverse impacts to any communities, including environmental justice communities or children.

### **5.23.2. Alternative 2 – TSP**

#### **5.23.2.1. Project Construction**

The adverse environmental impacts of implementation of the TSP are minimal and temporary in nature and include reduced air quality, increased noise from dredging operations and increased traffic from workers.

Air quality would be temporarily and insignificantly affected by the proposed action. Emissions are expected to occur from construction activities and would result from the operation of the dredge, and any other support equipment which may be on or adjacent to the job site. Emissions from the single additional dredge proposed would not impact air quality. The project area is currently in attainment with NAAQS parameters. The proposed action is not expected to affect the attainment status of the project area or region. Fugitive dust emissions generally originate from land based operations. The TSP project site is located in the water, and has no land-side construction staging areas. As

a result, fugitive dust emissions are anticipated to be minor and temporary during implementation of the TSP, and during future maintenance and operations dredging operations.

Dredging operations do not generate high levels of air noise. Dredging equipment moves frequently, thereby limiting the exposure of any one location to construction noise for a prolonged period of time. Noise would be evident to those workers on the job but would not likely be perceived by residents in the area. Noise levels would be similar to those generated during the existing maintenance activities. The impact of construction related noise would be short-term and insignificant.

Impacts to traffic from the approximate 34 temporary workers would be minor and temporary. Dredge crew members typically drive to the crew boat located at a private marina, then proceed to the dredge. The employees start work between 6:30 to 8:30 am, and switch out the crew every 8 or 12 hours. Crew may seek accommodations in area hotels or utilize crew quarters on the dredge equipment, if available. None of these activities would cause a noticeable increase in area traffic. Therefore, impact from traffic to environmental justice communities would be minor.

The general absence of significant adverse impacts to human health, environmental health risks, and safety risk indicates the proposed three year construction project would not have disproportionately high and adverse impacts to any communities, including environmental justice communities or children.

### **5.23.3. Future Maintenance**

The implementation of the TSP would result in navigation channel improvements allowing vessels to utilize full capacity and carry more cargo per trip. The completion of the APM container terminal expected in 2019 would result in additional full-time longshoremen jobs and the increase in the volume of commodities would also put a larger demand on truck traffic, creating additional trucking jobs. Although not directly a result of implementation of the TSP, these impacts would be long-term and beneficial.

Similar to the No Action Alternative, the cargo volume of commodities, including petroleum, coal as well as hazardous materials passing through the port is expected to increase. Under the TSP, increased shipments of hazardous materials could increase, but the increase would be minimal compared to the increase associated with the build-out of the container terminal. As indicated under the No Action Alternative, currently, trucks transporting hazardous materials are re-routed on local roads through the Mobile Central Business District (CBD) and use the Cochrane-Africatown Bridge to cross the Mobile River. Unless there is an unavoidable accident or other unforeseeable conditions, the transportation of increased volumes of hazardous materials and petroleum products should not harm human health or the environment. Once the I-10 Bridge is completed,

truckers would have the option to use the new I-10 Bridge or continue to use the Cochrane-Africatown Bridge. Most likely, the majority of truckers will utilize the I-10 Bridge as it is associated with the predominant east-west highway in this area

With compliance with state and Federal regulations related to the transport and handling of hazardous materials and the eventual completion of the new I-10 Bridge, minor impacts would be associated with any additional volumes of hazardous materials truck traffic associated with implementation of the TSP. With implementation of the TSP, impacts associated with hazardous materials truck traffic over the Cochrane-Africatown Bridge would be minimal; however, these impacts would be disproportionate to Africatown and other environmental justice communities along the existing detoured truck route. Once the new I-10 Bridge is completed, these impacts would be mitigated because trucks carrying hazardous materials will no longer be forced to detour through these communities. The new route via the I-10 Bridge would transverse other environmental justice communities south of the CBD. Overall, there would be minor, disproportionate impacts to environmental justice communities due to the transport of hazardous materials in association with implementation of the TSP.

As discussed in Section 2-4, dredged material from navigation projects are exempt from solid and hazardous waste consideration but are subject to the requirements of permitting authorities.

Implementation of the TSP does not require relocation of any persons or businesses, and is not expected to adversely impact subsistence consumption patterns.

Impacts of channel modification (to the extent landside areas are appreciably impacted) are spread proportionately among census tracts; therefore, construction of any of the TSP would not have a disproportionately high and adverse impact on areas with high concentrations of low-income, minority, juvenile, or elderly populations. Schools/childcare facilities and hospitals are dispersed throughout the area and are not disproportionately located near the harbor (EJScreen 2018) (NEPAssist 2018). Thus, no disproportionately high and adverse impacts to children are expected.

The ASPA participates in Green Marine, the largest voluntary environmental certification program for the maritime industry in North America that addresses key environmental issues, such as Prevention of Spills and Leakages, Pollutant Air Emissions, and Dry Bulk Handling and Storage to minimize community impacts. The program requires participants to adopt practices and technologies that will have a direct impact on the ground, and are independently verified, with results made public each year.

The general absence of significant adverse impacts to human health, environmental health risks, and safety risk indicates the proposed project would not have disproportionately high and adverse impacts to any communities, including environmental

justice communities or children for most resource areas. There would minor disproportionate impacts to environmental justice communities from truck traffic transporting hazardous materials.

## **5.24. Public and Occupational Health and Safety**

### **5.24.1. Alternative 1 – No Action**

Under the No Action Alternative, current channel and harbor maintenance operations would continue. No additional dredging operations would occur throughout the project area. Therefore, no increased risks to public and occupational health safety are expected to occur. However, safety issues due to larger vessels being unable to load to full capacity, but still using the current port, would continue. Additionally, safety hazards related to vessel traffic in the channel and turning basin would also continue. All activities in the Mobile Bay Harbor and Channel are governed by Federal and State regulations, and would continue to be so governed. These regulations would continue to ensure that minimal risk to public health and safety is present in the vicinity. Under the No Action Alternative, safety hazards due to large vessel traffic would continue, but as these are minimized by scheduling, they would still be minimal.

The increase in truck traffic associated with build-out of the container terminal would result in a 25 percent increase in truck traffic and truck traffic related emissions would likely increase by 25 percent. As discussed in Section 3-15, Appendix C truck emissions are not major emissions contributors and an increase in truck traffic would unlikely result in significant air quality impacts or occupational or public health concerns.

Indirect impacts to public and occupational health and safety are possible under the No Action Alternative. If the channel is not widened and deepened, it is possible that Mobile Harbor may not reach its full potential and larger container ships could choose another available harbor for loading and unloading. Over the long-term, this could result in less traffic in the channel and harbor over time, and a minor reduction in the possibility of transportation accidents. This may also reduce the potential for spills of petroleum products in Mobile Bay, due to lower traffic numbers. Generally, however, these impacts would be negligible as there is currently a very small risk of accidents and spills in the project area.

### **5.24.2. Alternative 2 – TSP**

#### **5.24.2.1. Project Construction**

Under the TSP, direct impacts to public and occupational health and safety could occur. A minor increase in activity in the harbor and channel could result in a minor increase in the potential for accidents involving the workforce or bulk liquid spills. Currently two dredges are required for maintenance of the harbor and channel. During construction an

additional dredge would be present in the area. This would not pose a significant increase in risk due to collisions or other accidents. Additionally, as dredging equipment would yield to accommodate vessel traffic so as not to disturb normal port operations, accident risk levels would be similar to those under normal maintenance dredging routines. The USACE and contractor safety programs provide sufficient training and supervision of new workers hired specifically for the project. If more vessels are concentrated in the harbor or other channel areas due to increased dredging operations, it is possible that an increased risk for collisions and spills could occur. However, with proper management of vessel operations and planned dredging locations, this risk would be minor and insignificant. Once dredging vessels have completed operations in one area, they would move to the next area designated for dredging, returning conditions in the harbor and channel to the current conditions.

Increases in air emissions from additional equipment could occur, but due to the existing air quality and the minimal amount of population over the general project area, these increases would be minor and would not generate any additional health risks. Although a slight increase in risk to public and occupational health and safety may occur during the construction process, this increase could be managed and would be insignificant and temporary.

Indirect impacts to public health and safety could occur under the proposed action. An increase in workforce may slightly increase the amount of traffic in the Mobile area if significant numbers of additional workers would be required for construction/dredging activities. This traffic increase could lead to an increase in the risk of traffic accidents in the vicinity of the project area, as a total of approximately 34 additional workers working in shifts are anticipated, road conditions should remain similar to those currently in the project area. Indirect impacts to air quality due to increased traffic are not anticipated. Both of these minor increases in risks to public and occupational health and safety would be temporary during construction activities and would be insignificant.

### **5.24.3. Future Maintenance**

With the widening associated with the implementation of the TSP and the associated reduction of demurrage fees currently associated with vessel delays, it is anticipated that volume of petroleum products passing through the port may increase. The level of increased throughput at the various terminals will be limited by tank capacity, dock availability, and available land for expansion. Likewise, with the harbor deepening, ships serving the McDuffie Coal Terminal should be able to load to greater capacities and potentially increase the volume of coal products passing through the port. The increased volume would be limited by the availability of storage space at the terminal. In addition, the volume of the container terminal will continue to increase through the Phase III build-out of 1.5 million TEUs annually, with the potential for increased hazardous materials shipments.

Each terminal maintains its own air permit and any potential increase in air emissions resulting from increased vessel and cargo-related traffic would be addressed and mitigated, if appropriate, through the individual permits, resulting in minor impacts to air quality. Increased PM<sub>2.5</sub> and PM<sub>10</sub> emission could result from a potential increase in coal throughput through the McDuffie terminal. Due to the overall reduction in coal demand and the limited storage capacity at the terminal, it is more likely that few ships (at larger capacities) would be the primary outcome. Based on the 2011 predicted baseline operational emissions, PM<sub>2.5</sub> and PM<sub>10</sub> emissions from the coal pile were less than 1% and 3.8% respectively. Should an increased coal demand arise and the number of shipments increase, the overall increase in PM<sub>2.5</sub> and PM<sub>10</sub> emissions associated with the coal pile would still be minimal compared to the overall PM<sub>2.5</sub> and PM<sub>10</sub> emissions from port-wide operations. Same paragraph as previous

As indicated in the No Action Alternative, the increase in truck traffic associated with build-out of the container terminal would result in a 25% increase in truck traffic and truck traffic related emissions. However, as discussed in Section 3-15, Appendix C truck emissions are not major emissions contributors and an increase in truck traffic would unlikely result in significant air quality impacts or occupational or public health concerns.

The larger volume of containerized cargo will lead to an increase of traffic on the roads in the vicinity of the port. Higher traffic numbers may lead to an increase in the possibility of accidents. If mitigation is needed, the Port may consider staging unloading operations such that traffic and associated risks are reduced to a minimal level. Overall, although a slight increase in the risk of traffic accidents may occur on local roadways, the impact would be insignificant. Additionally, one additional dredge may be required for maintenance of the deeper and wider harbor and channels. This mobile source of potential air emissions would not cause a significant impact to air quality.

With the compliance with Federal safety regulations and appropriate safety programs and processes, impacts associated with the implementation of the TSP on public and occupational health and safety would be minor.

## **5.25. Summary of Impacts**

The potential impacts on the resources within the project area were considered as part of this study and are addressed herein. A number of resources were determined to have little risk of being impacted as a result of the implantation of the TSP. These included climate, groundwater, marine mammals, Man-made hard bottoms and structures, protected and managed lands, recreation, socioeconomics, public health and safety, and public infrastructure.



Those resources determined to have potential to contribute to adverse impacts were evaluated in greater detail. A summary of the findings of those evaluations are included below:

### **Water Quality**

Salinity. Evaluation of monthly salinity distribution has shown the response to hydrological conditions for mean of depth-averaged salinity for February (wet condition) and October (dry condition). Differences in the monthly mean of depth-averaged salinity between results with project and without project show changes ranging between 0 to 2 ppt. Salinity changes greater than 1.5 ppt are found primarily in the vicinity of Gaillard Island and turning basin. Specific predicted changes in salinity as related to the various aquatic resources evaluated for this study such as wetlands, submerged aquatic vegetation, benthic communities, oysters, and fish were assessed using the results from the water quality and hydrodynamic modeling. The predicted changes in the salinity regime associated with aquatic resources indicate that estimated changes in salinity remain below tolerance thresholds. Salinity is predicted to increase considering a 0.5 m SLR, however, increases and distribution of salinity under that scenario would be the same as those under the baseline conditions.

DO. The results of the modeling analyses show that no impact from the project is predicted for DO levels in the surface or bottom waters and that the daily average DO conditions With Project are the same as the Without Project. The same modeling approach and setup was used to evaluate the potential impact of a proposed SLR. The same patterns, trends, and behavior exist for the SLR scenarios and no impacts to DO concentrations are expected as a result in future sea level change.

Nutrients. Modeling results indicate that the simulated nutrient levels are in good agreement with measured nutrient observations. Increases in ammonium at the mouths of the Mobile and Tensaw River correspond to changes in flow conditions. Results of the water quality modeling also reveal that nitrate levels agreed well with observed values. Subsequently, increases in nutrient levels would not be expected resulting from implementation of the TSP.

Turbidity. Results of the water quality modeling indicate that the predicted levels of total suspended solids are representative of the observed data. Subsequently, there would be no expected increase in the concentrations of the turbidity as a result of the implementation of the TSP.

Water Temperature. Results of simulations comparing the existing and With-Project conditions of the bay characterize Mobile Bay's water temperatures. Values for January/February time period represents high water flow conditions, those values for the mid-year period represents typical or average flows, and the values for the fall (October)

period represent low flow conditions. The simulated results for the existing and project condition are nearly identical, indicating very little change in surface and bottom temperatures resulting from implementation of the TSP.

## **Waves**

General Wave Climate. Model results indicate that implementing the TSP produces only slightly elevated peak water levels and wave conditions as compared with the baseline channel configuration and negligible changes in pre-storm tides. The largest simulated difference in maximum water surface elevation between the With- and Without-Project depths was 0.07 ft, which is well within the uncertainty of the model and would result in negligible changes in the wave climate. These results are captured in detail in Attachment A-1, Appendix A.

Ship Wake. Potential impacts of VGWE were evaluated by comparing the relative difference of With- and Without-Project conditions using forecasted vessel calls for years 2025 and 2035. Results of the analysis indicate a reduction in vessel generated wave energy for the future With-Project condition relative to the future Without-Project condition. Fewer vessels will call on the port in the future considering the TSP, which results in less vessel generated wave energy affecting the study area.

## **Sediment Transport**

Estuarine/Mobile Bay. Results from the one year model simulation with the TSP condition show a minimum difference range of no greater than +/- 0.3 ft of erosion when compared to the No Action Alternative. Subsequently, these results indicate that there is no discernable net erosion or net deposition throughout the bay. Similar results and conclusions were found for the future With- and Without-Project Conditions when accounting for mean sea level change. With no discernable impacts associated with waves, currents, and sediment transport throughout the project area, there would be no expected erosion or changes to the position of the Mobile Bay shorelines resulting from implementation of the TSP. Additional details of the estuarine sediment transport modeling effort are provided in Attachment A-1, Appendix A.

Ebb-Tidal Delta. The sediment transport modeling as described in Attachment A-2, Appendix A was conducted to include probable effects on shoreline changes within 10 miles east and west of the channel and adequately represented the deep navigation channel, associated modifications, and irregular shoreline configurations of the flow system. Results of the modeling indicate a minimum difference in bed level changes between the TSP and Existing Conditions in the bay and on the ebb tidal shoal. Similar results and conclusions were found for the future With- and Without-Project Conditions (i.e., accounting for mean sea level change). Additional details of the coastal sediment transport modeling effort are provided in Attachment A-2, Appendix A.

**Aquatic Resources.** An extensive evaluation of the major aquatic resources considered to be potentially impacted by the proposed action was conducted and reported by Berkowitz et al. (2018). Field studies and analyses were conducted looking at changes in water quality and hydrodynamics to evaluate the potential for impacts to benthic macroinvertebrates, wetlands, SAV, oysters, and fish. The assessment included extensive characterization of baseline conditions, followed by evaluation of estimated post project conditions related to aquatic resource habitat (e.g., changes in salinity, DO). Additionally, an analysis of potential impacts related to a 0.5 m SLR scenario were evaluated. Results of the detailed analyses suggest that no substantial impacts in aquatic resources within the study area are anticipated due to project implementation, as the area of greatest potential changes to environmental conditions are already adapted to natural shifts in salinity (and other factors) as well as conditions resulting from the existing navigation channel. Although SLR has the potential to alter aquatic resource habitats within Mobile Bay, additional impacts related to project implementation remain negligible under the 0.5 m SLR scenario.

**Cultural Resources.** . The literature review conducted for the Draft GRR/SEIS shows that there is a high potential for cultural resources to be present within the APE. Due to the ground disturbing nature of the project, there is a potential for those resources to be affected by this project. Maritime Phase I cultural resource investigations area recommended for portions of the APE that have not been adequately surveyed including the SIBUA northwest expansion, and the Bay Channel widening and bend easing. After the inventories have been completed, formal Section 106 consultation with the Alabama SHPO and the appropriate Tribal Nations will commence. Phase II investigations may be required to determine National Register (NR) eligibility of significant anomalies. Avoidance of significant anomalies or eligible resources, minimization of impacts as well as mitigation of adverse effects will be considered during Section 106 consultation. If adverse effects to significant anomalies or National Register eligible sites cannot be avoided, a Memorandum of Agreement (MOA) between USACE, the Alabama SHPO, and all appropriate Tribes, would be necessary in order to properly address adverse effects. If shipwrecks belonging to a foreign sovereign nation are involved, that nation would also need to be involved in the MOA.

**Essential Fish Habitat.** The USACE, Mobile District takes extensive steps to reduce and avoid potential impacts to EFH as well as other significant area resources. Adverse impacts to wetlands, oyster reefs, or SAV from the implementation of the project would be anticipated to be no-effect, limited or negligible. Most of the motile benthic and pelagic fauna, such as crab, shrimp, and fish, should be able to avoid the disturbed area and should return shortly after the activity is completed. No long-term direct impacts to managed species of finfish or shellfish populations are anticipated. However, it is reasonable to anticipate some non-motile and motile invertebrate species will be physically affected through dredging and placement operations. These species are expected to recover rapidly soon after the operations are complete. No significant long-

term impacts to this resource are expected as a result of this action. Increased water column turbidity during dredging would be temporary and localized. No change is anticipated to occur to the habitat types. Overall, impacts to EFH would be temporary in nature associated with the dredging and placement activities in Mobile Harbor. The proposed activities would not significantly affect coastal habitat identified as EFH in the project area. Based on the extent of this habitat in the general vicinity of the project and the temporal nature of the impact, the overall impact to fisheries resources is considered negligible. This determination is being coordinated with the NMFS Protected Resources Division according to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801-1882).

**Threatened and Endangered Species.** Based on this information presented herein, the USACE, Mobile District has made the determination that the proposed dredging and sediment placement activities is not likely to adversely affect any listed endangered and/or threatened species or their associated critical habitat. The USACE has initiated consultation with the USFWS under Section 7 coordination of the Endangered Species Act. It is expected that this consultation will be completed prior to the release of the Final GRR/SEIS.

**New Work Sediments.** During the PED Phase of the Mobile Harbor GRR, sediment testing and evaluation will be required for all material proposed for placement in the ODMDS. O&M, along with proposed new work dredged material suitability must comply with guidelines in accordance with the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972, and the EPA ocean dumping criteria (40 Code of Federal Regulation (CFR) §227). At this time, specific impacts associated with the new work sediment testing and evaluation during the PED phase of the study are not known, however, current presumptions are that the new work material associated with the GRR sampling would be similar to that already tested and should be suitable for placement in the Mobile ODMDS.

**Placement Areas.** Several sites were evaluated for placement of new work material for the TSP. These included six relic shell mining areas within the bay for the placement of mixed sand, silts, and clays dredged from the River and Bay Channels; the Ocean Dredged Material Disposal Site (ODMDS), including an expansion of this site, for placement of mixed sand, silts, and clays from within the River, Bay, and Bar segments; and a northwest extension of the SIBUA if new work sand sources are found within the bar channel. All of the proposed placement sites were found to be acceptable. Results of modeling indicate that material placed within the Relic Shell Mined Area will remain stable and not be transported outside of the placement area. Furthermore, placement of material may help to restore bay bottoms within this site. Future maintenance dredge

material will continue to be placed in the existing approved disposal areas. Mobile District is currently pursuing certification for the SIBUA and ODMDS extensions.

**Noise.** During construction, air noise levels would increase in the Mobile Harbor area due to dredging activities. These noise levels would approximate current levels as there is only one additional dredge proposed for the construction activities. When considering underwater noise, it is anticipated that the maintenance dredges presently being used in the harbor would also be used for harbor deepening and widening. It has been determined that the noise levels, both air and underwater, for the TSP during the construction period would be comparable to current activities and impacts would be less than significant.

**Air Quality.** The proposed deepening and widening of the Mobile Harbor Federal Navigation Channel would be a major construction project requiring certain large dredges to be used over several years. Two dredges are currently used for channel maintenance dredging activities. One additional dredge would be required during the widening and deepening activities. Since the deepening activity emissions would not take place along the channel at the same location for a long duration, they are considered temporary resulting in less than significant air quality impacts to the community along the channel.

**Transportation.** During construction, harbor operations are expected to continue without construction related interruption and therefore, no significant change to existing transit methods and routes of goods entering and exiting the harbor are anticipated. No change in surface transportation routes used to and from the harbor are anticipated as a result of construction. Under the proposed action, direct impacts to harbor traffic and surrounding transportation systems would be minor. Therefore, impacts to transportation as a result of construction activity in the harbor would be insignificant.

**Environmental Justice.** The general absence of significant adverse impacts to human health, environmental health risks, and safety risk indicates the proposed three year construction project would not have disproportionately high and adverse impacts to any communities, including environmental justice communities or children.

## **5.26. Mitigation**

In accordance with the mitigation framework established by Section 906 of the WRDA of 1986 (33 USC 2283), as amended by Section 2036 of the WRDA of 2007 and Section 1040 of the Water Resources Reform and Development Act of 2014, the Council on Environmental Quality (CEQ)'s NEPA regulations (40 CFR Sections 1502.14(f), 1502.16(h), and 1508.20), and Section C-3 of ER 1105-2-100, the USACE, Mobile District will ensure that project-caused adverse impacts to ecological resources are avoided or minimized to the extent practicable, and that any remaining, unavoidable impacts are compensated to the extent justified.

For adverse impacts to wetlands which cannot be avoided or minimized, options include compensatory mitigation in the form of restoration, establishment, enhancement, and/or preservation. Any proposed mitigation should be practicable and ensure that the project will not have more than negligible adverse impacts on ecological resources. Mitigation planning is an integral part of the overall planning process. The USACE, Mobile District began the mitigation evaluation early in feasibility study process. In order to evaluate appropriate mitigation options, an estimate was made of the type, location, and level of potential adverse ecological impacts. The USACE, Mobile District worked closely with the ERDC in Vicksburg, Mississippi to forecast potential ecological impacts to fisheries, benthic invertebrates, oysters, wetlands, and SAV in addition to analyzing possible changes to sediment transport and water quality conditions. The USACE, Mobile District



also solicited public input during the NEPA scoping phase of the study to identify additional concerns.

Practicable avoidance and minimization measures were considered. Should impacts not be avoided and minimized, the Mobile Harbor PDT prepared to assess potential compensatory mitigation measures and identify a rough order of magnitude cost for those measures.

This process included multiple consultations with Federal and State resource agencies. Early at the onset of the Draft GRR/SEIS, the PDT hosted a charette on January 28 and 29, 2015 in Mobile. At that meeting, the PDT presented the SMART planning process, identified modeling approaches planned, and acknowledged assumptions necessary to proceed with the modeling. Participants were asked to provide any suggestions to the USACE, Mobile District's modeling approach, including identifying any known data sets. The Mobile Harbor PDT hosted several additional resource agency meetings to present status updates and solicit their knowledge throughout the planning process.

The first step in mitigation planning involves efforts to avoid and/or minimize impacts. The PDT was able to avoid known resources during the channel modification development. The initial array of alternatives was coordinated with the resource agencies. These meetings centered on the primary ecological concerns of the project (DO, salinity increase, wetlands, fish habitat, endangered species, wetland, oysters, and sediment transport) as also identified during the NEPA scoping.

Studies were conducted through a combination of 1) direct measurements of aquatic resources and 2) modeling approaches to characterize the existing conditions within the project area which contains a variety of natural resources that are comprised of wetlands, SAV, oysters, benthic invertebrates and fish. Baseline conditions were established for oysters, SAV, fisheries, benthic invertebrates, and wetlands.

A characterization of baseline wetland community assemblages and distribution in estuarine, transitional, and freshwater habitats throughout Mobile Bay and the associated Mobile-Tensaw River Delta region were conducted (Berkowitz et al., 2018). Salinity tolerance classes were established for each wetland community using existing literature sources; including thresholds for decreased productivity and mortality. The study area focused on the central and southern portions of the Mobile Bay and the Mobile-Tensaw River Delta region, the area identified as having the highest likelihood of potential impacts associated with the proposed channel modifications. As a result, the study area encompasses the entire salinity gradient occurring with the Mobile Bay region, ranging from salt-intolerant bottomland hardwood forest species assemblages in the north to the halophytic plant communities common throughout coastal wetlands of the northern Gulf of Mexico. Ground truthing surveys conducted by the ERDC covered a distance of 40 miles throughout the Mobile Bay, with the goal of mapping the edges of various SAV beds

to compare to beds recently mapped by Vittor, which represents the baseline SAV conditions. Baseline conditions were also established for benthic infaunal communities in estuarine, transitional, and freshwater habitats in the Mobile Bay Watershed (ERDC 2018). Changes in benthic community composition among these habitat types are documented along the salinity gradient and are used to estimate how far upriver changes may occur following channel deepening. Since Mobile Bay ranks first in the number of freshwater species in the Southeastern Atlantic and Gulf of Mexico drainages, the ERDC conducted sampling in the freshwater, transition and upper bay zones for a total of 11 sites utilizing the same gear and protocol as with the FAMP database (seine and trawl) used by the ADCNR, MRD. Outputs from the fishery study provided for the fisheries baseline conditions. Using information provided by the ADCNR, MRD, 13 known adult oyster reefs were assessed (>3,600 acres) for salinity and DO potential impacts based on juvenile and adult oyster tolerance thresholds. Understanding the oyster larvae movement and reef recruitment dynamic is critical towards understanding how potential project actions will impact oyster populations within the project area of influence. Specifically, if alterations to the navigation channel cause hydrodynamic changes a higher percentage of oyster larvae could be flushed out of the bay, affecting the local oyster recruitment (ERDC, 2018). Detailed discussions of all of these findings are found in Section 3.25 above. Water circulation and quality model results were assessed to determine whether projected salinity increases affected those identified ecological habitats.

A summary of impacts is included in Section 3.25 above. Based on the minimal level of impacts determined for the implementation of the TSP and future project maintenance and operations, no compensatory mitigation is proposed for this action as no loss of wetlands, SAV, oysters, and recreational and/or commercial fisheries are anticipated nor are any significant adverse effects to ESA-listed species or marine mammals anticipated based on the analyses in this document. Additionally, detailed analyses have demonstrated the general absence of significant adverse impacts to human health, environmental health risks, and safety risk and that the proposed construction of the TSP would not have disproportionately high and adverse impacts to any communities, including environmental justice communities or children.

Several avoidance and minimization measures are proposed to ensure that impacts are insignificant; these include the following:

- 1) Comply with all water quality standards and conditions issued in the water quality certification and adhere to monitoring protocols in the water quality monitoring plan.
- 2) Dredge practices will adhere to the GRBO (2003, and amended in 2005 and 2007).
- 3) Implement additional conservation measures required by NMFS and USWFS for ESA-listed species.
- 4) Beneficial placement strategies for new material.
- 5) Continue working with cooperating agencies during the planning, PED, and construction phases.

## **SECTION 6.0 ENVIRONMENTAL COMPLIANCE**

### **6.1. Cumulative Impacts**

This section provides a summary of the potential cumulative impacts associated with the proposed TSP. These potential impacts would result from other facilities, operations, and activities that in combination with potential impacts from the Proposed Action may contribute to cumulative impacts in the geographical area of interest. A more detailed analysis concerning cumulative impacts is presented in Section 4, Appendix C.

The National Environmental Policy Act (NEPA), as implemented by Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] §§ 1500-1508) requires Federal agencies, including the USACE, to consider cumulative impacts in rendering a decision on a Federal action under its jurisdiction.

According to 40 CFR § 1508.7, a cumulative impact is the impact on the environment that results from the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future actions regardless of the agency (Federal or non-Federal) or person that undertakes such other actions; cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative effects include, but are broader than, the direct and indirect effects described in other sections of the Draft GRR/SEIS. According to 40 CFR 1508.8, "direct effects" are caused by the action and occur at the same time and place, while "indirect effects" are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. A cumulative impact analysis assesses the total impact of the direct and indirect effects of the proposed action in combination and interaction with the effects of all other activities impacting the same resources (Parson et al. 2015).

An inherent part of the cumulative effects analysis is the uncertainty surrounding actions that have not yet been fully developed. The regulations provide for the inclusion of uncertainties in the Draft GRR/SEIS analysis, and state that "when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking" (40 CFR Part 1502.22). The CEQ has also recognized that "the complexities of cumulative effects problems ensures that even rigorous analyses will contain substantial uncertainties about predicted environmental consequences" (Considering Cumulative Effects Under the National Environmental Policy Act, CEQ 1997)(Parson et al. 2015).

For the purpose of evaluating the effects of past, present, and reasonably foreseeable future actions, this evaluation focuses on (1) actions that would impact the geographic areas (noted below) that would be impacted by the proposed Federal action, (2) actions that affect the resources that are affected by the proposed action, and (3) the actions that would be induced by the proposed action. In accordance with the intent of the USACE planning modernization initiative, the analysis focuses on specific resources and impact areas of concern and excludes analysis related to areas and resources that would not be meaningfully impacted by the proposed action or induced actions. Also, in accordance with CEQ guidance, "agencies are not required to list or analyze the effects of individual past actions unless such information is necessary to describe the cumulative effect of all past actions combined. Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (Guidance on the Consideration of Past Actions in Cumulative Effects Analysis, CEQ 2005). Focusing the analysis only on resources where there is a likelihood of reasonably foreseeable cumulative impacts supports the intent of the NEPA process, which is "to reduce paperwork and the accumulation of extraneous background data; and to emphasize real environmental issues and alternatives" [40 CFR Part 1500.2(b)] (Parson et al. 2015).

Actions undertaken by Federal, state, local agencies and private companies and individuals are highlighted in Sections 4.2, 4.3, and 4.4, Appendix C. Federal and State agencies are given broader attention because their results have typically affected the widest geographic portion of the project area, have been ongoing for decades and are likely to continue throughout the life of the project, and have impacted many of those resources affected by the proposed action (e.g., water quality, wetlands, etc.). Past and present actions are those projects and activities that have contributed and continue to contribute to cumulative impacts on local resources. Future proposed actions consider projects which could contribute to cumulative impacts if undertaken. These projects and activities do not comprise the only actions to affect resources cumulatively in the project area, but the detailed projects have had (and will continue to have) the greatest effect on Mobile Harbor and channel ecosystem and a working knowledge of these actions provides an important context for understanding the scope and scale of cumulative effects.

A study for Mobile Bay was prepared to develop a sediment budget for assessing net changes in seafloor configuration relative to wave and current processes and engineering activities within the bay. The study concluded that despite the large volumes dredged from the Bay Channel the most significant changes occurring during the intervals evaluated were associated with deposition in the northern portion of the bay at the mouth of the Mobile-Tensaw River Delta; deposition in the southern part of the bay resulting from current flow and sediment movement at Mobile Pass, including sand transport into Mobile Bay along the north side of Mobile Point (Morgan Peninsula); and localized erosion

and deposition associated with navigation channel dredging and placement. Elsewhere in the bay, only minor deposition and erosion patterns were identified within a large estuarine system that is net depositional basin. Other studies have shown that while subsequent channel alterations had influenced sedimentation dynamics at and adjacent to the channel, periodic storm processes were most influential relative to bay sediment infilling and redistribution.

The majority of the potential direct and indirect impacts from implementation of the TSP on the various resources that were evaluated would be temporary, localized, and not significant. These incremental effects, when combined with relevant past, present, and reasonably foreseeable future projects, are unlikely to result in any adverse cumulative impacts. As previously mentioned, a full and detailed cumulative impact analysis is included in Section 4, Appendix C.



### **6.1.1. Magnitude and Significance of Cumulative Effects**

Implementation of the TSP and other foreseeable projects such as the Port of Mobile APM terminal expansion and the I-10 River Bridge and Bayway Widening project would not significantly impact geology. Based on geological setting, depth and thickness of the local stratigraphy, minor or no impact is anticipated on the aquifer system as a result of implementing the TSP or other relevant projects. No incremental adverse cumulative effects on geology of the Mobile Bay area are expected.

Upland soils would not be affected by the deepening project. Bay sediments are not expected to be impacted from implementation of the TSP, though upland soils could be affected by foreseeable future projects involving terrestrial soils. Current and foreseeable future projects that impact the bay bottom could have a minor effect on sedimentation, shoaling or siltation rates due to possible changes in hydrology. Historical dredging records have not shown increased shoaling rates resulting from ship channel maintenance or improvements. Significant mounding of bay bottom resulted from the placement of new work material from channel deepening in the 1960's. However, recent sediment transport modeling to evaluate possible effects on sediment transport in the bay and nearshore coastal areas showed that minimum bed level changes are expected in the bay and on the ebb-tidal shoal. Shoaling rates are expected to increase between 5 to 15%. Impacts to sediment from implementation of the TSP are expected to be minor and temporary with no long-term adverse effects anticipated. Net sediment movement within the bay suggests that open-Bay placement of sediment is most similar to natural long-term depositional processes. Testing has shown that sediment from the navigation channel met the Limiting Permissible Concentration for water quality, toxicity, and bioaccumulation, and is suitable for open-water placement. Implementation of the TSP is not expected to have a significant incremental cumulative impact on soils or sediments.

Mobile Bay is an estuarine transition zone where freshwaters from the rivers mix with saltwater from the Gulf of Mexico. Water quality changes are dynamic in tidally-influenced estuarine areas and biological resources are adapted to accommodating short-term, periodic changes in water quality such as turbidity, salinity and nutrient loading.

Under the TSP, water quality in the immediate vicinity of the dredging area and open-water placement sites would be temporarily impaired for a short period of time due to an increase in turbidity. The dredging and dredged material placement would be controlled and monitored so that none of these operations would cause an increase in turbidity greater than 50 NTUs above background levels outside a 400-foot mixing zone. Adverse effects on biota from changes in water quality would be temporary and localized. Permanent loss of shallow water habitat due to channel widening and other improvements would be relatively minor considering the magnitude of shallow water habitat available in this estuarine area. The habitat loss due to the widening would be inconsequential, representing approximately 0.02% of available bay habitat. Permanent loss of habitat

would be offset by the benefits of open-water placement and restoration of the relic oyster shell mined areas. No other permanent adverse impacts are anticipated.

Water quality and habitat loss from past actions have been or are being considered for mitigation by the passage of Federal and state environmental statutes, regulatory controls and mitigation measures to protect these resources. The TSP would comply with environmental statutes and commitments and would not result in significant long-term adverse effects on biological resources, protected species, marine mammals, or birds. Relevant proposed future actions would result in minor loss of wetlands, SAV and shallow bottom habitat, but would be subject to the same regulatory controls as the TSP. Further, it is unlikely that future actions would occur at the same time as the TSP, thereby exacerbating temporary adverse effects. Due to lack of suitable habitat and their location in coastal freshwater or nearshore coastal estuarine environments, species other than those discussed above would not occur in the TSP area. Effects from the TSP, when considered with other past, present, and reasonably foreseeable future actions are not expected to result in significant cumulative adverse impacts on biological resources.

Impacts to commercial and recreational fishing and shellfish harvesting from implementation of the TSP are expected to be minor and temporary with no long-term adverse effects anticipated. While the proposed new work dredging, open-water thin-layer placement for future maintenance material, beneficial use placement of new work material for restoring the relic shell mined areas, and placement at the ODMS and the SIBUA may be a temporary inconvenience to commercial and recreational fishermen during construction, it is not expected to have any long-term adverse effects on fishing activities or fishery resources in the area. Beneficial use of dredged material may improve habitat important for sustaining fishery resources. Widening and deepening the channel also would result in improved vessel transit safety. Incremental impacts from other known and foreseeable future projects such as the I-10 project, APM Terminal expansion, and proposed NFWF restorations also are expected to have minor, temporary impacts on water quality and fishery resources. Incremental effects from implementation of the TSP would result in insignificant cumulative impact on fishery resources.

The USACE, Mobile District has determined that the proposed maintenance dredging activities associated with the Mobile Harbor Federal Navigation Project does not fall within any zones established under CBRA, therefore the CBRA considerations are not applicable.

Widening and deepening the navigation channel would result in improved vessel transit safety and efficiency. Beneficial use of dredged material by placement in the SIBUA may improve coastal resources. The proposed NFWF Salt Aire Shoreline and Little Dauphin Island restorations and the USGS/USACE joint restoration project at Dauphin Island also are expected to improve coastal resources. Incremental adverse effects on coastal barrier resources from implementation of the TSP would not occur.

#### **6.1.1.1. Effects on Coastal Sediment Transport**

Numerous studies have investigated the historical effects of navigation channel dredging on sediment transport in the nearshore coastal areas and along the ebb tidal delta (e.g., Hardin et al. 1976; USACE draft, 1978; Douglass, 1994; Otvos, 2006; Morton, 2007; Byrnes et al. 2010). Most of these suggested that construction and maintenance dredging in the Bar Channel have produced a deficit of sand in the littoral drift system west of the channel; however, none, with the exception of Byrnes et al. 2008 and 2010, conducted a detailed evaluation of historical dredging records for the Bar Channel or a quantitative comparison of historical shoreline and bathymetry surveys to document historical sediment transport pathways and net rates of change across the ebb shoal and along the shoreline of Dauphin Island. As such, the focus of Byrnes et al. (2008 and 2010) was to quantitatively investigate and document ebb-shoal changes and shoreline responses relative to dredging, storms, and normal conditions/forces to determine the extent to which erosion and shoreline change could be attributed to channel construction and maintenance dredging operations.

Byrnes et al. (2010) concluded that, overall, net sediment transport from east-to-west between 1917/20 and 1986/2002 has been supplying sand quantities necessary to produce net deposition on the islands and shoals of the ebb-tidal delta, infill and nourish storm breaches and washover surge channels on Dauphin Island, and promote growth of western end of the island. Based on all available information, (Byrnes et al. 2008 and 2010) there appears to be no measurable negative impacts to ebb-tidal shoals or Dauphin Island beaches associated with historical channel dredging across the Mobile Pass Outer Bar.

Additionally, the USGS published the results of a study in late 2017 (i.e., Flocks et al. 2017) that evaluated seafloor change around Dauphin Island between the years of 1987 and 2015. The submerged environment around Dauphin Island was divided into five areas: two ebb-tidal deltas (Mobile Pass and Petit Bois Pass) at the inlets on either end of Dauphin Island; Pelican Island/shoal on the western flank of the Mobile ebb-tidal delta; the shoreface of Dauphin Island facing the Gulf of Mexico; and, the shoreface of Dauphin Island facing Mississippi Sound. Bathymetric (i.e., seafloor) change in these areas was analyzed over two time periods (1987 – 2006 and 2006 – 2015) and compared to the overall long-term (1987 – 2015). The 1987 – 2006 period corresponds to a period of frequent and intense storm impacts with 12 tropical storms passing near the island, 4 of them severe. The years 2006 – 2015 corresponds to a less-stormier period with only two tropical storms impacting the areas during that time. Results of this analysis indicate the most erosion occurs along the central and western shorefaces of Dauphin Island, both on Gulf and sound sides, with reduced net erosion occurring during the non-storm period; however, the ebb-tidal deltas at either end of the island appear to be in equilibrium, despite sediment being dredged from the navigation channel over this same time period. In other words, sand is being supplied to the ebb tidal delta at Mobile Pass via bypassing

and/or dredging at a rate approximately equal to the rate it is leaving that area and transporting towards Dauphin Island.

Most recently, the USGS conducted coastal sediment transport modeling as part of this study to assess the relative changes in sediment pathways and morphological response on the ebb tidal shoal and adjacent coastal areas as a result of the proposed channel modifications to deepen the existing Bar Channel by 5 ft. This is documented in Section 6 and Attachment A-2, Appendix A. Simulation time periods included a 2010 wind/wave climatology as well as a 10-year long-term climatology derived from the European Centre for Medium-Range Weather Forecast (ECMWF) ERA-Interim reanalysis model over the Delft-3D hindcast period of 1988-2016. The modeling results indicate minimal differences in morphologic change in the nearshore areas of Dauphin Island and Pelican Island as a result of the channel modifications. This suggests that sediment delivery away from the ebb tidal shoal to these areas is similar under these two scenarios and that shoreline positions are unlikely to be impacted as a result of the modified channel. Although comparison of the two simulations shows some spatial shifting of sand offshore of the Morgan Peninsula, the patterns of erosion/deposition in the two simulations are quite similar. Based on these results, it also appears unlikely that these changes would alter sediment delivery to the peninsula and only minor impacts to the terminal end of the peninsula closest to the channel could occur.

### **6.1.2. Irreversible and Irrecoverable Commitments of Resources**

This section describes the irreversible and irretrievable commitment of resources associated with implementing the TSP or any of the other restoration alternatives considered. An irreversible commitment of resources occurs when a resource would be committed permanently to the project and unavailable for other use. An irretrievable commitment of resources refers to a use of a resource that would cause that resource to be unavailable for use in the future. Irrecoverable resources could include minerals, cultural resources, or permanent changes in land use.

Dredging the new work material would result in the consumption of sediment deposits and bay bottom resources in the Mobile Bay as well as fossil fuels for operation of dredging and placement equipment. A portion of the sediment would remain in the bay but would be located in the Relic Shell Mined Areas which allows to remain in the system. The bulk of the new work material will be placed in the ODMDS which would permanently remove that sediment from the Mobile Bay natural sediment system.

In general, impacts to biological resources would occur to individual organisms and small portions of populations especially benthic organisms that would be covered during placement activities. They would not constitute an irreversible commitment of resources, since the biological systems would be expected to recover. These changes could cause

a long-term alteration of the bay bottom habitats for biological resources and local hydrology and currents around the project area.

## **6.2. Table of Compliance**

This section provides an overview of the laws, regulations and executive orders reviewed to ensure compliance by this SEIS and implementation of the TSP. If applicable, the compliance actions and consultation activities taken by the USACE are noted.

### **6.2.1. National Environmental Policy Act of 1969 (NEPA), as amended, 42 U.S.C. 4321 et seq.**

The NEPA requires that all Federal agencies use a systematic, interdisciplinary approach to document the potential impacts from Federal actions on the environment. This approach promotes the integrated use of natural and social sciences in planning and decision-making that could have an impact on the environment. The NEPA regulations provide for the use of the NEPA process to identify and assess reasonable alternatives to proposed actions that avoid or minimize adverse effects of these actions upon the quality of the environment. Scoping is used to identify the scope and significance of environmental issues associated with a proposed Federal action through coordination with Federal, state, and local agencies; the general public; and any interested individuals and organizations prior to the development of an EIS. The process also identifies and eliminates from further detailed study issues that are not significant or have been addressed by prior environmental review.

According to 40 C.F.R. § 1502.9, a supplement to either a draft or final EIS (DEIS or FEIS) must be prepared if an agency makes substantial changes in the TSP that are relevant to environmental concerns, or there are significant new circumstances or information relevant to environmental concerns and bearing on the TSP or its impacts. The Record of Decision (ROD) for the Mobile Harbor GRR/SEIS will be provided in the Final GRR/SEIS to complete the NEPA process.

This SEIS has been prepared in accordance with the NEPA process for Federal actions that may impact the environment and addresses new conditions that were not evaluated in the 1980 EIS. Specifically, this SEIS evaluates the sediment dredging and placement impacts associated with the widening and deepening activities for Mobile Harbor.

### **6.2.2. Clean Water Act**

The Federal Water Pollution Control Act of 1972, as amended, commonly called the Clean Water Act, or CWA, authorizes the EPA to regulate activities resulting in a discharge to navigable waters. Section 401 (33 U.S.C. § 1341) of the CWA specifies that any applicant for a Federal license or permit to conduct any activity that may discharge into navigable waters must obtain a certification that the discharge complies with applicable sections of the CWA. Section 401 of the CWA requires certification that activities, including dredge and fill activities, would not violate State water quality standards. Impacts associated with the discharge of dredged or fill material and for the building of structures in all waters of the U.S. are evaluated following guidelines implementing Section 404 of the CWA. Evaluation of the impacts associated with the placement of material related to the Mobile Harbor Federal Navigation Channel modifications will be completed. Coordination will be conducted with the ADEM to determine that elements described in the SEIS support the goals of the State Water Quality program. Following review of the specific impacts associated with the TSP in this SEIS and Section 404(b)(1) evaluation, Section 401 water quality certification will be requested from the ADEM.

Modeling results have predicted that impacts to critical water quality parameters from implementation of the TSP would be minimal. Overall, impacts to existing resources associated with predicted changes in water quality from the proposed dredging and placement activities have been shown to be temporary and localized in nature and would be similar to the existing maintenance dredging operations regularly occurring within the navigation channel. Based on the limited resources within and around the navigation channel and placement sites, the overall impact to water quality and aquatic resources are considered negligible. The USACE, Mobile District will pursue the Water Quality Certification (WQC) from the ADEM as required under Section 401 of the CWA prior to completion of the final report.

### **6.2.3. Federal Coastal Zone Management Act (CZMA), 16 U.S.C. 1451 et seq.**



The CZMA (16 U.S.C. § 1451 et seq.) was enacted by Congress in 1972 to develop a national coastal management program that comprehensively manages and balances competing uses of and impacts on any coastal area or resource. The program is implemented by individual state coastal management programs in partnership with the Federal Government.

According to the CZMA Federal consistency requirement, 16 U.S.C. § 1456, Federal activities must be consistent, to the maximum extent practicable, with a state's Federally approved coastal management program. The Federal consistency requirement is an important mechanism to address coastal effects, to ensure adequate Federal consideration of state coastal management programs, and to avoid conflicts between states and Federal agencies. The Coastal Zone Act Reauthorization Amendments of 1990 (P.L. 106-508), enacted on November 5, 1990, as well as the Coastal Zone Protection Act of 1996, amended and reauthorized the CZMA. The CZMA is administered by the Office of Ocean and Coastal Resource Management, within the NOAA National Ocean Service.

The ADEM is the lead agency for administering the state's coastal program. The USACE, Mobile District will make a determination on whether the TSP is consistent with the Alabama Coastal Program to the maximum extent practicable and following review of the SEIS, the USACE, Mobile District will request ADEM's concurrence with the USACE's determination.

#### **6.2.4. Clean Air Act (CAA), as amended, 42U.S.C. 7401 et seq.**

The CAA of 1990 is a Federal law that authorizes the EPA to regulate emissions of airborne pollutants, although the states do much of the work to implement the Act. Under this law, the EPA sets limits on how much of a pollutant can be present in an area anywhere in the U.S. This promotes uniformity in basic health and environmental protections. In addition, the law recognizes that it is appropriate for states to take the lead in implementing the CAA because pollution control problems often require special understanding of local industries, geography, housing patterns, etc.

Under the CAA, states must develop State Implementation Plans (SIPs). An SIP is a collection of regulations to clean up areas that exceed applicable air quality standards.

The potential air quality impacts resulting from this project are discussed in Section X. The discussion concludes that emissions would be minor and temporary. The area is currently in attainment for all NAAQS. The project would not result in exceedance of chronic or acute state air quality standards; therefore, the TSP is in compliance.

#### **6.2.5. U.S. Fish and Wildlife Coordination Act, 16 U.S.C.661-666(c)\**

The Fish and Wildlife Coordination Act of 1934, as amended, requires consultation and coordination with the USFWS and state fish and wildlife agencies “whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the U.S., or by any public or private agency under Federal permit or license “(16 U.S.C. § 662(a)). The USFWS submitted the initial Planning Aid Letter for the preparation of the Draft SEIS. A Fish and Wildlife Coordination Act Report (FWCAR) will be prepared during the preparation of the Final SEIS. Information received in this process will be instrumental in guiding the analysis of the TSP.

### **6.2.6. Endangered Species Act**

The ESA of 1973 (16 U.S.C. § 1531–1543), as amended, establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend. The ESA is administered by the Department of the Interior, through the USFWS, and by the USDOC, through the NOAA Fisheries, NMFS, Protected Resource Division. Section 7 of the ESA specifies that any agency that proposes a Federal action that could jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species (16 U.S.C. § 1536(a)(2)) must participate in the interagency cooperation and consultation process. The USACE will initiate formal consultation with both the USFWS and the NOAA Fisheries. Based on the assessments in this report, the USACE, Mobile District finds that the proposed modification activity is not likely to adversely affect any listed endangered and/or threatened species or their associated critical habitat. The USACE has initiated consultation with the USFWS under Section 7 coordination of the Endangered Species Act.

Magnuson-Stevens Fishery Conservation and Management Act (MSA), 16 U.S.C.1801 et seq.

The Fishery Conservation and Management Act of 1976 (16 U.S.C. § 1801 et seq.) established the following:

- A fishery conservation zone between the territorial seas of the U.S. and 200 nautical miles offshore
- An exclusive U.S. fishery management authority over fish within the fishery conservation zone (excluding highly migratory species)
- Regulations for foreign fishing within the fishery conservation zone through international fishery agreements, permits, and import prohibitions

In 1996, Congress enacted amendments to the Act, known as the Sustainable Fisheries Act (P.L. 104-297), to address the substantially reduced fish stocks, which had declined

as a result of direct and indirect habitat loss. The Act was renamed the Magnuson-Stevens Fishery Conservation and Management Act (P.L. 94-265), as amended on October 11, 1996. This act provides for the conservation and management of the fisheries, and the identification and protection of EFH (NOAA Fisheries, 1996).

EFH within the project area (including nearshore) and potential impacts on fish species and associated essential habitats are evaluated in this SEIS. The proposed TSP complies with the Act.

#### **6.2.7. Anadromous Fish Conservation Act, 16 U.S.C. 757, et seq.**

This Act authorizes the Secretary of the Interior to enter into a cooperative agreements with the States and other non-Federal interests for the conservation, development, and enhancement of the Nation's anadromous fishery resources that are subject to depletion from water resources developments and other causes, or with respect to which the Federal Government has made conservation commitments concerning such resources by international agreements. The program emphasizes the conservation and enhancement of anadromous fishery resources and the fish in the Great Lakes and Lake Champlain that ascend streams to spawn. The Act established a grant program to provide funding to states for habitat or fish enhancement work, and specifies cost-sharing and appropriation provisions.

Three anadromous fish species (Alabama shad, striped bass, and Gulf sturgeon) occur in the proposed project area. Based on the evaluation of potential impacts there would be minor and temporary impacts on these fish species. Because the overall impacts would not be significant, the TSP would be in compliance with the Act.

#### **6.2.8. Marine Mammal Protection Act (MMPA), 16 USC 1631 et seq.**

Under the MMPA of 1972 (16 U.S.C. § 1361 et seq.), the Secretary of Commerce is responsible for all cetaceans and pinnipeds, except walruses, and has delegated authority for implementing the Act to the NOAA Fisheries. The Secretary of the Interior is responsible for walruses, polar bears, sea otters, manatees, and dugongs, and has delegated the responsibility for implementing the MMPA to the USFWS. The MMPA established the Marine Mammal Commission and its Committee of Scientific Advisors on Marine Mammals, whose members are responsible for overseeing and providing advice to the responsible regulatory agencies on all Federal actions bearing upon the conservation and protection of marine mammals.

Use of the proposed area (including nearshore) and the potential impacts to marine mammals resulting from the TSP and protective measures to offset the potential impacts are considered. Agency consultation addressing marine mammals included discussions with both the USFWS and the NOAA. Incorporation of the safeguards used to protect threatened or endangered species during project implementation would also protect any marine mammals in the area; therefore, the project complies with this act.

### **6.2.9. Section 106 and 110(f) of the National Historic Preservation Act (NHPA), 54 U.S.C. 300101 et seq.**

The NHPA, enacted in 1966 and amended in 1970 and 1980, provides for the NRHP to include districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture. The law seeks to preserve the historical and cultural foundation of the U.S. According to EO 11593 of 1991 (*Protection and Enhancement of the Cultural Environment*), the Federal Government will provide leadership in preserving, restoring, and maintaining the historic and cultural environment. The NHPA provides funding for each state to establish a SHPO. The SHPO oversees performance of appropriate surveys to ensure that historic and cultural resources are protected under the law. Consultation with the Alabama SHPO has been initiated concerning the specific aspects of the TSP.

### **6.2.10. Marine Protection, Research and Sanctuaries Act**

The Marine Protection, Research, and Sanctuaries Act (MPRSA), also known as the Ocean Dumping Act, was passed in 1972 to prohibit the dumping of material into the ocean that would unreasonably degrade or endanger human health or the marine environment. Ocean dumping cannot occur unless a permit is issued by the EPA under the MPRSA for dredged material. The EPA is also responsible for designating recommended ocean dumping sites for all types of materials as well as inspection, monitoring and surveillance to ensure compliance with dredged material placement permit conditions.

The TSP includes the dredging and placement of material for Mobile Harbor Federal Navigation Channel modifications. Sediment investigations have indicated that the material is generally free of oil residue from the Deep Water Horizon oil spill and will not result in the placement of contaminated material. Procedures will be implemented during dredging and placement activities to identify potential oil contamination and avoid distribution of contaminated material. Some placed material will be for beneficial-use purposes and therefore, not governed by MPRSA but rather the CWA.

### **6.2.11. EO 13112, Invasive Species**

This EO was issued to prevent the introduction of invasive species; provide for their control; and minimize the economic, ecological, and human health impacts that invasive species can cause. This order defines invasive species, requires Federal agencies to address invasive species concerns and to not authorize or carry out new actions that would cause or promote the introduction of invasive species, and established the Invasive Species Council.

Invasive species were considered during the development of the TSP. The TSP would not promote invasive species and would comply with this EO .

#### **6.2.12. EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations**

This EJ Policy, based on EO 12898 of 1994, requires agencies to incorporate into the NEPA documents an analysis of the environmental effects of their proposed programs on minorities and low-income populations and communities. Environmental Justice is defined by the EPA as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.” The effects of the TSP on local populations and the resources used by local groups, including minority and low-income groups, are addressed. Based on this evaluation, the USACE has determined that the TSP addresses EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*.

#### **6.2.13. EO 13045, Protection of Children from Environmental Health Risks and Safety Risks**

On April 21, 1997, President Clinton issued EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*. This EO directs each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

The potential environmental health or safety risks to children resulting from implementation of a restoration alternative are addressed. Based on this evaluation, the USACE has determined that the TSP addresses EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*.

#### **6.2.14. Migratory Bird Treaty Act, 16 U.S.C. 703 et seq.; EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds**

The Migratory Bird Treaty Act (MBTA) of 1918 established Federal responsibilities to protect birds migrating between the U.S. and Canada. Subsequent treaties with Mexico (1936), Japan (1972), and the Union of Soviet Socialist Republics (1976) expanded the scope of international protection of migratory birds. Each subsequent treaty was incorporated into the MBTA as an amendment. The provisions of the MBTA are implemented domestically within the signatory countries. Under the MBTA, nearly all species of birds occurring in the U.S., their eggs, and their nests are protected. There are 836 bird species protected by the MBTA in the U.S., 58 of which are

legally hunted as game birds. The MBTA makes it illegal to take (to hunt, pursue, wound, kill, possess, or transport by any means) listed bird species, their eggs, feathers, or nests unless otherwise authorized, such as within legal hunting seasons. This SEIS evaluates the benefits and impacts of the TSP to migratory birds. The TSP is in compliance with the Act.

#### **6.2.15. Rivers and Harbors Act**

Section 10 of the Rivers and Harbors Act of 1899 prohibits the construction of structures or obstructions in navigable waters without the consent of Congress (33 U.S.C. § 407). Structures include wharves, piers, jetties, breakwaters, bulkheads, etc. The Rivers and Harbors Act also includes any changes to the course, location, condition, or capacity of navigable waters and includes dredge and fill projects in those waters. The USACE oversees implementation of this law.

This SEIS has been completed in coordination with appropriate entities of the USACE, Mobile District to ensure that no features of the channel improvements would obstruct navigation.

#### **6.2.16. Sunken Military Craft Act**

The Sunken Military Craft Act (SMCA) was enacted on October 28, 2004. Its primary purpose is to preserve and protect from unauthorized disturbance all sunken military craft that are owned by the U.S. Government, as well as foreign sunken military craft that lie within U.S. waters. The law preserves the sovereign status of sunken U.S. military vessels and aircraft by codifying both their protected sovereign status and permanent U.S. ownership, regardless of the passage of time. The purpose of the SMCA is to protect sunken military vessels and aircraft and the remains of their crews from unauthorized disturbance. The SMCA protects sunken U.S. military ships and aircraft wherever they are located, as well as the graves of their lost military personnel, sensitive archaeological artifacts, and historical information. Its scope is broad, protecting sunken U.S. craft worldwide and sunken foreign craft in U.S. waters defined to include the internal waters, territorial sea, and contiguous zone (up to 24 nautical miles off the U.S. Coast).



### 6.2.17. Table of Compliance

Relationship of the Proposed Action to Federal Laws and Policies		
Title of Public Law	U.S. Code	Compliance Status
National Environmental Policy Act of 1969 (NEPA), as amended	42 U.S.C. 4321 <i>et seq.</i>	Partially Compliant: Draft SEIS complete
Clean Water Act	33 U.S.C. § 1341	Partially Compliant: A WQC will be request from ADEM prior to Final Report
Federal Coastal Zone Management Act (CZMA),	16 U.S.C. 1451 <i>et seq.</i>	Partially Compliant: A Coastal Zone Consistency determination will be request from ADEM prior to Final Report
Clean Air Act (CAA), as amended	42U.S.C. 7401 <i>et seq.</i>	Partially Compliant: An initial determination that potential air emissions would not cause a significant impact to air quality was made. Will finalize prior to final report
U.S. Fish and Wildlife Coordination Act	16 U.S.C.661-666(c)	Partially Compliant: Received Planning Aid Letter from USFWS. Final Coordination Act Report being prepared.
Endangered Species Act (ESA) of 1973	16 U.S.C. § 1531–1543	Partially Compliant: In the process of conducting Section 7 coordination with USFWS and NMFS.
Magnuson-Stevens Fishery Conservation and Management Act (MSA)	16 U.S.C.1801 <i>et seq.</i>	Partially Compliant: In the process of conducting EFH coordination with NMFS.
Anadromous Fish Conservation Act	16 U.S.C. 757, <i>et seq.</i>	N/A
Marine Mammal Protection Act (MMPA)	16 USC 1631 <i>et seq.</i>	Partially Compliant: Will be conducting cultural resources surveys and completing coordination with SHPO

Relationship of the Proposed Action to Federal Laws and Policies		
Title of Public Law	U.S. Code	Compliance Status
National Historic Preservation Act (NHPA) Section 106 and 110(f)	16 U.S.C. 470 <i>et seq.</i>	Partially Compliant: Will be conducting cultural resources surveys and completing coordination with SHPO
Marine Protection, Research and Sanctuaries Act (MPRSA)	33 USC 1401	Compliant
Estuary Protection Act of 1968	16 U.S.C. §1221–1226; P.L. 90-454; 82 Stat 625	Compliant
Section 10 of the Rivers and Harbors Act of 1899	33 U.S.C. § 407	Partially Compliant: In the process of conducting Section 7 coordination with USFWS
Migratory Bird Treaty Act	16 U.S.C. 703 <i>et seq.</i> ; EO 13186	Partially Compliant: Will be conducting cultural resources surveys and completing coordination with SHPO
Sunken Military Craft Act (SMCA) October 28, 2004		Partially Compliant: Appropriate consultation will be completed prior to final report.
Floodplain Management	EO 11988	N/A
Protection of Wetlands	EO 11990	Compliant: Conducted wetland impact assessment.
Invasive Species	EO 13112	N/A
Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations	EO 12898	Partially Compliant: Initial determination that project would not have disproportionately high and adverse impacts to any communities, including environmental justice communities or children.
Protection of Children from Environmental Health Risks and Safety Risks	EO 13045	Partially Compliant: Initial determination that project would not have disproportionately high and adverse impacts to any communities, including environmental justice communities or children.

**From:**  
**To:**

(b)(6)

**Cc:**

**Subject:** Mobile Harbor GRR Bi-weekly Meeting Cancelled/ Key upcoming dates  
**Date:** Wednesday, July 18, 2018 9:55:00 AM

---

All,  
The bi-weekly meeting is cancelled for this afternoon. For your information, key upcoming dates for the Mobile Harbor GRR are as follows:

- 20 Jul - Submit Draft GRR/SEIS to EPA
- 27 Jul - EPA release Draft/SEIS for public review
- 31 Jul - IEPR, ATR, policy and legal review start
- 06 Sep - Public Meeting at Mobile Convention Center.

I will provide the dates for the kick-off meeting(s) for the IEPR and ATR Reviews as soon as those dates are set.

(b)(6)

-----Original Message-----

**From:** (b)(6)

**Sent:** Friday, July 13, 2018 2:48 PM

**To:** (b)(6)

(b)(6)

**Cc:** (b)(6)

(b)(6)

(b)(6)

Subject: Mobile Harbor GRR/SEIS Public Meeting

All,

The next public meeting for the Mobile Harbor GRR/SEIS will be held Thursday, 06 September at the Convention Center. More details to follow.

(b)(6)

-----Original Appointment-----

From: (b)(6)

Sent: Wednesday, February 01, 2017 12:39 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: Mobile Harbor GRR Bi-weekly Meeting

When: Wednesday, July 18, 2018 2:00 PM-3:00 PM (UTC-06:00) Central Time (US & Canada).

Where: MsCIP Conference Room

For those not in the district office, call-in Information is as follows:

USA Toll-Free (b)(6)

Access Code (b)(6)

Security Code: (b)(6)

All: The Mobile Harbor GRR bi-weekly meeting has been moved to Wednesdays at 2pm, beginning February 01, 2017. Please update your calendar accordingly. The purpose of the meeting remains to provide a brief update on the project, ensure all work is being performed, and ensure that the schedule is met.

Thanks,

(b)(6)

(b)(6)

**From:** [REDACTED] (b)(6)  
**To:** [REDACTED]  
**Subject:** RE: IWR Deliverable: Mobile Harbor CAP IEPR - Selected Panel Document  
**Date:** Wednesday, July 18, 2018 9:29:00 AM

---

We are not aware of any conflicts with the replacement.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Wednesday, July 18, 2018 9:17 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** RE: IWR Deliverable: Mobile Harbor CAP IEPR - Selected Panel Document

Hi [REDACTED] (b)(6)

Turns out the DDNPCX did have an issue with the original Econ/Planner reviewer for the IEPR [REDACTED] (b)(6). [REDACTED] (b)(6) requested a different reviewer due to [REDACTED] (b)(6) not being an economist by education. [REDACTED] (b)(6) has been identified as his replacement. A new Panel list is attached for your reference.

Let me know if you have any questions,

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Saturday, July 14, 2018 7:15 AM  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** Re: IWR Deliverable: Mobile Harbor CAP IEPR - Selected Panel Document

[REDACTED] (b)(6)

There are no known conflicts with the panel.

---

**From:** [REDACTED] (b)(6)  
**Date:** July 13, 2018 at 10:51:32 AM CDT  
**To:** [REDACTED] (b)(6)  
[REDACTED] (b)(6)  
**Subject:** FW: IWR Deliverable: Mobile Harbor CAP IEPR - Selected Panel Document



Hi (b)(6)

Please see attached. I need your feedback on whether or not the proposed Panel members for the Mobile Harbor IEPR are free from any known conflicts of interest. Sometimes a reviewer may slip through and a PDT knows that they shouldn't be doing the review. Need your feedback before next Wed (18 July) please.

Thanks and please let me know if you have any questions,

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Thursday, July 12, 2018 10:00 AM

To: (b)(6)

Cc: (b)(6)

Subject: [Non-DoD Source] IWR Deliverable: Mobile Harbor CAP IEPR - Selected Panel Document

Hello,

Please find attached information on the selected panel members for the Mobile Harbor IEPR. This is being delivered to you under Contract W912HQ-15-D-0001, Task Order W912HQ18F0078. The attached PDF file contains the qualifications and short bios for the four primary candidates. We have selected the most qualified panel to meet the PWS requirements.

Battelle requests USACE feedback on this deliverable which should include confirming that panel members being presented do not have any conflicts of interest that may not have been identified during the recruiting process. According to the National Academy of Sciences (NAS) Policy on Committee Composition and Balance and Conflicts of Interest , “In every case, the assessment of the qualifications of potential candidates for committee membership and the final determination of the individuals to be selected for membership on a committee rest solely with the institution.” EC 1165-2-214 indicates that NAS Policy should be followed and that USACE Headquarters has confirmed that the “institution” is the OEO (i.e., Battelle). To ensure that panel selection is consistent with NAS Policy and to eliminate additional effort in panel selection, we request that feedback not include the following:

- \* Requesting specific panel members be used or suggesting that someone from a specific company be contacted and used on the panel
- \* Requesting that a specific panel member not be used because of potential bias that is not consistent with NAS Policy
- \* Changing the technical requirements for the panel after they have been selected

We look forward to receiving your response regarding the selected candidates no later than COB, Wednesday, July 18th so that we can finalize subcontracting activities with the panel by July 27, 2018.

Thank you,

(b)(6)

(b)(6)

(b)(6)

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<Blockedhttp://www.linkedin.com/company/battelle>

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P Please consider the environment before printing this e-mail.

**From:**

**To:**

(b)(6)

**Cc:**

**Subject:**

Risk Register - Mobile Harbor GRR

**Date:**

Wednesday, July 18, 2018 7:33:00 AM

**Attachments:**

[Mobile Harbor GRR - Risk Register TSP\\_06Mar18.xlsx](#)

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All,

An updated Risk Register for the Mobile Harbor GRR is required for the ATR and IEPR Reviews. Attached is the latest Risk Register. Please update your risk tab and return to me by COB Wednesday, 25 July, 2018. I will update the Summary Page accordingly.

(b)(6)

Column	Risk Number	Date	Escaping Check or Item	Risk and its cause	Risk Type	Consequence	Consequence rating	Reference for Consequence rating	Reference for Consequence rating	Threshold rating	Evidence for threshold rating	Uncertainty rating	Risk Rating	Risk Management Options	Conclusions/Recommendations	FOC	Affected Study Component
30007	30007	1/2008	Dear entry was not updated	This is the escaping check/ item, decision, problem, question, issue or event (action, hazard or opportunity) (how to be managed)	Study Risk	Select: Study Risk (Analytical error, study design, study cost increase, poor planning/analysis), Implementation Risk (Schedule and cost of implementation, redesign), or Outcome Risk (Budget and project performance risk)	Describe the consequence of the column 4 risk. If things do "go wrong" in the way described what are the likely consequences for the study or project outcomes (at the most significant consequence first if more than one)	If the most significant consequence is critical, then the consequence rating is critical. If the most significant consequence is not critical, then the consequence rating is low or medium.	Other specific evidence used to support the consequence rating in column 8, if relying on an event from a previous study, list study and year.	What is the likelihood that the most significant consequence will occur?	Enter specific evidence used to support the likelihood rating in column 9. If relying on an event from a previous study, list study and year.	How great is the uncertainty about either the consequence or likelihood of the risk identified in column 4?	Qualitative risk rating from input table.	Clear options for reducing the risk and minimize any/loss impacts associated with the management action.	Identify any preferred recommendation for managing the risk. Tailoring the risk to the input system.	Form of (if person) assessing the risk (see column 17)	What other analyses of the study are affected by this risk? For example, what other analyses use outputs from the escaping check or item input.
PM-1	1-F4b-10	1-F4b-10	Plan selection/Budget and schedule development	Additional HarborFirm and engineering modeling runs may be required to determine the plan that reasonably maximizes net benefits. This is because the results of the engineering modeling runs and DDCD ship simulations performed after the initial economics screening may result in additional economic and engineering model runs to reevaluate the NEQ plan.	Study Risk (Prior to TSP Milestone)	Study completion may be delayed. Additional modeling will require more funds.	Low	No specific evidence is available.		Medium	Although using the economic benefit analysis to refine the alternatives will help limit the scope of the engineering modeling, the potential for discovered impacts caused by an economically justified plan remain.	Medium	Low	Delaying the final engineering modeling until after the determination of an economically justified plan is the best way to limit the likelihood of having to run multiple iterations.	Tolerate the risk and proceed	Engineering, Economic, Environmental	
PM-2	1-F4b-10	1-F4b-10	Budget and schedule development	Specific concern may arise from Public Spending Meeting that impacts development of TSP.	Study Risk (Prior to TSP Milestone)	Study completion may be delayed. Further development may cost more than anticipated.	Medium	Charleston Harbor received more than 700 comments during the public comment period.		Medium	Three comparable projects in the Southeastern United States - Charleston Harbor, Savannah Harbor, and Jacksonville Harbor - have all exceeded the cost and schedule estimated for this project.	Medium	Low	Address all known concerns prior to selecting plan.	Tolerate the risk and proceed	All disciplines	
PM-3	1-F4b-10	1-F4b-10	Budget and schedule development	Budget and Schedule under estimates net costs due to unforeseen project challenges. In example, additional cultural resource funding may be required to support DODAS.	Study Risk	Study completion may be delayed. Additional funds may be required for completion.	Medium			Medium	Three comparable projects in the Southeastern United States - Charleston Harbor, Savannah Harbor, and Jacksonville Harbor - have all exceeded the cost and schedule estimated for this project.	Medium	Medium	Address all known concerns during initial budgeting and scheduling process. Work closely with stakeholders to ensure that concerns are adequately addressed.	Tolerate the risk and proceed	Project Management	
PM-4	1-F4b-10	1-F4b-10	Schedule development	Proposed project schedule is predicated on receiving funds on time. Any delay in funding throughout the life of the project will impact the proposed schedule.	Study Risk	Study completion may be delayed.	Low	No specific evidence is available.		Low	Programs have provided sufficient funds for Mobile Harbor in a timely manner to date.	Low	Low	Ensure programs in involved. Develop accurate budget. Monitor expenditures closely.	Tolerate the risk and proceed	Project Management	
PM-5	27-AJ-11	27-AJ-11	Budget development	Contingency funds may not be sufficient to cover unexpected costs.	Study Risk	Additional funds may be required for completion.	Medium			Medium	Three comparable projects in the Southeastern United States - Charleston Harbor, Savannah Harbor, and Jacksonville Harbor - have all exceeded the cost and schedule estimated for this project.	Medium	Medium	Address all known concerns during initial budgeting and scheduling process. Work closely with stakeholders to ensure that concerns are adequately addressed.	Tolerate the risk and proceed	Project Management	
PM-6	13-Aug-10	13-Aug-10	Schedule development	Schedule assumes that the public review period on the final report is not extended beyond 30 days.	Study Risk	Study completion will be delayed if final public review period is extended.	Low	No specific evidence is available.		High	It is unlikely the panel would take the full 60 days after public review to issue the final report, particularly if the schedule for completion is negotiated with the TSP team before the public review period. Also, all work on the EIR review is substantially complete, the ADM will be ready to go if the final EIR report has not been issued yet.	Low	Low	Work closely with review agencies from the start of the project to ensure concerns are addressed.	Tolerate the risk and proceed	Project Management	
PM-7	13-Aug-10	13-Aug-10	Schedule development	Schedule assumes all substantive EIR comments are resolved concurrent with other reviews. In line, the EIR review is to be completed in 60 days to provide final comment after the public review period.	Study Risk	EIR comment resolution is required from the EIR team after completion of the comment review and final EIR report and extend the overall schedule.	Low	No specific evidence is available.		Low	It is unlikely the panel would take the full 60 days after public review to issue the final report, particularly if the schedule for completion is negotiated with the TSP team before the public review period. Also, all work on the EIR review is substantially complete, the ADM will be ready to go if the final EIR report has not been issued yet.	Low	Low	Ensure the best quality project going in to the public review, work closely with EIR team, and develop workarounds to keep ADM on track.	Tolerate the risk and proceed	Project Management	
PO-1	26-Jan-10	26-Jan-10	Policy Changes during study period	New law or executive order can happen in an given year. Internal policy changes can also be adopted. These changes can impact how a study is conducted and analyzed.	Study Risk, Implementation Risk, Outcome Risk	Study could be delayed addressing new requirements. Study outcomes may be affected.	Medium	Implementation of new policy would require guidance and time to incorporate into our study process.		Low	In the last two years the Corps has implemented the SMMAT Planning Program and WREDA 204 was signed into law. Both have required new executive orders and projects. Currently, no changes are expected prior to the TSP initiation.	Low	Low	Ensure engagement with vertical chain for awareness of any proposed policy changes.	Tolerate Risk and Proceed	Project Management, Planning, Engineering, Economic, Environmental, Real Estate	
PO-2	26-Jan-10	26-Jan-10	Study Funding	Appropriation change or non-availability could be enacted that would impact funding for the study and a timely completion.	Study Risk and Implementation Risk	Study funding could be reduced, delayed, or ended.	High	Federal only funding is ended or delayed project analysis could be delayed significantly or cancelled.		Low	While Congressional and Administration priorities can change at any time, none are expected prior to the TSP initiation.	Low	Medium	Ensure engagement with vertical chain for awareness of any proposed funding changes.	Tolerate Risk and Proceed	Planning, Engineering, Economic, Environmental, Real Estate	
PO-3	26-Jan-10	26-Jan-10	TSP Selection	Utilizing qualitative data to screen the focused array of alternatives may overstate or understate the cost, benefits, or environmental impacts and may incorrectly identify one alternative as the TSP.	Study Risk, Implementation Risk, Outcome Risk	Study outcome may incorrectly identify the most economical alternative with the least environmental impact. Economics of the alternative may be over- or under-estimated. Environmental impacts may be over-estimated or underestimated.	Medium	Should the economy or environmental impacts be over- or underestimated further refinement of the TSP when preparing the plan for recommendation will address an economical plan and will address the less environmental impacts of the plan.		Medium	Refinement of the TSP may not fully demonstrate that the selected plan is the optimal plan but the assessment of its environmental impacts should ensure that the impacts are minimized.	Medium	Medium	EIS needs to carefully examine and compare the information developed for each of the alternatives to ensure proper selection of the TSP.	Tolerate Risk and Proceed	Engineering, Economic, Environmental	
PO-1	19-Jan-10	19-Jan-10	Non-structural measures have been properly screened	Screening a non-structural alternative that should have been carried forward.	Study Risk	Transportation cost are not properly accounted for.	Medium	The difference in transportation cost may be more or less than anticipated.		Low	Cost effective alternatives are probably always being used.	Low	Low	Tolerate the risk and proceed			
PO-2	19-Jan-10	19-Jan-10	Identify benefitting communities and vessel classes	Incorrect identification of benefitting communities and vessel classes.	Study Risk	benefits will not be accurately captured.	Medium	depends on the magnitude of benefits captured or lost.		Low	The data gathered for the existing condition should be a good representation.	Low	Low	Tolerate the risk and proceed	(b)(6)	economics	
PO-3	25-Jan-10	25-Jan-10	Using Global freight commodity forecast to select TSP	TSP will be changed without additional sensitivity scenarios.	Study Risk	Could select NEQ that is too deep or shallow, over estimate cost, not estimate benefits.	Medium	Potential to over/under estimate project benefits. The forecast is based on historical and empirical data. If new data is available during the study, the forecast may or may not have a significant change.		Medium	Forecasting could be wrong, other ports and trade patterns.	Medium	Medium	1. Additional commodity growth rates could be projected to minimize risk.	Tolerate the risk and proceed		
PO-4	25-Jan-10	25-Jan-10	One commodity/fleet forecast throughout the study analysis, how year will not be updated as new data is available	Changes in the world economy could impact the anticipated amount of cargo calling the Gulf Coast.	Study Risk	Forecast may not adequately characterize uncertainty due to changing economic climate.	Medium			Medium	Recent ship simulations used to evaluate widening the upper bay segment of Mobile Harbor channel for two-way traffic for postpanama container ships (2,540 x 140 x 47.5 ft), and 965 x 106 x 41.3 ft) determined that one postpanama vessel could pass within a channel width of 550 feet over a distance of 3 miles using current CADIZ design guidance the required width for passing the same two postpanama container ships is around 770 feet. Evaluation of channel passing with a Charleston ADMX Operations Research Facility and mathematical simulations to determine delay costs in 1988 for a TPO x 200 ft. design vessel indicated passing in the lower reaches the channel could be done safely within 3 miles at a depth of 20 feet.	Medium	Medium	1. Update data/forecast as new data is available	Tolerate the risk and proceed		
PO-1	22-Jan-10	22-Jan-10	Channel ship simulations (i.e. geographic extent and vessels) from previous harbor studies in the upper bay in 2008 and 2009 as well as 2008 simulations, were used to guide the project delivery team in formulation of the initial array of alternative plans.	Assess safety and channel efficiency evaluated during the TSP with ship simulations using selected design vessels could identify channel enhancements beyond the initial array of alternatives (e.g. widths and turning lane lengths).	Study Risk and Study Delay	Additional Harbor Sim modeling may have to be performed to evaluate the refined alternative, if it is outside the bounding box of the initial array.	Medium	Professional judgement		Low	Recent ship simulations used to evaluate widening the upper bay segment of Mobile Harbor channel for two-way traffic for postpanama container ships (2,540 x 140 x 47.5 ft), and 965 x 106 x 41.3 ft) determined that one postpanama vessel could pass within a channel width of 550 feet over a distance of 3 miles using current CADIZ design guidance the required width for passing the same two postpanama container ships is around 770 feet. Evaluation of channel passing with a Charleston ADMX Operations Research Facility and mathematical simulations to determine delay costs in 1988 for a TPO x 200 ft. design vessel indicated passing in the lower reaches the channel could be done safely within 3 miles at a depth of 20 feet.	Medium	Low	Tolerate risk and proceed as proposed in the PMIP (i.e. build off previous ship simulation studies and apply a two-phased approach with reduced simulations during feasibility).	Tolerate risk and build off previous ship simulation studies and apply a two-phased approach with reduced simulations during feasibility.	Cost Estimates, Economic and Engineering, General, Plan Formulation	
PO-2	22-Jan-10	22-Jan-10	Timely and appropriate selection of the design vessels (i.e. critical to the project design and subsequent Benefit-Cost analysis. The design vessel used to be identified cost after the ADM selection for passing and/or results not currently calling on the Port is unknown how developed without this information.	Almost every aspect of the project design is dependent on the selection of the design vessels. Safe and efficient navigation of vessel lanes/Classes for passing and/or results not currently calling on the Port is unknown how developed without this information.	Study Delay	Proposer selection of the design vessels could include ship simulation and could lead to underestimating or overestimating of proposed project improvements. New vessel classes/Types could bring new requirements that affect other vessel treatment and possible delays.	High	Changes in vessel classes can result in dramatic differences in cargo capacity such as Panama-Post Panamax. Vessel handling characteristics change with new vessel classes and improved fuel efficiency.		Low	Assistance from DONRCA and Vertical Team Integration should result in appropriate selection of design vessels.	Medium	Medium	Timely and appropriate selection of the design vessels, which is critical to the project design and subsequent Benefit-Cost analysis.	Tolerate risk and build off previous ship simulation studies and apply a two-phased approach with reduced simulations during feasibility.	Cost Estimates, Economic, Engineering - General, Plan Formulation	
PO-3	22-Jan-10	22-Jan-10	Assumption that the design vessel will not be larger than what is currently calling to port for formulation of the initial array of alternatives.	Assumption for sizing number of likely alternatives to model based on the LBR and port and pilot association input at the Charleston was that widening the full channel would likely be necessary based on the anticipated vessels to call to port. Post Charleston discussions has indicated that larger 6 class vessels may call to port as many as 4 times per week. If larger vessels are found to be the "design vessel" additional alternatives may need to be considered.	Study Risk	Impact to schedule and study cost.	Medium	Likelihood have many alternatives to get to NEQ, multiple channel depths and widening, alignments, bend turning, varying beam changes etc.		Medium	Historically NEQ not done in only a few modeling alternatives for project this option.	Medium	Medium	1) Determine design vessel through economic and vessel alternatives prior to modeling. (2) Change risk that alternatives will number more than 1, (3) model alternatives against to alternatives modeling to evaluate schedule risk if alternatives increase.	Tolerate the risk and build off previous ship simulation studies and apply a two-phased approach with reduced simulations during feasibility.	Cost Estimates, Economic and Engineering, General, Plan Formulation	
PO-4	22-Jan-10	22-Jan-10	Calculating length of navigation channel required for safe and efficient travel of our way traffic.	Channel passing lane requirements have been largely based on design dimensions and driving experiences. Currently, the final design with requirements are usually considered through the use of a virtual ship simulator to assess the accuracy with which pilots are able to meet the channel for various environmental and vessel handling characteristics. However, there is a need to quantitatively evaluate the length of navigation channel required for two way traffic given numerous real life issues that can greatly affect the timing of two ship meeting.	Implementation Risk	Passing lane requirements will continue to address navigation issues related to two way channel traffic. Length with limited guidance relative to real life issues that can greatly affect the timing of two ship meeting which can result in the potential for higher overall project costs and reduced efficiency.	Medium	Expertise and Past Experience of Engineering Research and Development (ERDC) Civil Delivery Team Members on multiple CADIZ Channel designs including the 2003 upper Mobile Harbor passing lane design, which identified potential turning issues.		Medium	Recent ship simulations used to evaluate widening the upper bay segment of Mobile Harbor channel for two-way traffic for postpanama container ships (2,540 x 140 x 47.5 ft), and 965 x 106 x 41.3 ft) in 2009, which identified potential turning issues.	Medium	Medium	Assistance from ERDC, Flots, DONRCA and Vertical team integration during evaluation of passing lanes.	Tolerate risk and build off previous ship simulation studies and apply a two-phased approach with reduced simulations during feasibility.	Cost Estimates, Economic, Engineering - General, Plan Formulation	
PM-5	22-Jan-10	22-Jan-10	Advance maintenance	Currently, the authorized project includes 2' of Advance Maintenance and 2' of advance over depth for the entire channel. Justification and support for advance maintenance of the entire Mobile Harbor project is contained in a 25 October 2008 CADIZ OI CD memorandum. Should this be carried forward for all of the channel (Upper Bay, Lower Bay and Entrance channel) in PMIP and alternative evaluations.	Schedule and Implementation Risk	2' of advanced maintenance is carried forward and determined to require minimal time. It may be less per foot depending on if soil consolidated materials used at the bottom of the cut.	Medium	Advance maintenance is required in fast shoaling areas to avoid frequent re-dredging and ensure the stability and best overall cost of operating and maintaining the project. Authorial Determination. Changes in shoaling rates which occur with channel deepening and widening could necessitate changes in the advance maintenance requirements.		Low	Given that the Mobile Harbor Channel segments are not naturally deeper than the project depth, additional depth will increase dredging contract quantities.	Medium	Low	Accept the risk.	Accept the risk.	Cost Estimates, Economic, Engineering - General, Plan Formulation	

800.6	6-Feb-12	Adoptable bar channel depths for existing and future flows.	Study and Implementation Risk	High	EM 1110-2-1611, Channel and Floodway Engineering Technical Note 6.1 and FHWAC WCD 1307	Low	JCC reports indicate no bar channel depth concerns with existing flow. EM 1110-2-1611, Coastal and Floodway Engineering Technical Note 6.1 and FHWAC WCD 1307	Medium	1) Use EM 1110-2-1613 guidance to determine under bank. 2) Use EM 1110-2-1613 guidance and CHDT for entrance channel) to evaluate design under load.	Use the Channel Design Evaluation Tool (CADET) during the	Cost Estimates, Economics, Environmental, Real Estate and Engineering Analysis.				
800.7	22-Jan-12	Disposal Location/Beneficial Use Options	Schedule and Implementation Risk.	Medium	Some material may be amenable for Ocean Disposal and dispose at alternate location. Timing on EPA approval of an expanded COMDS is unknown. Potential alternatives may be economically infeasible to go anywhere but the COMDS.	Medium	Subsurface information gaps may exist regarding deep alternatives. Expanded COMDS by EPA has not been approved at this time. There is limited geologic capacity beyond and real estate is limited on the Island.	Medium	Hopper Restrictions from past testing in the northern bay channel and current ongoing EPA coordination for COMDS capacity increases.	Tolerate the risk and proceed.	Cost Estimates, Economics, Engineering, Environmental - General, Plan Formulation.				
800.8	22-Jan-12	Sea Level Change	Identified costs are incurred during the 10-year project life.	Medium	Low lying infrastructure will be flooded and require being elevated or possible relocation. Clearance under existing bridges may restrict navigation up river. Higher navigation channels will gain in depth.	Medium	Currently, there are no structural general navigation features associated with the Federal project such as piers. There are several adjacent disposal areas that may require increase in dune elevation. The vulnerability, frequency, severity and probability of past infrastructure has been generally assessed in a Federal Highway Administration (FHWA) study. Further assessments on timing areas and potential adaptive measures beyond those identified in the FHWA Phase I (2008) and Phase II (2010) study will be the next Federal action.	Low	FHWA Phase I (2008) and Phase II (2010) Study	Ensure that the non-Federal sponsor includes a discussion of the potential impacts of SL to Port infrastructure and operations as this will be brought out during vertical term reviews and Civil Works Review Board.	Cost Estimates, Economics, Engineering, Environmental - General, Plan Formulation.				
800.9	23-Jan-12	No new modeling of potential environmental effects was utilized in identification of the total array of alternatives.	Study and Implementation Risk	Medium	Identified and/or unmodeled impacts to sediment erosion and deposition, extent of safety intrusions, changes in fishing and water quality (D.O., nutrients, etc.) in the estuary, and habitat influences could result in resource plan changes that are outside the identified array of alternatives.	Medium	Utilizing hydrodynamic, sediment transport and water quality modeling could identify necessary plan changes and revision of additional alternatives.	Medium	Recent published reports indicate the potential influence of past the navigation channel improvements on bay habitats and the complexity of the estuary and variability of water habitats within it (Lisa E. Olyettman*, Christopher G. Smith (U.S.G.S. Estuarine, Coastal and Shelf Science, 2012), (Chen & Wu, 2012), (Fletcher et al., 2012), (Droessler et al., 2006), (Stoltz et al., 1996), (Duke, Schmalzer, Sherman, P., Burn & Gelfenbaum, 1994), (Park, Kim & Schmalzer, 2007)	Build off previous Hydrodynamic Modeling tools used in the system (ADCIRC, CH2D, ADI and STWAVE) with updated number of iterations occurring on the TSP.	Build off previous Hydrodynamic Modeling tools used in the system (ADCIRC, CH2D, ADI and STWAVE) with updated number of iterations occurring on the TSP.	Cost Estimates, Economics, Engineering, Environmental - General, Plan Formulation.			
800.10	23-Jan-12	Analysis to compare the focused array of alternatives will be qualitative in nature. Critical processes modeling will only be utilized to evaluate/compare the future w/o project condition on the ADCP plan.	Strongly identifying the TSP due to uncertainty and associated cost higher contingencies in the array of alternatives.	Study Risk	Carry forward the wrong TSP and not know it. Open up approach to scrutiny during review due to qualitative approach used for comparison.	High	Professional Judgment	Medium	Professional Judgment	Low	High	1. Perform modeling and quantitative analysis on the focused array of alternatives. 2. Perform sensitivity testing to bracket potential magnitude of effects. 3. Use qualitative analysis for comparison of focused array as inputs to the PMF.	Tolerate risk and proceed as scoped in PMF (management recommendation #1) because there's no schedule contingencies to do otherwise.	Cost Estimates, Engineering, Environmental, General, Plan Formulation.	
800.11	8-Dec-14	Sediment Testing	The Alternatives Mission will identify the channel reach to which to concentrate and prioritize sediment sampling and testing. Results of the new work testing may indicate the presence of some level of contaminants. However, performing limited sediment evaluations provide a general understanding of the sediment characteristics when installing the temporary project plan. This information is necessary when determining disposal options and beneficial use alternatives.	Study, Implementation, and Outcome Risk	The COM economic analysis and SES will have to address revised disposal systems and associated costs. The presence of contaminants in the new work material will have a direct bearing on the disposal options being considered.	Medium	Sediment testing of the new work material for the Mobile Harbor basin has been reviewed the presence of petroleum in the new work material. The presence of contaminants in the new work material will have a direct bearing on the disposal options being considered.	Medium	Considering the outcome of the sediment testing for the Mobile Harbor basin testing and resulting restrictions to the hopper dredge load capacity. It is likely that either the new work material would be incorporated for the proposed channel expansion. Not being able to account for this during scheduling and cost estimating could result in significant cost and schedule impacts.	Conduct limited level of sediment testing to provide some indication of sediment suitability.	Sediments, Cost, Schedule will be impacted if the disposal system are modified as a result of the sediment testing results.				
800.12	8-Dec-14	Cultural Resources	There is the potential for discovery of culturally significant sites throughout the project area. Even though Section 106 was conducted during the last authorization, this would not cover any activities outside of the project's authorized dimensions. In addition, among the opportunities being identified is the potential for beneficial use of dredged material. Any beneficial use activities would require Section 106 coordination.	Study and Implementation Risk	Cultural resource coordination required for the selected plan will build on the studies conducted during the last authorization. New and additional information could impact the cost, overall schedule, and delivery coordination. Additional studies and coordination will be required for any activities associated with disposal options other than the COMDS.	Medium	Best professional judgment and scientific literature justify the threshold rating.	Low	Best professional judgment and scientific literature justify the threshold rating.	Low	Low	Conduct cultural resource investigations and associated consultations early as possible in the study process.	Tolerate the risk and proceed.	Cultural Resources	
800.13	8-Dec-14	Geotechnical Investigations	The geotechnical investigations were conducted during the last authorization study. Assuming that the results of the previous investigations are still representative of current sediment characteristics, this information will be used for determining physical sediment suitability for appropriate disposal and beneficial use criteria. The channel/reach identified in the Alternatives Mission will help identify locations for additional sampling to be used in evaluating the selected plan.	Study, Implementation, and Outcome Risk	Having to conduct additional investigations after the study has been completed would have a cost and schedule impact as well as possibly affecting disposal alternatives.	Low	Best professional judgment and scientific literature justify the threshold rating.	Low	Best professional judgment and scientific literature justify the threshold rating.	Low	Low	A thorough review of the existing information conducted for the 100% feasibility study to verify the testing data is representative of the current project sediment conditions.	Conduct thorough review of existing information to verify it is still representative of the current project conditions.	Identifying and evaluating disposal alternatives including beneficial use opportunities.	
800.14	27-Feb-12	Habitat Impact Assessment	Alternatives identified in the Alternatives Mission will provide the necessary information to begin the engineering modeling necessary to conduct the habitat impact assessments associated with the selected plan. However, not all of the alternatives being investigated will be modeled. When conducting "with project" projects assessment, limited habitat impact assessments on alternatives being evaluated will rely on professional interpretations and analogies on the hydrodynamics, sedimentation, and water quality differences across the alternatives being considered. Being able to accurately predict the effects of these parameters introduces a degree of uncertainty when comparing and quantifying changes between alternatives. If accurate information is not available from the engineering modeling study component, effects of changes in salinity, D.O., and other nutrients may not accurately be reflected across the alternatives being considered which may have an impact mitigation requirements associated with each alternative.	Study, Implementation, and Outcome Risk	The intent of the SES is to address habitat impacts resulting from the actions and determine potential mitigation requirements. By not obtaining accurate and updated information across the alternatives being considered could result in lower confidence in assessing impacts and mitigation requirements.	Medium	Best professional judgment and scientific literature justify the threshold rating. Other similar projects such as Charleston Harbor has demonstrated the value of obtaining the right type of information in conducting impact assessments.	High	Best professional judgment and scientific literature justify the threshold rating.	Medium	High	High	Conduct qualitative impact analysis between each alternative to determine effects of hydrodynamic processes, sedimentation, and water quality using modeling results from the COM.	Use of engineering models and tools to accurately predict effects on sediment processes and water quality parameters to evaluate environmental impacts for each alternative being considered.	This may have an impact to assessing effects to water quality, fish and wildlife habitats, and navigation requirements across alternatives.
800.15	8-Dec-14	Determining Disposal Capacity and Alternatives	The Mobile District is in the process of coordinating with EPA regarding the designation of the COMDS. Currently the COMDS has been identified to an area of 4.7 square miles. There are ongoing conditions to increase the size of the COMDS, however, this is not a given as a result in disposal capacity.	Study, Implementation, and Outcome Risk	Although beneficial options will be explored, it is assumed that a significant amount of new work material will be taken to the COMDS. Instead, EPA is providing a smaller site with limitations of expanding it in the near future. However, the limitations of the expanded COMDS is not known at this point. If a larger COMDS is not provided, disposal alternatives may be drastically restricted for the proposed action.	Medium	Best professional judgment and existing capacity and use of the current COMDS.	Medium	Best professional judgment based on current use and coordination with EPA justify the threshold rating.	Medium	Medium	Medium	The expanded COMDS will be required before the project can be constructed. Also conduct modeling to the long term capacity of the COMDS.	Tolerate the risk and proceed.	Could have a significant impact on disposal alternatives which would affect budget and schedule.

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			<p>Alternatives identified in the Alternatives Milestone will provide the necessary information to begin the engineering modeling necessary to conduct the habitat impact assessments associated with the selected plan which in turn will be used to determine mitigation requirements. However, not all of the alternatives being investigated will be modeled. When conducting "web project" impact assessment, limited habitat impact assessments for all alternatives being evaluated will rely on professional interpretations and extrapolations on the hydrodynamics, sedimentation, and water quality differences across the alternatives being considered. Being able to accurately predict the effects on these parameters introduces a degree of uncertainty when comparing and quantifying changes between alternatives. If accurate information is not available from the engineering modeling study component, effects of changes in salinity, DO, and other nutrients may not accurately be realized across the alternatives being considered which may have an impact on mitigation requirements associated with each alternative.</p>	Study, Implementation, and Outcome Risk	<p>Evaluations must be made that may underestimate impacts to various habitats in the Bay across the alternatives being considered. Evaluations comparing between differences across the alternatives may introduce uncertainty in the mitigation requirements.</p>	Medium	<p>Best professional judgment based on engineering modeling for the selected plan. Other similar projects such as Charleston Harbor have demonstrated the value of obtaining this type of information in conducting mitigation requirements.</p>	Medium	<p>Being on limited modeling results. Information will introduce a lower uncertainty in study results.</p>	Medium	<p>Use available models and tools to provide adequate information to conduct accurate habitat impacts assessments to compare impacts across the alternatives to determine mitigation requirements.</p>	<p>Conduct appropriate modeling and implement predictive tools to adequately understand potential impacts to compare differences between alternatives.</p>	<p>Would have the potential to increase project costs.</p>
202-6	8-04-14	1	<p>Geotechnical considerations were not included in the screening criteria to identify the final array of alternatives. A geotechnical investigation will be conducted after identification of the M2 plan during the TSP milestone, if necessary. We have historical boring data for the entire channel to a depth of 52 feet. If the M2 plan does not require dredging to a depth greater than 52 feet, additional boring collection will not be necessary.</p>	Study	<p>Evolution of these high cost alternatives would result in lowered cost and effort from the POT during the TSP milestone.</p>	Low	<p>The cost and effort to evaluate the entire suite of alternatives was already accounted for in the project schedule and budget. Therefore, the study scope will not increase, resulting in a low consequence.</p>	Medium	<p>Considerable data gaps exist in portions of the channel below elevation -22.5 feet. Alternatives selected may include deepening the channel below elevation -22.5 feet in those areas where there is a higher level of uncertainty in the material type, associated dredging cost, and suitability for disposal.</p>	Medium	<p>1. Perform geotechnical investigation prior to completion of the alternatives selection. In doing so, the POT could use the information as an additional screening criterion.</p>	<p>Tolerate the risk and perform the geotechnical investigation after identification of the M2 plan during the TSP milestone, in accordance with the RMP.</p>	
202-1	21-04-14	2	<p>Qualifier costs for construction and maintenance (volume of material at current Disposal Area) were used as a screening criteria for alternatives. Parameter/historical costs will be developed to evaluate alternatives during the TSP milestone.</p>	Study	<p>More labor time and costs during the TSP milestone due to the number of alternatives being evaluated.</p>	Low	<p>The effort to provide parametric cost estimates for the entire suite of alternatives was already accounted for in the project schedule and budget. Therefore, the study scope will not increase, resulting in a low consequence.</p>	Medium	<p>Professional judgement</p>	Low	<p>The Option to perform quantitative analysis in the alternatives milestone would: 1. Decrease the uncertainty and more closely identify the costs and 2. Decrease the amount of time spent in the TSP, but increase the time in the alternatives milestone.</p>	<p>Tolerate Risk.</p>	<p>Cost, Environmental, Design, Economics, H&amp;M</p>
237-1	21-04-14	3	<p>Costs for construction and maintenance (volume of material at current Disposal Area) were used as a screening criteria for alternatives. Parameter/historical costs will be developed to evaluate alternatives during the TSP milestone.</p>	Study	<p>More labor time and costs during the TSP milestone due to the number of alternatives being evaluated.</p>	Low	<p>The effort to provide parametric cost estimates for the entire suite of alternatives was already accounted for in the project schedule and budget. Therefore, the study scope will not increase, resulting in a low consequence.</p>	Medium	<p>Professional judgement</p>	Low	<p>The Option to perform quantitative analysis in the alternatives milestone would: 1. Decrease the uncertainty and more closely identify the costs and 2. Decrease the amount of time spent in the TSP, but increase the time in the alternatives milestone.</p>	<p>Tolerate Risk.</p>	<p>Economics, Planning, Engineering</p>
237-2	21-04-14	4	<p>Prepare Abbreviated Risk Analyses (ARAs) using primary qualitative information to identify potential environmental impacts and mitigation requirements.</p>	TSP Milestone Study Risk	<p>Primarily qualitative engineering and environmental analyses will be used to compare the uncertainty in the difference in effects between alternatives will be reflected through higher cost consequences/parametric cost estimates and could result in the selection of the wrong TSP.</p>	High	<p>Professional judgement</p>	Medium	<p>Professional judgement</p>	High	<p>1. If there are multiple alternatives with similar net benefits, use cost consequences to perform quantitative engineering/environmental modeling and analyze to reduce uncertainty and increase confidence in the selection of the correct TSP. 2. Carry the alternative with the highest net benefits forward in the TSP plan, not taking into account the uncertainty in the costs. If it's determined that the TSP needs further cost details using analyses' results, the free turned cost will be performed concurrently with "Final Screening of Alternatives" per RMP. If it's determined that the alternatives need to be evaluated, the process will be carried through during the same time. This is the approach presented in the RMP.</p>	<p>Tolerate risk and proceed with management option K2 as presented in the RMP.</p>	<p>Planning, Econ,</p>
95-1	27-04-14	5	<p>Depth or width increase may cause impact to utility causing potential for relocation.</p>	Study, Implementation, and Outcome Risk	<p>Cost and Schedule increase if a utility line is deemed to be impacted by project.</p>	Medium	<p>Total research/NOAA reveals a number of utility lines transiting or paralleling a portion of the channel in lower bay.</p>	Medium	<p>Depending on the chosen TSP, significant cost/schedule delays could occur or dictate re-scope</p>	Medium	<p>Detailed research and valid surveys</p>	<p>Tolerate Risk and proceed</p>	<p>Cost Engineering</p>
95-2	27-04-14	6	<p>Alternatives identified will provide the necessary information to begin the engineering modeling necessary to conduct the habitat impact assessments associated with the selected plan which in turn will be used to determine mitigation requirements. However, not all of the alternatives being investigated will be modeled. When conducting "web project" impact assessment, limited habitat impact assessments for all alternatives being evaluated will rely on professional interpretations and extrapolations on the hydrodynamics, sedimentation, and water quality differences across the alternatives being considered. Being able to accurately predict the effects on these parameters introduces a degree of uncertainty when comparing and quantifying changes between alternatives. (See Environmental Comment E014 regarding same).</p>	Study, Implementation, and Outcome Risk	<p>Uncertainty in the mitigation requirements could impact the amount of mitigation funds that may need to be acquired by the MFS or the Corps depending on decisions made.</p>	Medium	<p>Towannah Harbor Deep Draft Navigation Project provided a model for mitigation that due to salinization impacts impact 1/3 of the deepening Charleston Harbor was another example of identifying potential mitigation prompts/accuracy.</p>	Medium	<p>Being on limited modeling results. Information will introduce a lower uncertainty in study results.</p>	Medium	<p>Use available models and tools to provide adequate information to conduct accurate habitat impacts assessments to compare impacts across the alternatives to determine mitigation requirements.</p>	<p>Tolerate risk, but buy down as much as possible w/in project cost ability. To conduct appropriate modeling and implement predictive tools to adequately understand potential impacts to compare differences and COSTS between alternatives.</p>	<p>Cost Engineering, Environmental</p>
95-3	27-04-14	7	<p>Fast benefits have occurred by Daughen Island homeowners association barrier island to the west of channel due to down-drift sand concerns. While no real estate interests could likely be acquired due to a depth/width increase to the channel. These external threats could impact project direction and ultimately could impact real estate plan.</p>	Study, Implementation, and Outcome Risk	<p>Potential cost and schedule increases could occur due to external opposition to the tentatively selected plan.</p>	Low	<p>Fast climate acquisition w/ local communities has been sometimes strained due to delayed impacts to beach benefits of channel.</p>	Medium	<p>Medium</p>	<p>Medium</p>	<p>Clearly coordinating w/ local stakeholders and other agencies</p>	<p>Tolerate Risk and proceed</p>	<p>Cost Engineering, Engineering</p>

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**From:**  
**To:**

(b)(6)

**Cc:**

**Subject:** FW: LTG SEMONITE TRACKING - Your email about cumulative impact analysis of past efforts and studies  
**Date:** Thursday, July 19, 2018 8:48:00 AM  
**Attachments:** [2018-07-18 reply to Col Joly signed.pdf](#)

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FYI

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From: Semonite, Todd T LTG USARMY HQDA OCE (US) <Todd.T.Semonite@usace.army.mil>  
Date: July 18, 2018 at 5:12:13 PM CDT  
To: Joly, Sebastien P COL USARMY CESAM (US) <Sebastien.P.Joly@usace.army.mil>  
Cc: Diana M. Holland BG <Diana.m.holland2.mil@mail.mil> (b)(6)

(b)(6)

Subject: LTG SEMONITE TRACKING - Your email about cumulative impact analysis of past efforts and studies

Sebastian:

Welcome to COMMAND!! Will continue to monitor...do the right thing...but stay engaged. Most important people we need to keep talking to are the ones that DON'T like what we do. Someday....lay all this out for me so I understand the two sides of the story. Thanks.

Vr LTG S

LTG Todd T. Semonite  
54th Chief of Engineers  
Commanding General, USACE  
ARMY STRONG.....BUILDING STRONG!!

-----Original Message-----

From (b)(6)  
Sent: Wednesday, July 18, 2018 5:34 PM

To: Joly, Sebastien P COL USARMY CESAM (US) <Sebastien.P.Joly@usace.army.mil>  
Cc: Semonite, Todd T LTG USARMY HQDA OCE (US) <Todd.T.Semonite@usace.army.mil>; Diana M. Holland  
BG <Diana.m.holland2.mil@mail.mil>; (b)(6)

(b)(6)

Subject: [Non-DoD Source] Your email about cumulative impact analysis of past efforts and studies

Dear Col. Joly,

Attached is copy of my letter to you in reply to your email of July 16, 2018, which is in response to my July 13, 2018 email, which details my belief that the Mobile District have not been truthfully advising Colonel James A. DeLapp about the causes of the erosion that has occurred to the shoreline of Dauphin Island.

I am sending copies of this to email to Lt. Gen. Todd Semite, BG Diana Holland and other interested parties, so that everyone understands the facts surrounding the erosion to Dauphin Island. This letter is also being sent to you via USPS.

With best regards,

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July 18, 2018

Sebastien P. Joly, Colonel  
U.S. Army Corps of Engineers,  
Mobile District  
P.O. Box 2288  
Mobile, AL 36628

Dear Colonel Joly,

I am in receipt your e-mail of July 16, 2018 which is in response to my July 13, 2018 e-mail that details my belief that the Mobile District staff did not truthfully and factually advise Colonel James A. DeLapp about the relationship between maintenance of the Mobile Harbor Outer Bar Channel and the accelerated rate of erosion of Dauphin Island that began after 1957 according to the US Geological Survey's 2007 report and the Mobile District's own 1978 report.

Your July 16 e-mail stated you "...certainly understand the importance of learning from history and fully expect the team to provide [in the General Reevaluation Report (GRR) and accompanying Supplemental Environmental Impact Statement (SEIS)] a cumulative impact analysis of past efforts and studies". While your stated expectation is consistent with the provisions of the Corps' procedural regulations governing the preparation of GRR reports and the Council on Environmental Quality's Guidelines for complying with the National Environmental Policy Act (NEPA), your stated expectation is totally inconsistent with what your Mobile District staff has told the public the GRR and SEIS would and/or would not address since the initial Public Scoping Meeting was held on January 12, 2016.

Chapter 4, ¶4-1.b.(1) of ER 1105-2-100 (dated 2 Apr 2000) that deals with the preparation of GRRs requires a previously completed study to be reanalyzed "**due to changed conditions**" in the Study Area and the previous plan to be modified if appropriate. This Corps planning requirement is consistent with your expectations expressed in your referenced July 16 e-mail. However, it is in direct conflict with what your staff has consistently told the public the GRR would not address. In the intervening 38 years since the original feasibility report recommending the Mobile Harbor channel be deepened and widened was submitted to Congress in 1980, Dauphin Island has experienced significant erosion. Yet, your staff has repeatedly told the public that the GRR will ignore the island's historic erosion issue and will instead **only** analyze the effects of the channel enlargement on conditions as they exist today. Your staff's position is not only at odds with your stated expectations, but also do not comply with the Corps' planning regulations as identified above. Thus far, your staff has failed to provide an explanation as to why the GRR will not include an analysis of the historic erosion problem that certainly represents a major change in the conditions of the Study Area that has occurred since the 1980 report was prepared.

It is important that you understand the connection between Dauphin Island's erosion problem and the maintenance of the Mobile Harbor Outer Bar Channel. Maintenance dredging of the Outer Bar Channel captures essentially all the littoral drift sand moving west from the Fort Morgan peninsula according to internal Corps



memoranda obtained through the Freedom of Information Act process. During the 38 years that have passed since the 1980 report was completed, the western lobe of the Mobile Pass Ebb Tidal Delta Shoal has experienced significant erosion as evidenced by the steady disappearance of the Sand Island-Pelican Island Complex beginning in the early 1970s. The ongoing loss of the ebb tidal delta shoal is contributing to the erosion of Dauphin Island's Gulf shoreline, as well as to the steady loss of overall topographic relief of the island's West End.

In an attempt to counter the erosion, which is attributed to the Corps' Outer Bar Channel maintenance practices in the above-mentioned reports, in 1998 the Corps began using the so-called Sand Island Beneficial Use Area (SIBUA) which the Corps alleged would return the average annual quantity of 500,000 cubic yards of dredged beach quality sands to the natural littoral drift system. That has not occurred as evidenced by the continued erosion of the ebb tidal delta shoal and Dauphin Island. That fact was substantiated by Justin McDonald of your staff during the Corps' February 22, 2018 public meeting when he acknowledged half of the dredged sands placed in the SIBUA are accumulating in the SIBUA and not returning to the littoral drift system to nourish Dauphin Island's eroding Gulf shoreline. Based on Corps dredging records, since 1998, a total of 15 million cubic yards have been placed in the SIBUA. That means since 1998, the Corps' channel maintenance program has robbed Dauphin Island of over 7 million cubic yards of sand that would have been delivered to the island by natural processes if not for the Corps' dredging operations.

Also, of importance, between 1980 and 1998 before use of the SIBUA began, the Corps dumped an additional 15 million cubic yards of beach quality sands in the deep waters of the offshore Mobile Ocean Dredged Material Disposal Site where those valuable and irreplaceable beach quality sands have been permanently lost from the nearshore littoral drift system. In summary, since 1980 the Corps channel maintenance practices have significantly contributed to starving Dauphin Island of over 22 million cubic yards of sand. Yet your staff refuses to consider this significant historic impact in the GRR, a loss that will increase in the future if the channel is enlarged.

It is also important that you be made aware of the important fact that the **1980 EIS did not address** the erosion of Dauphin Island and its relationship to the maintenance of the Outer Bar Channel as report in the Corps' separate 1978 report. Thus, the original EIS would have been judged to have been deficient because of its silence on the erosion issue if it had been the subject of a NEPA based lawsuit. The 1980 report also failed to comply with Section 5 of the 1935 River and Harbor Act which requires:

**“Every report submitted to Congress in pursuance of any provision of law for preliminary examination and survey looking to the improvement of the entrance at the mouth of any river or at any inlet, in addition to other information which the Congress has directed shall be given, shall contain information concerning the configuration of the shore line and the probable effect thereon that may be expected to result from the improvement having particular reference to erosion and/or accretion for a distance of not less than ten miles on either side of the said entrance.”**

This provision of the 1935 law remains in effect today and is major requirement of the Corps' engineering and design requirements for all projects occurring within inlets like the Mobile Pass through which the Mobile Harbor project passes.

The above referenced statement by Justin McDonald at the February 22<sup>nd</sup> public meeting represents the first time the Mobile District has admitted 50% of the sands placed in the so-called SIBUA remain within that site instead of being transported by littoral drift to Dauphin Island as the Corps claimed was occurring over the last two decades. Of equal significance, the Mobile District has no monitoring system to know with certainty where the



sand that does move out of the SIBUA actually goes according to a news article in the magazine ClimateWire: Friday, July 18, 2014. The following significant quote from the article stated:

“Pat Robbins, a spokesman for the Army Corps of Engineers district office in Mobile, said the agency does in fact place dredged sand in a "beneficial use area" south and east of Dauphin Island, where it can migrate through currents to sand-starved beaches. **But the Army Corps has no formal monitoring program to ensure that the sand is reaching its intended targets.** Asked whether Dauphin Island was being aided by the Army Corps' dredge operation, Robbins said, "Parts of it are, parts of it aren't. That's just typical of barrier islands."

I also want to point out that the Mobile District is conducting a separate study of the SIBUA. In 2008, the Mayor of the Town of Dauphin Island requested that the Corps of Engineers, Mobile District, to change the deposit location of sand to the north of the SIBUS, but instead, the Mobile District expanded the SIBUA south and southwest to accommodate depositing of the dredged sands from the Mobile Ship Channel. This study should not be a separate study of the disposal area but instead include that important disposal study in the ongoing GRR.

COL Joly, can you and your staff answer the question with absolute certainty as to how much of the 7 million cubic yards of sand alleged to have moved out of SIBUA has actually been transported by littoral drift to the Dauphin Island Gulf shoreline. If you are unable to answer that question, then you will understand why the public is so concerned with the proposed enlargement of the Outer Bar Channel because they continue to witness Dauphin Island eroding on a consistent basis while the Corps and the Alabama State Port Authority remain completely unconcerned over their contributing role in the erosion problem.

I understand the Draft GRR and SEIS will be released in late July and that the Mobile District plans to conduct an open house in September to give the public additional opportunities to review and understand the findings. I think it is important to advise you that the open house format is not conducive to a productive discussion with the public. The Mobile District **MUST** hold a meeting like the public meeting format held on February 22, 2018, in which the Corps presented information about the Mobile Harbor GRR Tentatively Selected Plan, with the public having an opportunity for open dialog through questions and answers with the Corps representatives. The public benefits are greater when all the attendees hear the same information at the same time. The Corps must answer questions and not arbitrarily end the meeting as occurred on February 22 with members of the audience still having questions. I can assure the public dislikes that open house style meeting format. But, we understand your staff prefers the open house style since it better insulates the Corps from having to answer the tough questions in front of a concerned public that is well educated to the issues.

Nevertheless, I look forward to hearing from you about the above stated concerns and that a public meeting allowing for open questions from all and discussions without any time limits will be held in lieu of the open house format.

In conclusion, I would like comment that several individuals, from different public areas, have met with the Mobile District on multiple occasions and specifically with Col DeLapp on two specific occasions. I would like to request that a small group of individuals meet with you, and only you, to discuss the issues and concerns that we have previously discussed with Col DeLapp and his, only to be met with deaf ears. Knowing that you are busy acquainting yourself with the business of the Mobile District and especially the GRR/EIS, I believe such a meeting would be of sincere benefit to you.



I look forward to hearing from you about the above stated concerns, a public meeting allowing for open questions from all and discussions without any time limits will be held instead of the public open house forum and importantly a meeting with you.

Sincerely,



(b)(6)

Cc: David Sessions, State Representative  
Jeff Collier, Mayor, Town of Dauphin Island  
Joe Mahoney, Chair, Sierra Club Mobile Bay Group  
Carol Adams Davis, Sierra Club  
Casi Callaway, Executive Director Mobile Baykeeper  
Sarah Stokes, Attorney, Southern Environmental Law Center  
Avery Bates, VP Organized Seafood Association of Alabama  
Glen Coffee, Sierra Club  
Dennis Knizley, President Dauphin Island Property Owners Association (DIPOA)  
Stan Graves, Property Owner & Former Board Member DIPOA



**From:**

**To:**

**Cc:**

**Subject:**

**Date:**

**Attachments:**

(b)(6)

Mobile Harbor GRR Cost Share  
Thursday, July 19, 2018 1:03:00 PM  
[CostShare523 19 JUL 2018.pdf](#)

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(b)(6)

See attached.

(b)(6)



**US ARMY CORPS OF ENGINEERS**  
**CEFMS COST SHARE CONTROL RECORD CHANGE REQUEST**

DATE: 19 Jul 2018  
 CEFMS COST SHARE CONTROL NO: 523  
 PROJECT: Mobile Harbor  
 PPA%: FEDERAL 76 NON-FEDERAL 24  
 CURRENT SECTION 902 LIMIT (if applicable): \_\_\_\_\_

**CHANGES TO COST SHARE CONTROL RECORD:**

(Complete applicable areas)

	FROM	TO	
PROJECT EST END DATE	<u>08 Nov 2016</u>	<u>04 Nov 2019</u>	
TOTAL EST SHARED PROJECT COST	<u>\$7,800,000</u>	<u>\$7,800,000</u>	
FEDERAL AMOUNT	<u>\$5,930,000</u>	<u>\$5,930,000</u>	<u>76%</u>
SPONSOR CASH AMOUNT	<u>\$1,870,000</u>	<u>\$1,870,000</u>	<u>24%</u>
SPONSOR IN-KIND ESTIMATE	_____	_____	_____
SPONSOR LERRD ESTIMATE	_____	_____	_____
PROJECT MANAGER	<u>David P. Newell</u>	_____	

**REASON FOR CHANGE:**

No changes

**ATTACHMENTS:**

DOCUMENTATION TO SUPPORT CHANGE:

- Letter or email to sponsor
- Letter or email from sponsor showing concurrence with change
- Amended Agreement
- Revised Project Management Plan (PMP), Jointly signed
- Composite Rate Worksheet, Jointly signed
- Project Cost Estimate, Jointly signed

**APPROVAL SIGNATURES AND DATE:**

PROJECT MANAGER NEWELL,DAVID.P.12 Digitally signed by NEWELL,DAVID.P.12  
 DN: c=US, o=U.S. Government, ou=DoD, ou=PM,  
 ou=USA, cn=NEWELL,DAVID.P.12 (b)(6) Date \_\_\_\_\_

CSCM \_\_\_\_\_ Date \_\_\_\_\_

**From:**

**To:**

**Cc:**

(b)(6)

**Subject:**

Mobile Harbor Draft GRR/SEIS Uploaded

**Date:**

Friday, July 20, 2018 4:02:00 PM

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All,

The Mobile Harbor Draft GRR/SEIS has been uploaded to the EPA e-NEPA website. The document will be published to the Federal Register Notice of Availability next Friday, 27 July 2018.

The IEPR, ATR, and policy reviews will begin shortly after public release.

(b)(6)

**From:** [REDACTED]  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** RE: DQC Comments - Mobile Harbor GRR  
**Date:** Friday, July 20, 2018 8:27:00 AM

---

Please contact those who have not closed their comments and let them know to close (or further evaluate) their comments today, if possible. You can't complete the DQC Report until they get their comments closed out.

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Friday, July 20, 2018 8:18 AM  
**To:** [REDACTED] (b)(6)  
**Cc:** [REDACTED] (b)(6)  
**Subject:** RE: DQC Comments - Mobile Harbor GRR  
**Importance:** High

Thank [REDACTED] (b)(6) All of my backchecks are closed now. We still have about 40 pending backchecks. Probably half are cultural and the others are a mix of cost and engineering. How do you want to proceed? I can reach out to [REDACTED] (b)(6) but he is TDY at [REDACTED] (b)(6) for work next week. I'm not sure how fast he can close out. How do you want to proceed?

[REDACTED] (b)(6)

-----Original Message-----

**From:** [REDACTED] (b)(6)  
**Sent:** Thursday, July 19, 2018 1:59 PM  
**To:** [REDACTED] (b)(6)  
**Cc:**  
**Subject:** DQC Comments - Mobile Harbor GRR

[REDACTED] (b)(6)  
I'm working with [REDACTED] (b)(6) to close out your two pending comments right now. Hopefully we can get the DQC Certification complete tomorrow.

(b)(6)

**From:** (b)(6)  
**To:**  
**Subject:** RE: milestone Mobile Harbor  
**Date:** Friday, July 20, 2018 11:30:00 AM

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Please change it to 27 July.

-----Original Message-----

**From:** (b)(6)  
**Sent:** Friday, July 20, 2018 11:03 AM  
**To:** (b)(6)  
**Subject:** milestone Mobile Harbor

(b)(6) I just saw that the Release of Draft Report on Mobile Harbor has 18-Jul date. Do I need to mark it as an actual, change it?

(b)(6)



**From:**  
**To:**  
**Cc:**  
**Subject:**  
**Date:**

(b)(6)  
RE: Mobile Harbor GRR/Dauphin Island Sediment Transport (UNCLASSIFIED)  
Friday, July 20, 2018 8:35:42 PM

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I'm okay with the document technically and I am okay with sending as it is. The only thought I had after reading was if we should include language or any background about the lawsuit settlement.

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From: (b)(6)  
Date: July 20, 2018 at 5:56:18 PM CDT  
To: (b)(6)  
(b)(6)  
Cc: (b)(6)  
(b)(6)  
Subject: RE: Mobile Harbor GRR/Dauphin Island Sediment Transport (UNCLASSIFIED)

(b)(6)

I incorporated some additional editorial edits and comments. The information provides good detailed content. Concur with (b)(6) giving it read, too. We'll submit to (b)(6) on Monday. (b)(6) has the lead on responding.

Thanks,

(b)(6)

-----Original Message-----

From: (b)(6)  
Sent: Friday, July 20, 2018 4:55 PM  
To: (b)(6)  
Cc: (b)(6)  
(b)(6)  
Subject: RE: Mobile Harbor GRR/Dauphin Island Sediment Transport (UNCLASSIFIED)

(b)(6)

My comments are attached. I think the content of the paper is good. Since (b)(6) is fairly new to this topic, I think it would be good for him to review as well, really to see if the story/point gets across. If he doesn't have time, I suggest (b)(6) look at it and then send it on to (b)(6) for his comments.

Have a good weekend and I'll talk to you when I get back from vacation.

(b)(6)

(b)(6)

-----Original Message-----

From: (b)(6)  
Sent: Friday, July 20, 2018 3:02 PM  
To:  
Cc: (b)(6)

(b)(6)

Subject: RE: Mobile Harbor GRR/Dauphin Island Sediment Transport (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Sorry I just realized that figure 6 of the white paper used the figure from the placemat which was old. I updated with the figures from the latest draft and the final simulation runs.

(b)(6)

-----Original Message-----

From: (b)(6)  
Sent: Friday, July 20, 2018 2:44 PM  
To:  
Cc: (b)(6)

(b)(6)

Subject: RE: Mobile Harbor GRR/Dauphin Island Sediment Transport (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

(b)(6)

Sorry for the slight delay. I decided to add the complete context and not just the sediment transport summary. Please review and make any necessary revisions you see fit prior to forwarding on to upper management.

Sincerely,

(b)(6)

-----Original Message-----

From: (b)(6)  
Sent: Wednesday, July 18, 2018 12:20 PM  
To:  
Cc: (b)(6)

Subject: FW: Mobile Harbor GRR/Dauphin Island Sediment Transport

(b)(6)

Let's discuss this afternoon. I expect that you can just pull the info from sections of the GRR, summarize if needed, and format the info into a brief white paper.

Need to prepare the white paper by Thurs, submit for review (b)(6), and finalize by mid-Fri.

Thanks,

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Wednesday, July 18, 2018 7:54 AM

To: (b)(6)

(b)(6)

Subject: FW: Mobile Harbor GRR/Dauphin Island Sediment Transport

(b)(6) - HQUSACE and SAD has asked for a little more than the placemat.

(b)(6) is asking for a short (2-3 page maybe) white paper on the "science" behind Dauphin Island sediment transport.

In my mind, we already have this in the Engineering appendix for Mobile Harbor . . . just need to cut and paste.

Can you have (b)(6) do this? I'm thinking by end of this week would be good.

(b)(6)

-----Original Message-----

From: (b)(6)

Sent: Monday, July 16, 2018 12:31 PM

To: (b)(6)

(b)(6)

Cc: (b)(6)

(b)(6)

Subject: Mobile Harbor GRR/Dauphin Island Sediment Transport

(b)(6)

Regarding the Chief's question regarding the "science" behind the Dauphin Island/sediment transport question, attached is the placemat we used to discuss the GRR and sediment transport when BG Holland visited two weeks ago. Probably the best way to brief the Chief on this subject would be from the placemat, preferably by VTC. If you agree, request SAD coordinate this with HQ. Thanks.

Vr,

(b)(6)

-----Original Message-----

From: (b)(6)  
Sent: Monday, July 16, 2018 7:31 AM  
To: (b)(6)  
Cc: (b)(6)  
Subject: RE: [Non-DoD Source] Reply to your July 6, 2018 letter

(b)(6)

I talked to (b)(6), as we understood it BG Holland was briefed on the science and SAD was going to brief LTG Semonite. Are we wrong in this assumption?

(b)(6)

-----Original Message-----

From: (b)(6)  
Sent: Monday, July 16, 2018 7:24 AM  
To: (b)(6)  
Cc: (b)(6)  
(b)(6)  
Subject: FW: [Non-DoD Source] Reply to your July 6, 2018 letter

(b)(6)

Here is the follow-on e-mail from (b)(6). She has attached her follow-on letter to BG Holland. Please prepare a draft response.

In my previous e-mail, I reminded you of the requirement to present the "science" to LTG Semonite as he requested.

Thanks.

Best regards.

VR,

(b)(6)

-----Original Message-----

From: Holland, Diana M BG USARMY CESAD (US)  
Sent: Monday, July 16, 2018 7:24 AM  
To: Joly, Sebastien P COL USARMY CESAM (US) <Sebastien.P.Joly@usace.army.mil> (b)(6)  
(b)(6)  
Subject: Fwd: [Non-DoD Source] Reply to your July 6, 2018 letter

All,

This reminded me to check on the status of providing the Chief with a "science" briefing on this project. Will also

need to highlight what aspects she believes Corps employees are untruthful.

Thanks

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From: [REDACTED] (b)(6)  
Date: July 16, 2018 at 12:18:14 AM EDT  
To: [REDACTED]  
Cc: [REDACTED] (b)(6)  
Subject: [Non-DoD Source] Reply to your July 6, 2018 letter

Dear Brigadier General Diana Holland,

Thank you for replying to my email of June 27, 2018.

I have attached my reply to your July 6, 2018 letter and the Corps Sand Dredging History for your information.

I very much look forward to you sending me information about the sand coming to Dauphin Island.

Since you have only been the commander of the South Atlantic Division for only a year, I will send you all of my emails of the facts about the Corps causing the erosion to Dauphin Island. I feel after you read them, you will understand why the first thing I told Col. DeLapp was -- the Mobile District employees were not telling him the truth about Dauphin Island.

Sincerely,

[REDACTED] (b)(6)

CLASSIFICATION: UNCLASSIFIED  
CLASSIFICATION: UNCLASSIFIED