**Environmental Assessment**
**for**
**North Central Gulf of America (Gulf) Integrated Multi-Trophic Aquaculture (IMTA) Demonstration, Research, Training, and Outreach**

**NEPA ID # 44945.835**

April 9, 2025

Prepared by:

National Oceanic and Atmospheric Administration National Marine Fisheries Service

Office of Aquaculture

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACOE | U. S. Army Corps of Engineers |
| ADCP | Acoustic Doppler Current Profiler |
| AHC | Alabama Historical Commission |
| AIS | Automatic Identification System |
| AL | Alabama |
| AMOC | Atlantic Meridional Overturning Circulation |
| AMRD | Alabama Marine Resources Division |
| AOI | Area of Interest |
| BES | Baseline Environmental Survey |
| BIA | Bureau of Indian Affairs |
| BOEM | Bureau of Ocean Energy Management |
| CASS | Coastal Aquaculture Siting and Sustainability Program |
| CEQ | Council on Environmental Quality |
| C.F.R. | Code of Federal Regulations |
| CJS | Consolidated Appropriations Act of 2021, Division B-Commerce, Justice, Science, and Related Appropriations Act |
| cm | centimeter |
| CZMA | Coastal Zone Management Act |
| DISL | Dauphin Island Sea Lab |
| DOC | Department of Commerce |
| DoD | Department of Defense |
| DPS | Distinct Population Segment |
| E | Endangered |
| EA | Environmental Assessment |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| ESA | Endangered Species Act |
| FAD | Fish Aggregation Device |
| FAO | Food and Agriculture Organization of the United Nations |
| FGBNMS | Flower Garden Banks National Marine Sanctuary |
| FKNMS | Florida Keys National Marine Sanctuary |
| FMP | Fishery Management Plan |
| FONSI | Finding of No Significant Impact |
| FR | Federal Register |
| ft | feet |
| g | gram |
| GMFMC | Gulf of Mexico Fishery Management Council |
| GoMMAPPS | Gulf of Mexico Marine Assessment Program for Protected Species |
| h | hour |
| HAPC | Habitat Areas of Particular Concern |
| HCD | Habitat Conservation Division |
| HDPE | High Density Poly-Ethylene |
| HMS | Highly Migratory Species |

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| IMTA | Integrated Multi-Trophic Aquaculture |
| kg | kilogram |
| km | kilometer |
| kts | knots |
| L | liter |
| lbs | pounds |
| m | meters |
| mm | millimeter |
| MBTA | Migratory Bird Treaty Act |
| MOA | Military Operating Area |
| MPA | Marine Protected Area |
| mph | miles per hour |
| MS | Mississippi |
| MSA | Magnuson-Stevens Act |
| NAAQS | National Ambient Air Quality Standards |
| NADP | National Aquaculture Development Plan |
| NAO | NOAA Administrative Order |
| NCCOS | National Centers for Coastal Ocean Science |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| nm | nautical mile |
| NMFS | National Marine Fisheries Service |
| NMSA | National Marine Sanctuaries Act |
| NOAA | National Oceanic and Atmospheric Administration |
| NSTC | National Science and Technology Council |
| OAQ | Office of Aquaculture |
| OCM | Office of Coastal Management |
| OCS | Outer Continental Shelf |
| ONMS | Office of National Marine Sanctuaries |
| PEA | Programmatic Environmental Assessment |
| PI | Principal Investigator |
| ppt | parts per thousand |
| PRD | Protected Resources Division |
| RFP | Request for Proposals |
| s | second |
| SERO | Southeast Regional Office |
| SHPO | State Historic Preservation Office |
| SUA | Special Use Airspace |
| T | Threatened |
| TCMAC | Thad Cochran Marine Aquaculture Center |
| U.S. | United States |
| UNH | University of New Hampshire |
| U.S.C. | United States Code |
| U.S. FWS | United States Fish and Wildlife Service |
| USM | University of Southern Mississippi |
| YSI | Yellow Springs Instruments |

# EXECUTIVE SUMMARY

Pursuant to the National Environmental Policy Act (NEPA) of 1969, the United States (U.S.) Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS or Fisheries) has prepared an EA to describe and analyze the potential environmental effects related to the potential funding of the North Central Gulf of America (Gulf), Integrated Multi-Trophic Aquaculture (IMTA) Demonstration, Research, Training, and Outreach pilot project (hereinafter referred as the "Gulf IMTA"). NOAA Fisheries' proposed action is to provide funding to install, operate, monitor, decommission and remove an IMTA system in the north central Gulf.

The proposed action would fund the establishment of an IMTA system, including: 1) the siting of the IMTA demonstration project; 2) construction and deployment of the AquaFort platform; 3) larval rearing and cage stocking; 4) grow-out operations of selected marine species; 5) harvesting of product; 6) decommissioning of the AquaFort platform; 7) environmental monitoring; and 8) training and outreach. This EA describes and analyzes the potential environmental effects related to the potential funding of the Gulf IMTA as required under NEPA and NOAA Administrative Order 216-6A. Two alternatives were considered: Alternative 1, the proposed action for the funding, and subsequent deployment and operation of the IMTA at Site 3B, including monitoring (i.e., the Preferred Alternative), and the No Action (Alternative 2).

NOAA Fisheries considered a range of potential environmental impacts associated with funding the IMTA project. The proposed action would have no impact on: climate and air quality, closed areas, marine protected areas, national marine sanctuaries and artificial reefs, military activities and cultural and historic resources. The proposed action is not expected to have disproportionately high or adverse environmental or human health effects on particular communities. The proposed action could have adverse, but not significant or cumulative, potential effects to some physical and biological resources. No federally listed species or critical habitat would be adversely affected by the project. The proposed action could have beneficial, direct and indirect, short and long-term, impacts on social and economic resources. Under the No Action alternative, NOAA Fisheries would not fund the Gulf IMTA project, resulting in none of the activities detailed in the proposed action. The No Action alternative would result in no change to resources in the physical and biological environment. The No Action alternative could have an adverse, direct and indirect, short and long-term, negligible to minor effect to social and economic resources by hindering the growth and development of the marine economy in the region.

## 1.0 Introduction

Pursuant to the National Environmental Policy Act (NEPA), the United States (U.S.) Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NOAA Fisheries) has prepared an EA to describe and analyze the potential environmental effects related to the potential funding of the North Central Gulf of America (Gulf), Integrated Multi-Trophic Aquaculture (IMTA) Demonstration, Research, Training, and Outreach pilot project (hereinafter referred as the "Gulf IMTA"). NOAA Fisheries' proposed action is to provide funding to install, operate, monitor, decommission and remove an IMTA system in the north central Gulf. The proposed action would fund the establishment of an IMTA system, including: 1) the siting of the IMTA demonstration project; 2) construction and deployment of the AquaFort platform; 3) larval rearing and cage stocking; 4) grow-out operations of selected marine species; 5) harvesting of product; 6) decommissioning of the AquaFort platform; 7) environmental monitoring; and 8) training and outreach.

Integrated multi-trophic aquaculture (IMTA) is the co-cultivation of fed species (such as finfish) with extractive species, such as suspension or deposit-feeding invertebrates and macroalgae (Chopin 2013). The Gulf IMTA project would culture only native species including finfish, bivalve molluscs, and macroalgae. Species considered for stocking include eastern oyster (*Crassostrea virginica*), graceful red weed (*Gracilaria* spp.), and Red drum (*Sciaenops ocellatus*).

This EA describes and analyzes the potential environmental effects related to the potential funding of the Gulf IMTA as required under NEPA and NOAA Administrative Order 216-6A (NAO 216-6A) (NOAA 2016).

- Chapter 1 presents a summary of NOAA's authority to administer funding for the IMTA project, the purpose and need for NOAA Fisheries' proposed action, and the project under consideration for funding. This chapter explains the background and environmental review process associated with the potential project funding.
- Chapter 2 describes the Gulf IMTA aquaculture system, infrastructure, siting analysis, alternatives considered and alternatives not carried forward for analysis.
- Chapter 3 describes the baseline conditions of the affected environment, including the physical, biological, economic, and social environments.
- Chapter 4 describes the environmental effects, including direct, indirect, and cumulative effects, to the affected environment.
- Chapter 5 provides a description of relevant environmental laws.
- Chapter 6 provides a list of preparers.
- Chapter 7 lists references cited.

## 1.1 Proposed Action

NOAA Fisheries' proposed action is to provide funding to install, operate, monitor, decommission and remove an IMTA system in the north central Gulf.

## 1.2 Purpose and Need for the Proposed Action

The purpose of the proposed action is to establish a demonstration project to collect data to develop and refine IMTA methods and systems appropriate for warm water environments. NOAA Fisheries needs to undertake the proposed action to fulfill a Congressional directive, under the Consolidated Appropriations Act of 2021, Division B-Commerce, Justice, Science, and Related Agencies Appropriations Act, 2021, 134 Stat. 1182, P.L. 116-260 (Dec. 27, 2020) [CJS 2021], and the agency's broader goals of fostering responsible aquaculture. The Joint Explanatory Statement accompanying the Consolidated Appropriations Act, 2021 (Public Law 116-260) included the following language:

> *In addition, the Committee provides no less than $2,000,000 for the NOAA Fisheries Aquaculture Office, in partnership with the Gulf States Marine Fisheries Commission, to partner with a university or consortium of universities to establish a multi-year demonstration pilot of an Integrated Multi-Trophic Aquaculture [IMTA] system in State waters of the Gulf of Mexico, which shall culture native species of finfish, bivalve mollusks, and macroalgae. The pilot is to be for research, training, and educational purposes only and should involve students, fisherman, and farmers, and shall endeavor to inform how to adapt IMTA methods and systems, in an environmentally and ecologically balanced manner, for deployment in warm water environments.*

## 1.3 NEPA Compliance

In accordance with NEPA (42 U.S.C. § 4321 et seq.), as revised by the Fiscal Responsibility Act of 2023, 137 Stat. 10, P.L. 118-5 (June 3, 2023) (FRA), federal agencies are required to identify the reasonably foreseeable environmental effects of proposed actions and a reasonable range of alternatives to the proposed action, avoid or minimize adverse effects of proposed actions, and restore and enhance environmental quality to the extent practicable in their decision-making processes. Additionally, the NEPA process is intended to encourage and facilitate public involvement in decisions which affect the quality of the human environment. NOAA Administrative Order (NAO) 216-6A (NOAA 2016) and its Companion Manual, dated January 13, 2017, established NOAA's policy and procedures for compliance with NEPA (NOAA 2017). The Companion Manual provides guidance on agency compliance with policies pursuant to NEPA and related authorities.

## 1.4 Background

NOAA provides funding for aquaculture research and development through various types of federal grant programs (NOAA 2021). The overall goal of NOAA's aquaculture research and development financial assistance awards is to provide opportunities to public and private entities to obtain scientific knowledge that will inform NOAA's regulatory and resource management decisions and foster innovative and sustainable approaches to aquaculture. Funding may address aquaculture-related topics such as environmental monitoring, recirculating systems, shellfish farming, alternative aquafeeds, new species research, offshore aquaculture, and other topics.

NOAA defines aquaculture as "the propagation and rearing of aquatic organisms for any commercial, recreational, or public purpose" (NOAA 2011). This definition covers the production or farming of finfish, shellfish, macroalgae (seaweed), and other aquatic organisms for: 1) food and other commercial products; 2) wild stock replenishment for commercial, recreational, and subsistence fisheries; 3) rebuilding populations of threatened or endangered species under species recovery and conservation plans; and 4) restoration of coastal, marine, and Great Lakes habitat (NOAA 2011).

### 1.5 Regulatory Framework and NOAA's Role

NOAA has a multi-faceted role in aquaculture development in the U.S., from supporting scientific research, education, and engagement to federal policy-making and regulation. NOAA is charged with ensuring that U.S. aquaculture develops sustainably, in concert with healthy, productive, and resilient coastal ecosystems. The agency's aquaculture mission is implemented in a manner that is consistent with NOAA strategies and policies and advanced by several federal financial assistance award programs that support associated aquaculture priorities (NOAA 2011). Federal mandates and agency strategies inform the purpose and need for the proposed action analyzed in this EA.

In 1980, Congress enacted the National Aquaculture Act, which provided a national aquaculture policy, mandated creation of a National Aquaculture Development Plan (NADP), and required federal coordination of aquaculture activities with the establishment of a Joint Subcommittee on Aquaculture (16 U.S.C. § 2801 et seq.). The Act promotes and supports the development of private aquaculture and provides for financial assistance in the form of grants for aquaculture projects. The first NADP was published in 1983 and later updated in 2024 (NSTC 2024). In 2011, NOAA published the NOAA Marine Aquaculture Policy, which further highlighted several national and regional goals related to offshore aquaculture. In 2022, NOAA published the Aquaculture Strategic Plan for 2023-2028 (NOAA 2022) which includes a mission statement "to provide science, services, and policies that create conditions for opportunity and growth of sustainable aquaculture". NOAA's Aquaculture Strategic Plan aligns with implementing the NADP and its three National Strategic Plans developed by the interagency National Science and Technology Council (NSTC) Subcommittee on Aquaculture: (1) the National Strategic Plan for Aquaculture Research; (2) the Strategic Plan to Enhance Regulatory Efficiency in Aquaculture and (3) the Strategic Plan for Aquaculture Economic Development. The updated National Aquaculture Development Plan provides a holistic framework describing how federal agencies are advancing the contributions of aquaculture to support public health and nutrition, resilient communities, a strong economy, and a healthy planet (NSTC 2024). NOAA (2022) provides an overview of the federal statutes and regulations governing aquaculture in the U.S., including those implemented by NOAA and as well as other federal agencies.

### 1.6 NOAA Fisheries Federal Financial Assistance Award Programs for Aquaculture

In 2021, NOAA Fisheries' Office of Aquaculture (OAQ) was directed by Congress to partner with the Gulf States Marine Fisheries Commission (GSMFC) to fund an IMTA research demonstration project (CJS 2021). The GSMFC requested proposals from U.S. universities or consortia to establish a multi-year project of an IMTA system culturing native species of finfish, bivalve molluscs, and macroalgae in Gulf state waters. The IMTA system aims to mitigate ecosystem impacts seen in traditional monoculture practices (Buck et al. 2018). The Gulf IMTA project would culture only native species including finfish, bivalve molluscs, and macroalgae, including eastern oyster (*Crassostrea virginica*), graceful red weed (*Gracilaria* spp.), and Red drum (*Sciaenops ocellatus*). As stated in the GSMFC's Request for Proposals (RFP), the purpose of the Gulf IMTA project is to inform the aquaculture industry, regulators, and the public on IMTA methods and systems, economic viability, and how aquaculture can be conducted in an environmentally and ecologically balanced manner, specifically in warm water environments. Researchers from the Dauphin Island Sea Lab (DISL) and the University of Southern Mississippi (USM, hereinafter collectively referred to as the "Applicant") proposed a series of activities associated with planning an IMTA project in state waters in the Gulf as discussed below.

Pursuant to NEPA and NAO 216-6A, the Action of funding the proposed activities related to this project must be considered, analyzed and documented, as applicable, for its potential to impact the quality of the human environment. The Applicant is required to secure all permits and authorizations in order to use grant funding to deploy the IMTA system and the AquaFort. Funding for activities associated with construction, deployment, operation, monitoring and decommissioning of the AquaFort are the subject of this EA.

### 1.7 General Description of the Proposed Project to be Potentially Funded

The Gulf IMTA project seeks to install and operate a temporary floating structure platform capable of cultivating finfish, shellfish, and macroalgae southeast of Dauphin Island in Alabama's state waters for a maximum of four years (2025-2029). The aim is to develop a community-based seafood aquaculture system to grow out three native species, including a maximum of 4,000 Red drum (*Sciaenops ocellatus*) per year as the fed species, eastern oyster (*Crassostrea virginica*), and graceful red weed (*Gracilaria* spp.) as extractive species. The National Centers for Coastal Ocean Science (NCCOS) Coastal Aquaculture Siting and Sustainability Program conducted spatial analyses to identify potential areas for siting the Gulf IMTA project. The Applicant then conducted in-water bathymetric and archaeological surveys and in situ measurements and commissioned an engineering study to model the configuration of the structure and mooring system that would be used (Hiroji 2022a, 2022b). The AquaFort platform is based on the design developed by the University of New Hampshire (UNH) (Fredriksson et al., 2004, 2007; Chambers et al., 2024). The Applicant plans to deploy this system in the fall of 2025 at one of two potential sites in state waters of Alabama located at these coordinates which are the center points of the selected sites and may differ slightly at deployment of the IMTA structure: Site 1 (30.201833 (30°12'06.6N), -87.965 (87°57'54.0W); Site 2 (30.203 (30°12'10.8N), -87.976 (87°58'33.6W). These sites, within a ~22 hectare (1 hectare =10,000 $m^2$) survey area, were selected as optimal based on recommendations from a siting analysis conducted by NCCOS and the archaeological site assessment and Baseline Environmental Survey (BES). The IMTA would be deployed for four grow-out seasons over 5 fiscal years total as follows: 1) first deployment between late October and November 2025, and decommissioned between May and June 2026, 2) re-deployed between late October and November 2026, and decommissioned between May and June 2027, 3) re-deployed between late October and November 2027, and decommissioned between May and June 2028, and 4) re-deployed between late October and November 2028, and decommissioned between May and June 2029. For each deployment, there would be a two to four week sea trial of the platform and mooring installation before fish, shellfish, and macroalgae would be added to the AquaFort. This planning allows flexibility in case of poor weather conditions around the time of deployment. The proposed timing for stocking and grow-out would substantially reduce the potential for damage to the IMTA system during hurricane season which extends from June 1 through November 30 (i.e., gear and equipment loss, damage to netting and equipment, fish escapes). The siting analysis in state waters and proximity to shore coupled with the proposed timing also considers siting the farm in calmer waters to optimize leeward effects from the Fort Morgan peninsula to reduce the effect of wind-generated waves which tend to be strong from the north and persistent in winter months. The siting analysis in state waters and proximity to shore coupled with the proposed timing also gave consideration to wind-generated waves which tend to be strong from the north and persistent in winter months.

DISL and the Applicant would conduct environmental monitoring to assess the effects of the Gulf IMTA AquaFort and aquaculture activities on physical and biological resources. Monitoring would be conducted in three phases: pre-deployment, during deployment, and post-deployment. Prior to and during deployments, environmental sampling would be conducted to assess any environmental changes. Pre-deployment monitoring and sampling will begin in fall 2024 and continue through spring 2025. During IMTA AquaFort deployment, sampling will occur: 1) November 2025 through May 2026, 2) October 2026 through May 2027, 3) October 2027 through May 2028, and 4) October 2028 through May 2029. Post-deployment monitoring and sampling would occur in October 2029 through May 2030. (See Appendix 2, Operations Procedures and Structural Components of the Alabama State Waters IMTA Project v.2).

### 1.8 Proposed Project Area

The two sites selected are within a ~22 hectare area located 1.9 mi (3.1 km) south of the Fort Morgan Peninsula and 8.1 mi (13 km) southeast from Dauphin Island, in Alabama state waters. Two sites with the highest suitability within Cluster 3B are shown as dark blue hexagons that comprise ~22 hectare as shown in (Figure 1). Environmentally relevant structures (e.g., navigation aids, oil and gas boreholes and platforms, wrecks and obstructions, oil and gas pipelines), habitats, and infrastructure are also shown in relation to the proposed IMTA sites. The boundary vertices of ~22 hectare area are as follows: NW corner 30.2036°N, 87.96975°W; SW corner 30.199367°N, 87.96945°W; NE corner 30.2036°N, 87.96485°W; SE corner 30.199367°N, 87.964533°W). The exact coordinates of the two potential deployment sites are provided in Section 1.7.

The actual footprint of the AquaFort floating platform, including nets and mooring, would be no larger than one hectare targeted from within the ~22 hectares of the preferred site. The exact anchor coordinates will not be known until installation is complete.

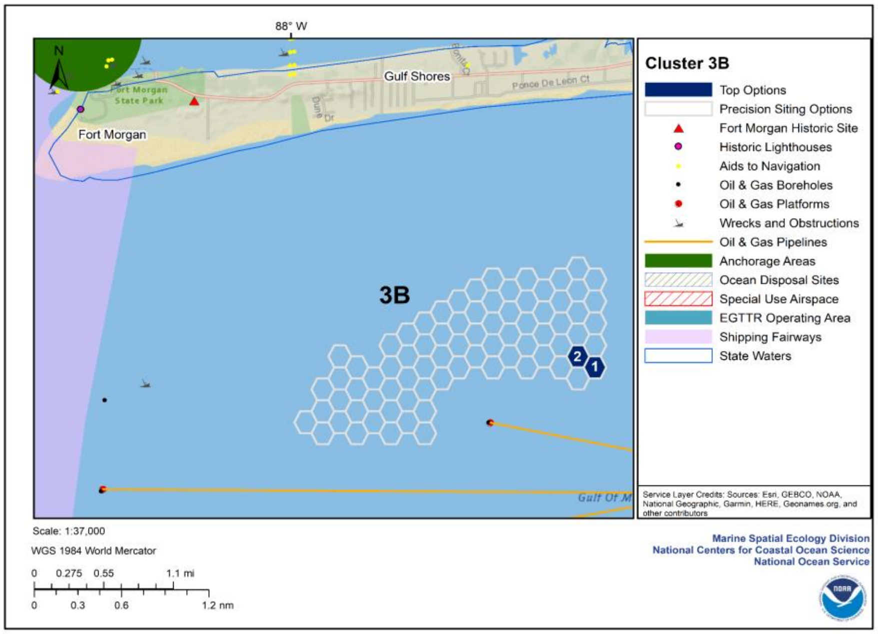


Figure 1. NCCOS IMTA Siting Analysis

The Applicant's benthic survey in August 2022 of the ~22 hectare (0.22 km$^2$) area found an average water depth of ~ 36 ft (11 m) and a substrate of relatively uniform, sandy sediments composed of similar grain sizes (Hiroji 2022a, 2022b). The survey did not detect any seafloor features or complex habitats. There was a homogenous subsurface layer in the first 16.4 ft (5 m) of sediment depth and no clear signal of significant buried rocks or accumulation of unconsolidated sediments. Water temperature measurements during this survey and others from fall 2022 to spring 2023 seasons ranged from 59-88° F (15-31°C) and salinities ranged from 27-30 ppt, and meets the parameters and the timing of the Gulf IMTA project deployment.

To examine the direction of the predominant currents and wave activity at the sites, oceanographic data was collected through the deployment of an Acoustic Doppler Current Profiler (ADCP) and from the nearby NOAA NDBC buoy 42012. The ADCP was deployed from July through August 2023 to provide real condition estimates of current speeds at the proposed siting area for the IMTA system and AquaFort for stress-modeling. Predominant recorded currents in the area occurred from the east and northeast but peak currents approached from the southwest, west, and northwest, reaching maximum values of 1.8 knots (0.92 m/s), with the 10-year extreme value exceeding 1.9 knots (1 m/s). Maximum wave height in this area, from November to June, was 17.7 ft (5.4 m), and came predominantly from the S and SE, noting that wave height data was collected from a buoy moored at a site over twice as deep as the proposed IMTA site area. All environmental data were used by ocean structural engineers that were subcontracted to assess the AquaFort platform, net, and mooring design using worst-case scenario conditions to provide design recommendations (Fredriksson and Chambers 2023 Personal communication).

The AquaFort platform design is scaled to produce approximately 4,000 kg Red drum, 4,000-6,000 oysters (50 oysters per SEAPA basket (Figure 5) up to 80 baskets) and 12 kg *Gracilaria* spp. during each annual production cycle. An engineering evaluation on the moored AquaFort platform for deployment in an exposed site near Dauphin Island, Alabama in the Gulf was completed to establish design wave, current, and wind conditions at the site; evaluate the proposed mooring system in extreme conditions; and calculate the mooring loads on the structure to inform structural engineering work.

### 1.9 Scope of the Environmental Assessment

This EA presents baseline descriptions of the physical, biological, social, and economic environments and analyses of the potential consequences of alternatives related to funding research and development of the Gulf IMTA project in state waters off the coast of Alabama. The temporal scope of this EA is based on funding for four seasons of the Gulf IMTA project through 2029 including the associated operations and monitoring during the demonstration project. This EA is intended to provide focused information on the primary issues and impacts of environmental concern, which is NOAA Fisheries' funding for demonstration of the Gulf IMTA system and AquaFort platform. Thus, the analyses specific to funding the Gulf IMTA project and the physical, biological, and socioeconomic and cultural environments within the north central Gulf project area are presented.

The analysis incorporates by reference NOAA's 2023 Final Programmatic Environmental Assessment (PEA) for Funding Aquaculture Research and Development Projects (88 FR 29891, May 9, 2023). NOAA completed a PEA to issue federal financial assistance awards through existing programs within the Office of Oceanic and Atmospheric Research (Sea Grant, Small Business Innovation Research) and NOAA Fisheries OAQ for aquaculture research and development projects involving farmed and wild populations of aquatic organisms (defined for the PEA as crustaceans, molluscan shellfish, echinoderms, algae and aquatic plants, and finfish). The potential "Action area" evaluated in the PEA includes permitted aquaculture facilities and sites, research laboratories (compliant with the Occupational Safety and Health Administration), the Great Lakes and associated freshwater areas, and ocean and coastal environments within the Exclusive Economic Zone (EEZ) of the United States and its territories. The analysis in the Final PEA and Finding of No Significant Impact (FONSI) concluded that none of the project types of the proposed action alternative have the potential for significant impacts. The Final PEA assessed the direct, indirect, and cumulative environmental impacts of issuing federal financial assistance awards for aquaculture research and development projects.

The scope of this analysis is limited to the decision for which NOAA Fisheries is responsible, which is whether to fund the Gulf IMTA project. This EA is intended to provide focused information on the primary potential issues and impacts of environmental concern that may result from the funding of the Gulf IMTA project. In addition, the action area is limited to the nearshore waters of the Gulf proximate to Fort Morgan, AL which are presented in Figure 1 and defined in Section 3.1 Physical Environment. No onshore component that occurs outside an existing laboratory facility is proposed; therefore, onshore resources are not evaluated. The NCCOS Coastal Aquaculture Siting and Sustainability Program conducted spatial analyses and an exhaustive site screening process to identify an appropriate project site. Some of the criteria considered during the site screening process included avoidance of corals, coral reefs, submerged aquatic vegetation, and hard bottom habitats; and avoidance of marine protected areas, marine reserves, and habitat areas of particular concern (HAPC) (Section 3.1.4).

The NCCOS siting analysis also gave consideration to avoidance of nearshore and offshore cultural resources (i.e., historic shipwrecks, sunken aircraft, and pre-contact archaeological sites). An archeological survey conducted by the Applicant and NOAA Fisheries consultation with the Alabama Historic Commission, State Historic Preservation Officer (SHPO), did not recommend areas for avoidance or investigation based on the prehistoric archaeological potential and no effect on historic or cultural resources.

It is unlikely that public health would be impacted by the project. Red drum and *Gracilaria* spp. are common throughout the Gulf and oyster broodstock would be collected from Pascagoula Bay, MS and Graveline Bayou, MS and held in off-bottom cages at the Thad Cochran Marine Aquaculture Center (TCMAC) Deer Island farm. Oysters are not being sold for consumption. Biosecurity measures implemented by TMCAC during species cultivation and grow-out and disease control procedures reduce any potential risk when these species are introduced into the IMTA system in Gulf waters (Section 2.3.4) and harvested (Section 2.3.5). Section 4.2.1.3 discusses disease control procedures.

To ensure navigation safety for recreational boaters and commercial vessels, an aid to navigation required by the U.S. Coast Guard District 8 would be established for the project's duration. Mariners would be notified of the project location in the weekly Local Notice to Mariners.

This EA does not provide a detailed evaluation of the effects to physical resources including geology, land use, National Wildlife Refuges, park lands, wetlands because these resources do not occur in the project area; biological resources including coral reef systems or other protected systems because these resources do not occur in the project area; and socioeconomic resources including indigenous cultural resources because none occur in the project area.

## 2.0 Proposed Action and Alternatives

The proposed action is to provide funding to install, operate and monitor, decommission and remove a demonstration IMTA system in the north central Gulf. The alternatives evaluated in this EA must meet the proposed action purpose and need and be technically and economically feasible, without violating federal environmental statutes and regulations described in Appendix A. Any alternative that fails to meet the agency's purpose and need or violates federal environmental statutes and regulations, need not be carried forward for further consideration. Thus, comparing the alternatives to the stated purpose and need serves as a preliminary step before evaluating them against more detailed screening criteria to help determine feasibility in terms of technical, economic, scientific or other applicable screening criteria (see Section 2.1).

Comparing alternatives helps to ensure that ultimate decisions concerning the proposed project are well founded and consistent with national policy goals and objectives. Alternatives analyzed in detail, including a No Action alternative as required under NEPA (42 U.S.C. 4332(2)(C)(iii)), were developed based on the purpose and need for the proposed action and additional screening criteria described in Section 2.1. Two alternatives are carried forward for detailed analysis: Alternative 1, the proposed action for the deployment and operation of the IMTA at Site 3B, including monitoring (i.e., the Preferred Alternative), and the No Action (Alternative 2).

### 2.1 Screening for Selection of Alternatives

Other than the No Action Alternative, screening focused on identifying alternative geographic sites for the IMTA project within the Gulf through spatial modeling and environmental surveying. No technology alternatives were considered because no comparable technology alternative exists at this time that would meet the goals of testing an IMTA system and meet the purpose of the proposed action. Spatial modeling, siting analysis, and precision siting were conducted by NCCOS, followed by a BES to refine potential deployment sites (Randall et al. 2025). Suitability scores were evaluated for factors related to site suitability per the applicant’s criteria, vessel traffic, natural and cultural resources, national security, industry and navigation, and fishing and aquaculture. Based on a final suitability score and site suitability factors provided by the applicant, a number of geographic areas were removed from consideration because they did not meet the established criteria (Randall et al. 2025). Suitable 10 acre sites were initially identified, which were then studied through the BES. The BES and applicant analysis resulted in the identification of only two 10 acre grid cells in Cluster 3B as potentially suitable for deployment of the Aquafort (Figure 1). No other sites were potentially suitable. These two sites are adjacent to one another and identical in terms of environmental characteristics. The Aquafort would be deployed at one of the two suitable sites. These two sites are equivalent in environmental characteristics so were not carried forward for analysis as separate alternatives (see Section 2.2).

### 2.2 Geographic Alternatives Considered but Eliminated

Grid cells within other geographic areas within the area of interest (AOI) were eliminated from consideration if spatial modeling and precision siting indicated resource conflicts or inadequate site suitability. This is detailed in the site suitability report (Randall et al. 2025). After further study, two grid cells within Cluster 3B were considered possibly suitable for deployment of the Aquafort (Figure 1). These 10 acre grid cells have homogenous environmental characteristics and resources relative to one another and are in relatively close proximity to one another. Because the areas are equivalent and the analysis in this EA would apply to both areas, the areas are not analyzed as two potential alternatives. The two areas are similar and close to one another; therefore, the effects of the action in either area would be expected to be the same. Therefore, this EA does not separately analyze the impacts at the two different locations as two different alternatives.

#### 2.2.1 Alternative 1: Cluster 3B - Preferred Alternative

Based on all of the information available, the Applicant chose a preferred location, and proposes to deploy an IMTA system sited in the Gulf in Alabama state waters, approximately at geographic position 30.194394 N, -87.974008 W; 30° 11' 39.8209N, 87° 58' 26.4335W (Figure 1). This location meets the parameters for the deployment of an IMTA system using the survey results of a NOAA-led site suitability analysis, including, a bathymetric survey, hydrographic studies, ADCP data analysis, and an archeological assessment.

### 2.2.2 Alternative 2: No Action

Under the No Action Alternative, NOAA Fisheries would not fund the Gulf IMTA project and the installation of the AquaFort platform in state waters of the northern Gulf. NOAA Fisheries assumes that without funding, the proposed IMTA project would not be constructed or operated. In this case, the No Action Alternative would mean that baseline conditions at the location of the preferred site of the AquaFort would likely remain unchanged from existing conditions described in Chapter 3, Affected Environment, because NOAA Fisheries would not provide funding for the project.

## 2.3 IMTA Aquaculture System

The IMTA system is designed and scaled to produce 4,000 kg Red drum, 4,000-6,000 oysters (50 oysters per SEAPA basket (Figure 5) up to 80 baskets) and 12 kg *Gracilaria* spp. during each of grow-out season (Fredriksson and Chambers 2023). Stocking of Red drum, oysters, and macroalgae would occur approximately two to four weeks after the AquaFort has been moored offshore (post "sea-trial" period) and after all necessary adjustments have been completed. The AquaFort would be stocked with ~4000 juvenile Red drum (50 g), oyster seed (2.5 cm), and *Gracilaria* spp. for a six to seven month grow-out season over four years with each grow out beginning in late October of 2025, 2026, 2027, and 2028; final decommissioning would occur between May and June 2029.

It is unlikely that project activities would introduce or spread invasive species, causing negative ecological consequences when cultured animals and plants are placed in the offshore IMTA system. As described below, all species, Red drum, oysters, and macroalgae would be collected from the Gulf in waters that are deemed to be pollution-free and transported to the Thad Cochran Marine Aquaculture Center (TCMAC) in Ocean Springs, Mississippi for propagation and rearing. Fish, oysters and macroalgae would be quarantined for a specified period of weeks under strict laboratory protocols. The TCMAC is a research leader in marine animal health, genetics, larviculture, reproductive physiology, and biosecure recirculating aquaculture systems. An aquatic health specialist would examine all species, before their transporting to the offshore IMTA system.

### 2.3.1 Red drum (*Sciaenops ocellatus*)

Red drum is a Gulf native finfish, and well-established spawning and culture protocols. Optimal water temperature for the Red drum is between 20-32° C and optimal salinity is between 27-35 ppt. All broodstock would be collected within ~130 km radius of the IMTA site during the summer of 2025, and transported to the TCMAC. The fish would be quarantined for ~4 weeks to allow for the treatment and mitigation of any ecto-parasites, and then transferred into several recirculating systems for spawning. First generation offspring (F1 juveniles) fingerlings would be used for stocking the AquaFort pens at a density of ~2,000 fish per net pen. The native, wild-caught broodstock and the first-generation fingerlings from that broodstock, would not undergo any genetic modification or selective breeding.

Fingerlings would be ~50 g when they are ready for stocking at the IMTA site in late October/November 2025. Juvenile Red drum would be transported in insulated containers via truck to the port at Dauphin Island. The fish would then be loaded onto a transport vessel and kept in oxygenated water throughout the process, thereby reducing stress and improving acclimation to their new environment. The transport vessel would be equipped with portable water pumps and oxygen delivery manifolds to maintain water quality and assist with acclimating the fish to onsite conditions. Once the fish have fully acclimated, they would be transferred from the transport vessel to the nursery net pen using a food-grade, reinforced PVC hose that uses gravity to move the fish from the insulated containers into the nursery net pen with minimal stress. Oysters and macroalgae would be transported to the site in a similar fashion; however, the transfer from the insulated containers to SEAPA baskets (or similar oyster cultivation baskets) would be done by hand.

During the first two months of the grow-out season, nursery nets would be used in the net pens to contain the smaller fingerlings until they are large enough to not escape the larger predator defense net mesh (see Section 2.4). The nursery net removal process would occur slowly to minimize stress on the fish by lowering one side of the nursery net down into the pen and pulling the opposite side of the nursery net onto the AquaFort deck, simultaneously enticing the fish out of the nursery net by scattering feed on the dropped side. The nursery nets would be removed, cleaned, repaired if necessary, and stored onshore until the following growing season. Inventory would be counted in three stages for each grow-out season: first at the hatchery before transport to the IMTA site, second at the farm when fish arrive and are transferred to the net pen, and finally during the harvest at the end of the grow-out season. Mortalities will be removed and deducted from inventory and biomass for record keeping.

### 2.3.2 Eastern Oyster (*Crassostrea virginica*)

Eastern oyster (*Crassostrea virginica*) would be used in the IMTA system to extract the fine organic particulate waste (feces or excess feed) from finfish culture. These bivalves are efficient at filtering particles suspended in the water column and are amenable to culture in high densities (Prins et al., 1998). The TCMAC plans to produce ~100,000 F1 Eastern Oysters (*Crassostrea virginica*) to stock the AquaFort in November 2025, 2026, 2027 and 2028. Broodstock would be collected from Pascagoula Bay and Graveline Bayou, Mississippi in December/January and held in off-bottom cages at the TCMAC Deer Island farm. Oysters would be stocked in a recirculating conditioning system to accelerate gamete production before spawning in late spring/early summer. In the laboratory environment, stressors (e.g., elevated water temperature) would be applied to the cultured oysters at the point of fertilization to induce a physiological response which causes them to become almost 100% infertile, referred to as triploid oyster. Triploid oysters are sterile and will typically grow faster than their diploid counterparts because they do not expend any energy in reproducing.

Post-fertilization larvae would be grown in static holding tanks with artificial seawater and fed a live macroalgae diet at TCMAC's land-based oyster hatchery. Once the larvae develop to the pediveliger stage, they would be harvested and transported to a raw seawater nursery, where they would be set over microclutch in downwelling silos in a recirculating natural saltwater system. After retention on a 1-mm screen, the single-set spat would be moved to upwelling, flow-through silos, where they would remain until they retain on a 6-mm screen and are deployed to off-bottom cages at the Deer Island farm. This seed would be tumbled, counted, and culled several times before deployment to the AquaFort. Once a shell height of ~2.54 cm is attained, the oysters would be transported via truck to the port at Dauphin Island in insulated containers. The oysters would then be loaded onto a transport vessel and kept in water throughout the process. Transfer from the insulated containers to SEAPA baskets on the AquaFort would be done by hand. Oysters would be stocked at a density of ~300 animals per 25-L SEAPA oyster basket, which would be suspended from the platform frame on lines wrapped around the AquaFort frame. As oysters grow larger, basket densities would be reduced throughout the grow-out season.

### 2.3.3 Macroalgae (Gracilaria spp.)

The TCMAC plans on producing around 2,400 g (wet weight) of graceful red seaweed (*Gracilaria* spp.) utilizing an outdoor recirculating aquaculture system with artificial seawater. Initial seed would be collected offshore from the Gulf. For the treatment and mitigation of epiphytic growth of diatoms, algae would be quarantined for a minimum of two weeks. The algae would be held indoors in 200 L static tanks filled with artificial seawater, illumination would be provided by LED lights, pH would be controlled by $CO_2$ injection, and exogenous nutrient additions and medium exchanges would be performed as needed. Post-quarantine, the biomass would be placed into 25 L SEAPA baskets and moved to the outdoor recirculating aquaculture system production tanks. The system would be maintained at a salinity of 35 ppt, temperature of 23-25°C, pH of 8.00-8.20, and exogenous nutrient additions would be performed as indicated by N and P determination. The algae would be initially stocked into 25 L SEAPA baskets at 4 g/L, and screened and weighed biweekly for a targeted biomass of 2,400 g, with an expected density of 8 g/L per basket for deployment on the IMTA AquaFort. Macroalgae would be transported via truck to the port at Dauphin Island in insulated containers and loaded onto a transport vessel and kept in water until they are transferred from the insulated containers onto the AquaFort frame manually.

### 2.3.4 Grow-out Operations

Red drum feeding and feed distribution methods would vary depending on the phase of the grow-out period, because of changes in fish size and water temperature as detailed in the operations plan for the project that has been submitted to the relevant agencies. At the start of the grow-out period, when fish are smaller, they would be fed frequently throughout the day. As they grow larger, they would be fed twice per day. The fish would be fed daily through a combination of hand feeding and a solar-powered automated feeder during periods of inclement weather. IMTA project personnel would visit the project site three to four days per week to hand feed fish and to refill the automated feeders. Stocked Red drum would be collected bimonthly to establish growth rates during deployment, and these data would be used to iteratively update farmers on feed quantities to be delivered throughout the growth period to prioritize both high growth and minimal feed waste.

### 2.3.5 Harvesting of Product

Red drum harvest would be conducted by IMTA project personnel and project participants at the end of each grow-out season (May), once fish achieve the targeted harvest size of ~1 kg. Harvesting would take place on a designated harvesting vessel. Fish would be collected from the net pens using a combination of seines and dip nets, only collecting a portion at a time to reduce handling. After the fish have been processed for market, they would be tagged with a distinctly numbered external ID tag to distinguish farmed product from wild-caught product.

Oysters and macroalgae would be harvested at the end of the grow-out season (late April or May) and would not be sold for consumption. The oysters would be used for restoration purposes, education, and donated shell material. For example, the Applicant would collaborate with oyster reef restoration and living shoreline restoration entities to adapt a plan for suitable use of oyster products in local Mobile Bay area restoration activities. Otherwise, oysters would be donated for demonstration purposes to the Auburn Shellfish Laboratory at Dauphin Island, or culled and used as donated shell material. Some of the macroalgae would be donated for use in culinary dishes and the remaining used for other research purposes. Currently, there is no commercially farmed or harvested seaweed in the north central Gulf or Mobile Bay area.

### 2.4 Aquafort Infrastructure, Gear, and Maintenance

The Applicant proposes to deploy the UNH AquaFort at the preferred alternative location (Cluster 3B). Based on the engineering evaluation, the AquaFort and associated mooring system will consist of two fish containment sections each with a submerged volume of about 4,803 $ft^3$ (136 $m^3$). The entire outer structure is 56 ft x 28 ft (17 m x 8.5 m) and each inner containment is 20 ft x 20 ft (6.1 m x 6.1 m). The IMTA system, AquaFort floating platform including nets and mooring, is no larger than 1 hectare (10,000 $m^2$) targeted within the 22 hectares site. The "jump-net" is mounted on the structure from the top of the handrail down to a depth of 3.28 ft (1 m) and consists of high density polyethylene (HDPE) mesh. Copper alloy mesh (CAM) is mounted on the structure from a depth of 3.28-12 ft (1 to 3.66 m). The CAM product is used: 1) to prevent biofouling, and 2) the mesh strength will protect the Red drum from predators (e.g., sharks, dolphins). Netting would be repaired and replaced only as needed. Figures 2, 3, and 4 provide details on the dimensions and structural components of the AquaFort and mooring system.

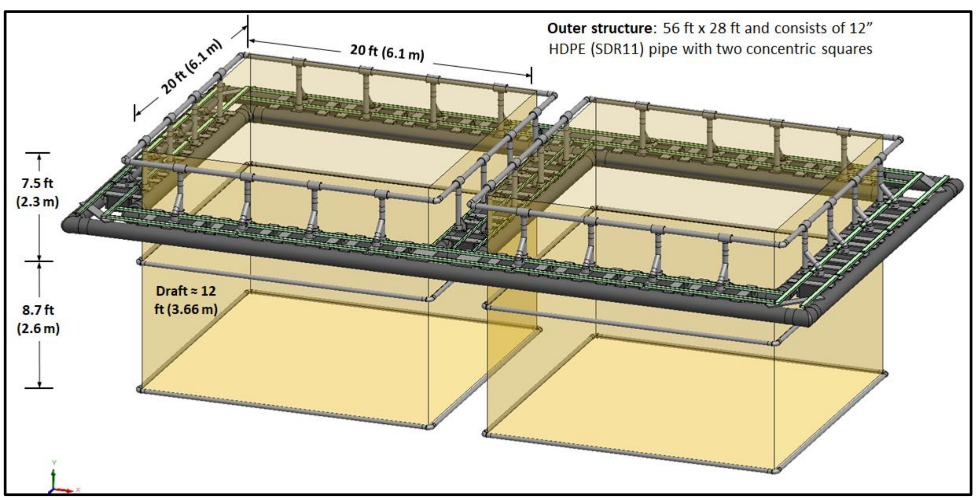


Figure 2. Diagram of the AquaFort Floating Platform

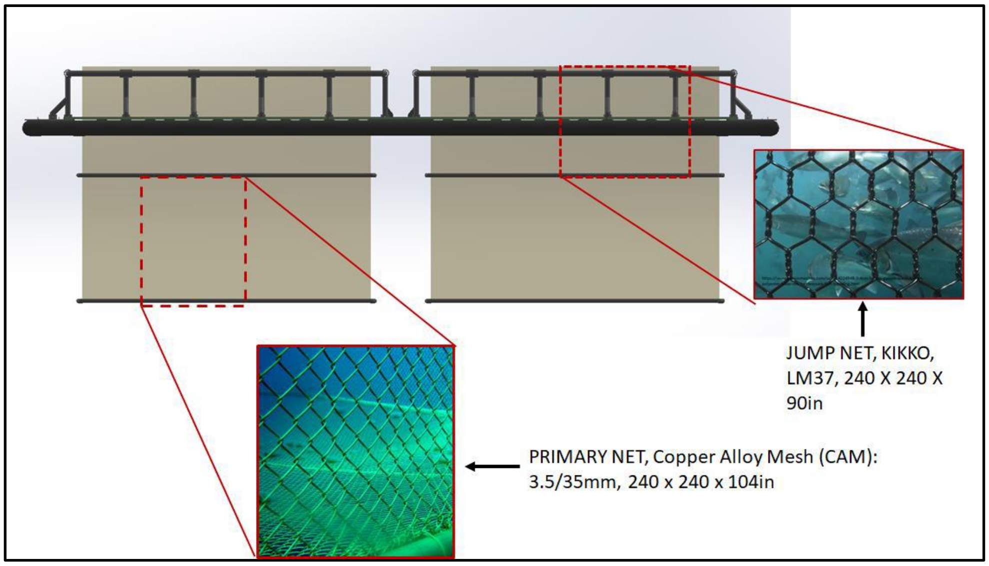

Figure 3. Dauphin Island IMTA Structure Design Assembly

The AquaFort is secured to the ocean floor with a four-point mooring with each leg having a set of bridles as shown in Figure 4.

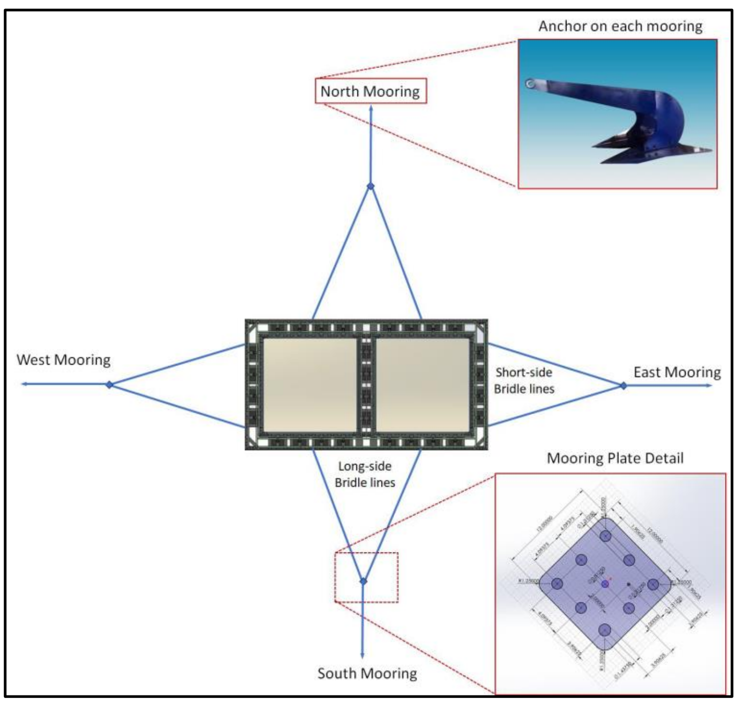

Figure 4. Details of the AquaFort Mooring System

Mooring characteristics are as follows: stingray-type anchor on each mooring leg; 60 ft (18.3 m) of 3⁄4 inch, open link mooring chain on each mooring leg; 200 ft (61 m) of 1-1/2 inch, three strand polysteel mooring rope on each mooring leg; one inch steel (AR500 alloy) connector plate with shackle attachments; bridles composed of 34 ft (10.4 m) of 1-1/4” three strand polysteel. The platform would have line tethers and stringers would support approximately 50 – 25 L SEAPA oyster baskets (Figure 5) to hold oysters and macroalgae. The SEAPA baskets would be attached to the perimeter of the AquaFort floating structure and located outside the nets to avoid injuring the Red drum. The baskets would be hanging from the outer edge of the walkway so that they can be easily accessed by pulling the lines up from the walkway. Macroalgae would be retained and grown inside the SEAPA baskets with the oysters.

Figure 5. SEAPA basket

The operation and maintenance of the IMTA project is provided in detail in Appendix B.

Maintenance of the IMTA site would be the responsibility of the IMTA project personnel and the project participants, who would be recruited to train and work at the site. Weekly responsibilities include: cleaning and maintaining oyster baskets (e.g., with brushes, hoses), checking for fish mortality and removing any dead fish, recording hand-feeding observations and data collection, and checking and conducting maintenance on the satellite camera, satellite location beacon, and environmental monitoring equipment. Biweekly responsibilities include: loading feed into the automatic food distribution hoppers and taking growth measurements of the aquaculture species, including total length and weight of Red drum, oyster length, and macroalgae biomass and color (as an indication of nutrient availability). Monthly responsibilities include: net pen inspections and repair, net pen cleaning, mooring inspections, and line replacement when necessary. Divers and/or ROVs would be used to check nets for holes or evidence of fraying, and to check mooring lines and anchors. The ROV is ~ 57 lb (26 kg), with dimensions of 17.3 in x 9.25 in x 28.0 in (440 mm (W) x 235 mm (H) x 717 mm (L)); composed of aluminum, carbon fiber, stainless steel, and buoyancy foam. Net pen cleaning would be done by divers using industry-standard pressure washers to remove accumulated organic matter from nets and other surfaces, with cleaning done inside the net pens and spraying towards the outside of the net pen.

### 2.5 IMTA System Environmental Monitoring

The following monitoring would be conducted during the IMTA project: 1) on site at the IMTA system and AquaFort, and 2) in situ environmental sampling at control sites. Onsite environmental monitoring of water quality parameters includes examination of temperature, conductivity, turbidity, total suspended solids, photosynthetically active radiation, dissolved organic matter; water column nitrate; and water currents in the immediate vicinity of the IMTA system. An underwater ROV would be used to monitor cultured fish behavior in the enclosures, wildlife behavior in immediate proximity to the net pens, and to conduct maintenance checks on net pen, platform, and mooring system integrity. A satellite beacon would be attached to the platform to monitor and track the location of the AquaFort platform in the event the platform became unmoored because of unforeseen conditions. Additional monitoring is detailed in a Protected Species Management Plan (PSMP) (Appendix A).

Devices that would record and monitor site security, human behavior on and near the platform, fish feeding behavior, fish behavior inside the enclosures, and large vertebrate behavior on and near the platform (e.g., transient birds, marine mammals) would be positioned on or in close proximity (within 100 m) to the AquaFort platform. These recording systems include: 360° IP cameras with night vision and 2-way audio that would be connected to a satellite/cellular modem to allow for remote monitoring. The final monitoring systems will conform to DoD requirements for the area pursuant to an agreement between DoD and DISL.

### 2.5.1 Storm Planning

Selecting the months of October through May for IMTA deployment minimizes hurricane impacts on the project's success. High seas are still possible during these months, so the entire system, including the AquaFort platform and mooring system, has been stress-modeled and designed to withstand extreme weather conditions. Proper monitoring and maintenance of the mooring lines and attachments would also be conducted regularly with divers and by ROV inspection for wear, abrasions, and misalignment, and addressing potential weaknesses before any severe weather. These observations would be recorded along with actions taken to prepare for severe sea weather. To prepare for an event, IMTA personnel would perform preventative measures to ensure the integrity of the IMTA, including visual inspections of the platform, mooring system attachments, net connections to handrails, bird net securely fitted and tied down, and all equipment removed. Oyster baskets would be removed and brought back to DISL to be placed in a flow-through seawater system until after the storm. Following a storm, the IMTA personnel would transport the oyster baskets back to the IMTA site and all pre-storm inspections would be conducted again and any evidence of damage would be noted and repaired if possible. Finally, the AquaFort would have a satellite beacon attached to monitor real-time location to track the platform for re-positioning or collection as soon as conditions permit.

### 2.5.2 Environmental Sampling at Control Sites

The environmental sampling protocol includes data collection of benthic macroinvertebrate and in fauna community structures, sediments and seawater, and fish surveys to quantify community structure of fish and macroinvertebrates (nekton) at the IMTA site and two of the three control sites (Figure 6). Vertical profiling of the water column for temperature, salinity, dissolved oxygen (DO), pH, and fluorometric chlorophyll-a and sediment chemistry would be conducted. All sites have unvegetated, sandy bottom types containing no nursery fish or macroinvertebrate habitats (Hiroji 2022a, 2022b). Additional monitoring is detailed in a Protected Species Management Plan (PSMP) (Appendix A).

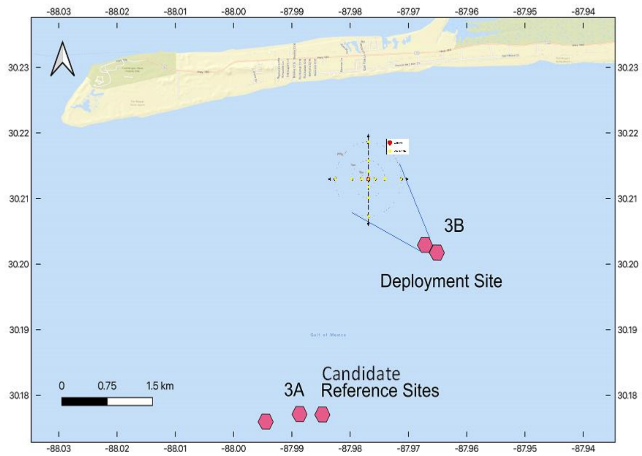


Figure 6. IMTA Environmental Monitoring Sites with Candidate Control Sites

Control Site Location 30.194394, -87.974008 (30° 11' 39.8209N, 87° 58' 26.4335W)

### 2.6 Operating Vessels and Activities Summary

NOAA Fisheries Southeast Region's vessel strike avoidance measures for marine mammals, fish (such as Giant manta rays) and sea turtles, including vessel speed restrictions, would be implemented at all times when project vessels are transiting to and from homeport and during environmental sampling. Operating vessels include: R/V Jim Franks equipped with rigging capable of sampling in the marine environment; R/V Alabama Discovery research vessel for conducting benthic sampling and trawl surveys; R/V E.O. Wilson; project participants operating privately-owned vessels; and vessels contracted for installation and decommissioning of the IMTA system and AquaFort platform.

Table 1. Operating Vessels

| Vessel Specifications | R/V Jim Franks (USM) | R/V Alabama Discovery (DISL) | R/V E.O. Wilson (DISL) |
|---|---|---|---|
| Type | Catamaran (aluminum hull) | Trawler | Open deck, open transom, amenities below deck |
| Size, GRT | 60 ft (18 m), 84 tons | 65 ft (19.8 m), 42 tons | 46 ft (13.7 m), 44 tons |
| Beam | 25 ft (7.6 m) | 19 ft (5.8 m) | 16 ft (4.9 m) |
| Draft | 6 ft (1.8 m) | 5 ft (1.5 m) | 4 ft (1.2 m) |
| Cargo | Box corer and related gear | N/A | Diving and sampling equipment, buoys |
| Crew Size | 4 | 2-4 | |
| Passenger Size (max) | 40 | 44 | 10 |
| Type of Rigging | Varies for marine sampling | Varies for marine sampling | Long-line rigging |
| Cruising Speed | 20 kts (10 m/s) | 10 kts (5 m/s) | 15-20 kts (7.5-10 m/s) |
| Sampling Trawl Speed | NA | ~ 3 kts (1.7 m/s) | NA |
| Departure Point | Point Cadet, Biloxi, MS (30° 23.536, -88° 53.098) | Dauphin Island, AL | Dauphin Island, AL |
| Distance to Project Site | 50 mi (77 km) | 16 mi (25 km) | 16 mi (25 km) |
| Travel Route | MS Sound, inside barrier islands | Mobile Bay Channel to Main Ship Channel | Mobile Bay Channel to Main Ship Channel |
| No. Hours Vessel Underway Transit (Roundtrip) | 5 hrs per day | ~ 3 hrs per day | ~ 3 hrs per day |
| No. Hours Vessel Onsite | 7 hrs per day | Up to 12 hrs per day | Up to 12 hrs per day |
| Time of Operations | 0600-1800 | 0730-1800 | 0730-1800 |

As noted in Table 1, vessels would transit from the home port of either Point Cadet, Biloxi, Mississippi, or Dauphin Island, Alabama, to the IMTA and environmental survey sites. The total number of trips from the port at Dauphin Island to the IMTA site over the course of the project, including additional trips for inclement weather, is expected to be 158 trips for the Wilson and 29 for the Alabama Discovery. The total number of trips from Biloxi, Mississippi (30°23.536, -88°53.098) to the IMTA site over the course of the project is 15 trips for the R/V Jim Franks. The total number of trips are estimated and broken down into activity category descriptions and deployment in Table 2. Note that the frequency of trips would be greater near the end of the grow-out seasons, when biomass and feed consumption are highest.

Table 2. Vessel Trip Estimates from Dauphin Island, AL, and from Biloxi, MS, to IMTA Site during the Project

| Trip Category | Activity | Vessel | Number of trips |
|---|---|---|---|
| ***Pre-deployment monitoring and first deployment (Nov. 2025 to May 2026)*** | | | |
| Environmental monitoring | Nekton sampling (trawls) | Alabama Discovery | 6 |
| | Water and benthic sampling | Jim Franks | 6 |
| Deployment | Scout mooring sites | Wilson | 2 |
| | Tow platform from Dauphin Island to IMTA site | Alabama Discovery | 1 |
| | Install moorings and navigation aids | Wilson | 1 |
| | Haul net pens | Wilson | 1 |
| | Install monitoring and feeding equipment | Wilson | 1 |
| Stocking | Red drum, oyster, and macroalgae stocking | Wilson | 2 |
| Daily operations | Biweekly trips from Nov-April to add feed to hopper, transitioning to weekly trips in April-June | Wilson | 20 |
| | Monthly trips for net checks and repairs | Wilson | 6 |
| Harvest | Red drum, oyster, and macroalgae harvest | Wilson | 5 |
| Decommission | Uninstall and remove equipment | Wilson | 1 |
| | Uninstall and remove net pens | Wilson | 1 |
| | Uninstall navigation aids and unmoor platform | Wilson | 1 |
| | Tow platform from IMTA site to Dauphin Island | Alabama Discovery | 1 |
| ***Second deployment (October 2026 to May 2027)*** | | | |
| Environmental monitoring | Nekton sampling (trawls) | Alabama Discovery | 3 |
| | Water and benthic sampling | Jim Franks | 3 |
| Deployment | Tow platform from Dauphin Island to IMTA site | Alabama Discovery | 1 |
| | Install moorings and navigation aids | Wilson | 1 |
| | Haul net pens | Wilson | 1 |
| | Install monitoring and feeding equipment | Wilson | 1 |
| Stocking | Red drum, oyster, and macroalgae stocking | Wilson | 2 |
| Daily operations | Biweekly trips from Nov-April to add feed to hopper, transitioning to weekly trips in April-June | Wilson | 20 |
| | Monthly trips for net checks and repairs | Wilson | 6 |
| Harvest | Red drum, oyster, and macroalgae harvest | Wilson | 5 |
| Decommission | Uninstall and remove equipment | Wilson | 1 |
| | Uninstall and remove net pens | Wilson | 1 |
| | Uninstall navigation aids and unmoor platform | Wilson | 1 |

| Trip Category | Activity | Vessel | Number of trips |
|---|---|---|---|
| | Tow platform from IMTA site to Dauphin Island | Alabama Discovery | 1 |
| ***Third deployment (October 2027 to May 2028)*** | | | |
| Environmental monitoring | Nekton sampling (trawls) | Alabama Discovery | 3 |
| | Water and benthic sampling | Jim Franks | 3 |
| Deployment | Tow platform from Dauphin Island to IMTA site | Alabama Discovery | 1 |
| | Install moorings and navigation aids | Wilson | 1 |
| | Haul net pens | Wilson | 1 |
| | Install monitoring and feeding equipment | Wilson | 1 |
| Stocking | Red drum, oyster, and macroalgae stocking | Wilson | 2 |
| Daily operations | Biweekly trips from Nov-April to add feed to hopper, transitioning to weekly trips in April-June | Wilson | 20 |
| | Monthly trips for net checks and repairs | Wilson | 6 |
| Harvest | Red drum, oyster, and macroalgae harvest | Wilson | 5 |
| Decommission | Uninstall and remove equipment | Wilson | 1 |
| | Uninstall and remove net pens | Wilson | 1 |
| | Uninstall navigation aids and unmoor platform | Wilson | 1 |
| | Tow platform from IMTA site to Dauphin Island | Alabama Discovery | 1 |
| ***Fourth deployment (October 2028 to May 2029)*** | | | |
| Environmental monitoring | Nekton sampling (trawls) | Alabama Discovery | 3 |
| | Water and benthic sampling | Jim Franks | 3 |
| Deployment | Tow platform from Dauphin Island to IMTA site | Alabama Discovery | 1 |
| | Install moorings and navigation aids | Wilson | 1 |
| | Haul net pens | Wilson | 1 |
| | Install monitoring and feeding equipment | Wilson | 1 |
| Stocking | Red drum, oyster, and macroalgae stocking | Wilson | 2 |
| Daily operations | Biweekly trips from Nov-April to add feed to hopper, transitioning to weekly trips in April-June | Wilson | 20 |
| | Monthly trips for net checks and repairs | Wilson | 6 |
| Harvest | Red drum, oyster, and macroalgae harvest | Wilson | 5 |
| Decommission | Uninstall and remove equipment | Wilson | 1 |
| | Uninstall and remove net pens | Wilson | 1 |
| | Uninstall navigation aids and unmoor platform | Wilson | 1 |
| | Tow platform from IMTA site to Dauphin Island | Alabama Discovery | 1 |
| ***Post-deployment monitoring (October 2029 to May 2030)*** | | | |

| Trip Category | Activity | Vessel | Number of trips |
|---|---|---|---|
| Environmental monitoring | Nekton sampling (trawls) | Alabama Discovery | 3 |
| | Water and benthic sampling | Jim Franks | 3 |
| *Additional trips (throughout the demonstration project period)* | Extra days to cover for inclement weather | Wilson, Alabama Discovery, and Jim Franks | 34 |
| **TOTAL TRIPS TO SITE** | | | **236** |

## 2.7 Mitigation Measures

As outlined in NOAA's NAO 216-123, NOAA Mitigation Policy for Trust Resources, mitigation is an important component of accomplishing NOAA's mission. Mitigation falls into three general categories: avoidance, minimization, and compensation. Mitigation measures would be incorporated into the Gulf IMTA project as required by the terms of any consultation, permit, or authorization necessary to implement the project. For example, implementation of vessel strike and avoidance measures developed by NOAA SERO Vessel Strike Avoidance Measures would mitigate impacts to the potential presence of protected species in the vessel transit area during deployment, decommissioning and environmental sampling and is incorporated into the project. The SERO Protected Species Construction Conditions and the monitoring detailed in the PSMP would be applied to the project.

Mitigation measures are incorporated in the project siting analysis and Aquafort engineering design. A precision siting analysis was conducted to inform site feasibility based on the USM aquaculture farm parameters. Additional siting criteria included consideration of special use spaces and areas for national security; presence of natural and cultural resources; active commercial and industry operational areas (i.e., oil and gas operations, ocean disposal sites), active navigation and transportation fairways, the number of vessels transiting through the area, and shrimping effort. These resources and concerns were considered and factored into identification of a suitable site whereby no mitigation would be needed or effective.

## 2.8 Best Management Practices Included in the Proposed Action

Best management practices (BMPs) are generally used to ensure that activities described in the proposed action comply with applicable laws for environmental protection and minimization or avoidance of potential impacts on environmental resources. The BMPs identified in this document are part of the proposed action and are not potential mitigation measures proposed as a function of the NEPA environmental review process for the proposed action. No mitigation measures or BMPs were recommended during the consultation on essential fish habitat (Section 3.2.4). No mitigation measures were recommended during United States Fish and Wildlife Service (U.S. FWS) ESA and MBTA consultations, but BMPs were recommended (Section 3.2.6).

As part of reducing or avoiding impacts and avoiding the need for potential mitigation efforts, implementation of best management practices would enhance IMTA system performance and efficiency. NOAA's 2023 Final PEA for Funding Aquaculture Research and Development Projects (88 FR 29891, May 9, 2023) provides a summary of BMPs used in all aquaculture research and development projects funded by NOAA's federal financial assistance awards. These practices would be used for the Gulf IMTA demonstration project and have been considered in the analysis of environmental effects of the project.

In addition, project- and site-specific BMPs would be implemented as warranted by project managers overseeing the IMTA demonstration project and through agency consultation and technical and engineering expertise. BMPs are incorporated in The Operations Procedures and

Structural Components of the Alabama State Waters IMTA Project (October 2024) and discussed, as applicable, in this EA and summarized in Table 3.

As part of reducing or avoiding impacts and avoiding the need for potential mitigation efforts, implementation of best management practices may also enhance performance efficiency (water use, feed conversion, disease prevention, prevention of unintentional introductions of farm raised organisms into wild populations) and reduce waste (physical waste and operation inefficiency).

Table 3. Best Management Practices Included in the Proposed Action

| **Areas of Best Practices** | **BMPs** | **Types of Impacts** |
|---|---|---|
| IMTA Siting | ● Identify farm parameters to maximize bottom depths and current flows through net enclosures.<br>● Conduct spatial modeling, siting analysis, in-water bathymetric and archeological surveys, in situ measurements.<br>● Conduct farm risk assessment: proximity to critical, sensitive, or protected species and habitats<br>● Evaluate sites to avoid high pest and predator concentrations. | ● Identifies viable areas for siting, (i.e., proximity to ports, current velocity, industry, navigation and transportation concerns, vessel traffic)<br>● Avoids potential marine use conflicts.<br>● Minimizes the likelihood of overlap with migration routes or critical breeding and foraging habitats of protected species.<br>● Reduces the risk of disease and parasitic outbreaks<br>● Reduces effects of metabolic waste discharge. |
| Design, Construction and Installation | ● Perform engineering design study using oceanographic data (currents, wave, and wind activity) to assess worst-case scenarios.<br>● Conduct structural analysis for mooring loads<br>● Identify construction schedule to avoid seasonal extreme weather conditions<br>● Appropriate facility design | ● Good engineering design and analysis avoids worst-case scenarios (i.e., equipment damage, loss of infrastructure, fish escapes).<br>● Ensures personnel safety<br>● Comply with SERO Protected Species Construction Conditions |
| Vessel Operations | ● Vessel Management Plan includes construction, operations and decommissioning of the aquaculture system.<br>● Reduce the number of vessels used during operations and maintenance if possible.<br>● Operate vessels at slow speeds and with caution when transiting to the farm site and around the farm site.<br>● Conduct daily operations in the farm site from stationary vessels tied to structure.<br>● Operators practice vigilance and watch for marine mammals, sea turtles, and other ESA-listed motile species turtles at or near the surface, and if practicable, reduce vessel speed to maintain steerage. | ● Minimizes vessel strikes to marine mammals, sea turtles and birds<br>● Reduces fuel needs<br>● Minimizes disturbance to seafloor and benthic habitat |

| Areas of Best Practices | BMPs | Types of Impacts |
| --- | --- | --- |
| | ● When dolphins are bow- or wake-riding, vessels maintain course and speed as long as it is safe to do so or until the animal(s) leave the vicinity of the vessel. | |
| Anchoring and Mooring Decommissioning and Maintenance | ● Before any equipment, anchor(s), or material enters the water, personnel verify that no ESA-listed marine animals are in the area where the equipment, anchor(s), or materials are to be placed.<br>● Lower anchors, moorings and other equipment in a slow and controlled manner.<br>● Mooring systems use the minimum line length necessary to account for expected fluctuations in water depth because of tides, currents and waves.<br>● Mooring systems are designed to keep the line as tight as possible<br>● Reduce gear chafing by using proper lay-out and tensioning.<br>● Provide an inventory of line and buoy type for each pen structure, including quantity, line size diameter and line tension.<br>● Use appropriate anchors, mooring chains and rope as designed for optimal operation.<br>● Mark cage locations and farm boundaries with navigation buoys. | ● Minimizes damage to benthic habitat<br>● Minimizes potential entanglement risks<br>● Minimizes loss or conversion of existing habitat.<br>● Minimizes turbidity to water column and sediment<br>● Reduces scouring of seafloor and impacts to benthic habitat<br>● Ownership of recovered equipment, lines or netting can be determined and analyzed for damage.<br>● Navigation safety for recreational boaters and commercial vessels. |
| IMTA Stocking Fish, Macroalgae and Shellfish | ● Use native species with established spawning and culture protocols<br>● Ensure proper stocking densities, husbandry protocols, harvest or euthanasia procedures<br>● All holding, transport, and culture systems at land-based facilities are designed, operated and maintained to ensure animal health and prevent the escape of farmed aquatic species into waters of the state.<br>● Transport fish from hatchery to a new environment in a manner that reduces stress.<br>● Inventory fish stock for each grow-out season to assess growth, health and mortality.<br>● Quarantine fish, oysters, and macroalgae to prevent disease spread during culturing.<br>● Consult an aquatic health specialist or veterinarian before use of drugs, if applicable.<br>● Properly transport shellfish and macroalgae to IMTA to ensure health of animals and algae. | ● Not likely to pose a competitive risk to wild stock in the event fish escape<br>● Acclimation improves survivability.<br>● Ensures healthy animals and algae are being placed in a new environment, reduces transmission of disease to existing site fauna.<br>● Macroalgae provide food and habitat for marine life.<br>● Macroalgae assimilates excess nutrients from the fish waste, improving water quality. |

| Areas of Best Practices | BMPs | Types of Impacts |
|---|---|---|
| Operations and Maintenance Plan | ● Perform daily pre-work equipment inspections for cleanliness and any evidence of engine fluid leakage.<br>● Ensure equipment is secure during deployment and retrieval<br>● Minimize excess food in the pen and its deposition<br>● Monitor feeding to maximize feed conversion efficiency.<br>● Use fully remote or remotely controlled feeding equipment, as appropriate.<br>● Copper alloy mesh (CAM) reduces biofouling.<br>● Remove project-related organic matter or debris that has potential to cover the sea floor and dispose at an appropriate upland facility.<br>● Provide aid to navigation AtoN required by the U.S. Coast Guard for visibility of navigation safety.<br>● All operational and maintenance activities should occur during daylight hours.<br>● Storm planning protocol is established. | ● Minimizes potential for oils and hazardous substances to enter the waterway.<br>● Mitigates presence of predators and other foraging animals and their interactions with farmed animals.<br>● Reduction in the need for cleaning prevents additional materials from accumulating on the seafloor and entering the water column.<br>● Storm planning and seasonal decommissioning reduces the potential for infrastructure and equipment failure and loss, fish escapes, debris entering the waters.<br>● AtoN prevents boating mishaps.<br>● Daylight operations improve personnel safety and reduce mishaps. |
| Gear Management | ● Assess biofouling and perform maintenance as needed. Antifouling treatments such as biocides may not be used.<br>● Monitor lines on a schedule through-out the lifetime of the operation using depth finders, ROV with video, and/or SCUBA.<br>● Ensure that all lines have permanent markers with the applicant's contact information.<br>● Ensure that all lines and anchors remain under the designed tension and in good working condition.<br>● Use a satellite beacon attached to the platform to monitor and track its location in the event the platform becomes unmoored. | ● Improper maintenance can result in insufficient water exchange inside the IMTA system, because organisms such as algae, oysters, clams, and barnacles aggregating on and attaching to the wall of the cage.<br>● Minimize the loss of materials and or equipment that may result from breakages and structural failures including the retrieval of lost gear, and the collection of any derelict fishing gear or marine debris that may have collected on the structure.<br>● Tracking allows timely recovery of derelict or lost equipment. |
| Wildlife Interactions and Entanglement | ● Minimize the number of vertical lines in the water to reduce entanglement risks for marine mammals<br>● Inspect each net pen for net damage, net tension, and hardware issues in accordance with the Operations and Maintenance Plan.<br>● Conduct monthly inspections on anchor, mooring lines and hardware.<br>● Maintain proper tension on all anchor lines.<br>● Remove all loose netting and lines during routine inspections. | ● Reduces potential for injury to or behavioral changes in marine mammals, sea turtles or birds.<br>● Fewer lines in the water and maintenance of nets reduces entanglement risks.<br>● Reduces opportunities for subsurface and above surface predators from being conditioned to feeding routines. |

| Areas of Best Practices | BMPs | Types of Impacts |
| --- | --- | --- |
|  | ● Install bird netting or bird spikes to deter above surface predators (i.e., diving birds).<br>● Manage stocking and feeding operations<br>● If protected species become entrapped in an enclosed area, immediately notify the appropriate federal action agency and NMFS.<br>● Train employees and volunteers not to feed marine mammals around the IMTA system.<br>● Implement Standard Manatee Conditions for In-Water Activities and Nationwide Avoidance and Minimization Conservation Measures for Birds (U. S. FWS Version 2, July 2024) | ● Artificial structures can attract a variety of marine life for use as refuge from predators, cover for immature marine animals and fish, and foraging opportunities.<br>● Proper notifications can minimize injury and death to affected animals.<br>● Alleviate potential adverse impacts (entanglement, drowning) to bird species |
| Predator Controls | ● Use rigid cage materials, ensure ad all lines securing the cage and ancillary equipment are kept taut.<br>● Remove mortalities on a routine basis; use cameras or visual inspection and transport all mortalities back to shore for disposal.<br>● Ensure net mesh size provides for containment of farmed fish, predator exclusion and ease of maintenance. Use multiple layers of netting and monitor netting, checking for holes, damage<br>● Exclusion measures including predator nets, top nets, and other deterrents should be installed at the start of the farming operation.<br>● Use predator-resistant netting materials such as Kikkonet and CAM. Anti-predator nets provide a second layer of stronger netting.<br>● Maintain maximum fish health through regular feeding and cage cleaning and proper management of dead fish and discards.<br>● Employ fish escape protocols such as immediate repair, recapture, and report, as applicable. | ● Deterrents prevent training potential predators to locate a food source and develop predatory behaviors around the farm |
| Escapes | ● Copper alloy mesh (CAM) product is the toughest netting on the market. It is used: 1) to prevent biofouling, and 2) the mesh strength will protect the Red drum from predators (e.g., sharks, dolphins).<br>● CAM is impact resistant and designed to survive storm events if completely submerged. Routine inspections of the netting and mooring components, and good maintenance can dramatically reduce unintentional escapes as well as careful handling of fish during harvesting.<br>● Construct farms to withstand the local weather and climate conditions, as well as risks like predator attacks.<br>● Establish steps to monitor and maintain facilities in the event of an escape and implement | ● Appropriate cage technology can withstand unforeseen adverse weather conditions<br>● Netting materials prevent predators from damaging the net and reduce fish escapes. |

| Areas of Best Practices | BMPs | Types of Impacts |
| --- | --- | --- |
| | appropriate response plans | |
| Sediment and Water Quality | ● Appropriate facility design that takes advantage of current flow, wave action, tidal forces and bottom depth.<br>● Minimize nutrient, phosphorus, nitrogen and solids discharge through optimization of efficient feed formulations.<br>● Operate feed storage, handling, and delivery methods to minimize waste and the creation of fine particles of feed; prevent overfeeding.<br>● Minimize onsite net pen cleaning to reduce debris and paint from being released into the water column and sediment. | ● Minimize accumulation of solids and burial of benthic habitats under the aquaculture structure.<br>● Seasonal fallowing will be used to minimize impacts to the benthic environment.<br>● Reduces water quality impacts |
| Sampling and Monitoring | ● Use tow lines for environmental sampling that are designed not to loop or tangle during changes in vessel speed.<br>● Survey the area surrounding the vessel to ensure that no protected species are visible at the surface before the initiation of the trawl.<br>● Use non-toxic equipment. | |
| Security and Surveillance | ● Use devices that record and monitor site security, human behavior on and near the platform, fish feeding behavior, fish behavior inside the enclosures, and large vertebrate behavior on and near the platform.<br>● Conduct daily security checks for signs of tampering or unusual situations | ● Immediately identifies vulnerabilities, adulteration/tampering and reporting to local law enforcement officials. |

## 3.0 Affected Environment

This chapter describes the potentially affected resources before the proposed action as a point of comparison for evaluating the consequences or impacts resulting from the proposed action (funding deployment and operation of the IMTA system). The current status of each potentially affected resource is discussed below, grouped into the Physical Environment (Section 3.1), the Biological Environment (Section 3.2), and the Social and Economic Environment (Section 3.3). Resources that are not expected to be impacted by the proposed action are not discussed in this chapter and therefore are not carried forward for analysis (Section 1.9).

It is the intent of the environmental impacts analysis to focus information on the primary issues and impacts of environmental concern. The analysis of environmental impacts to the localized geographic area where the proposed action is located evaluates impacts to resources that are fixed in nature (i.e., their location is stationary such as benthic and archaeological resources) or for resources where impacts from the proposed action would occur within waters at and adjacent to the project area (e.g., water quality). The entire Gulf and its coastal estuaries have high biodiversity and support a wide variety of marine and coastal habitats and mammals, sea turtles, fish, and birds. Given their highly mobile and, in some cases, migratory nature, it is likely that some species would occur in the project area during deployment, operation, monitoring and decommissioning. This analysis includes potential activities that are anticipated to occur in Alabama state waters and in the north central Gulf.

Additionally, the area for cultural, historical, and archaeological resources encompasses the depth and breadth of the seabed between the coastline and the selected site. Onshore areas from which the site activities can be visible are considered for analysis. There is no indication the proposed action involves expansion of existing port or onshore infrastructure; existing infrastructure would be used. Where available, area-specific data are discussed; otherwise, information from the wider Gulf is described.

## 3.1 Physical Environment

This Section characterizes the affected physical environment in the overall vicinity of the project site and provides descriptions of existing conditions for environmental resources. The Gulf IMTA project would be sited in state waters of Alabama seaward of Fort Morgan. The characterization of the physical environment is specific to the area where data is available; otherwise, data from the entire Gulf are described.

### 3.1.1 Ocean and Coastal Environments

The Gulf is a mesotidal marginal sea of the western Atlantic Ocean bordered by the United States, Mexico, and Cuba and extends to the east and south of the area of the project site.[1] The

[1] R. Eugene Turner, Nancy N. Rabalais, in World Seas: an Environmental Evaluation (Second Edition), 2019.

Gulf is a semi-enclosed sea that is connected to the Caribbean Sea to the south through the Yucatan Channel and the Atlantic Ocean in the east through the Straits of Florida. The circulation in the Gulf is dominated by the Caribbean Current/Loop Current/Florida Current system, as well as eddies off the Loop Current. The Loop Current is part of the upper branch of the Atlantic Meridional Overturning Circulation (AMOC)[2] which makes it all the more important to understand as AMOC has significant influence on global and even regional decadal climate variations (Buckley and Marshall, 2016; Enfield et al., 2001). The Loop Current and its associated eddies are dominant circulation features in the Gulf's deep offshore waters, creating dynamic zones with strong divergences and convergences that concentrate and transport organisms (including larvae from both oceanic and continental shelf fisheries species).

In the Gulf, coastal waters include all bays and estuaries from the Rio Grande River to Florida Bay. Offshore waters include both State offshore waters and federal Outer Continental Shelf (OCS) waters extending from outside the barrier islands to the EEZ. The inland extent is defined by the Coastal Zone Management Act (CZMA). The Gulf's shallow, offshore waters (water depth < 984 ft [300 m]) east and west of the Mississippi River are highly productive and largely influenced by freshwater inputs from rivers and estuaries, particularly in the north central and western Gulf. The IMTA BES Report indicated that predominant recorded currents in the area occurred from the E and NE but peak currents approach from the SW, W, and NW, reached maximum values of 3.01 ft/s (0.92 m/s (1.8 knots)), with the 10-year extreme value exceeding 3.28 ft/s (1 m/s). The seafloor topography within Cluster 3B is a relatively flat, even seafloor sloping to the south, and consists of homogenous sediments consistent with unconsolidated silty sand or sand.[3, 4]

### 3.1.2 Water Quality

The term "water quality" describes the condition or environmental health of a waterbody or resource. It reflects particular biological, chemical, and physical characteristics and the ability of the waterbody to maintain the ecosystems it supports and influences. The primary factors influencing water quality in coastal and offshore waters are temperature, salinity, dissolved oxygen, chlorophyll content, nutrients, potential of hydrogen (pH), oxidation reduction potential, pathogens, transparency (i.e., water clarity, turbidity, or suspended matter), and contaminant concentrations, such as heavy metals, hydrocarbons, and other organic compounds. In the Gulf, water quality is greatly affected by both natural and anthropogenic factors. Bacterial contamination (i.e., enterococci bacteria) in Alabama's coastal recreational waters can originate from sources, including shoreline development, wastewater collection and treatment facilities, septic tanks, urban runoff, disposal of human waste from boats, bathers themselves, commercial and domestic animals and natural animal sources such as wildlife. People who swim and recreate in waters contaminated with such bacterial pollution are at an increased risk of becoming ill.

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[2] The Atlantic Meridional Overturning Circulation (AMOC) refers to the warm and saline northward flow from the Southern Ocean into Labrador and Nordic Seas and the return deep water flow all the way to the Weddell Sea.

[3] IMTA Baseline Environmental Survey (Bathymetry Report), Hydrographic Science Research Center, University of Southern Mississippi, Aug 2022.

[4] USM Archeological Survey

Because Alabama's coastal beaches are a major tourist attraction as well as a lifestyle staple for Alabama residents, waters are classified for swimming under the State's Water Use Classification System. The Alabama Department of Environmental Management (ADEM) and Alabama Department of Public Health (ADPH) conduct water quality monitoring for bacteria enterococci levels that routinely fall below the EPA recommended threshold at the Fort Morgan Beach monitoring site (Lat/Long 30.22580N, 88.00940W) indicating that the water quality is safe for swimming. Based on historic data at Fort Morgan the average water temperature in winter is 62.4°F (16.88°C), in spring 70.9°F (21.66°C), in summer the average temperature rises to 84.6°F (29.22°C), and in autumn it is 77.2°F (25.1°C). The maximum depth observed in state waters of the AOI is 52.5 ft (16 m).

On April 20, 2010, the Deepwater Horizon (DWH) oil drilling rig operating 47 miles southeast of Louisiana in the Mississippi Canyon Block 252 of the Gulf, exploded and sank releasing the largest marine oil spill disaster in the U.S. history of marine oil drilling operations. Four million barrels of oil flowed over an 87-day period from the damaged Macondo oil well, before the well was finally capped on July 15, 2010 (EPA 2017). The oil spill's surface extent exceeded 19,305 square miles and ranged from central Louisiana to the Florida Panhandle. The Macondo well is located at coordinates 28°44′17″N, 88°21′58″W (28.738056°N, -88.366111°W) in the Gulf more than 90 nm S/SW of the proposed location of the Gulf IMTA demonstration project. The Final Programmatic Damage Assessment and Restoration Plan (PDARP) and Final Programmatic Environmental Impact Statement (PEIS) describes the impacts of DWH.[5]

### 3.1.3 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° F (27.2-32.7° C) and 42–63° F (5.5-17.2° C), 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. Tropical storms occur in the Gulf in summer through fall. Hurricane season extends from June 1 to November 30. The season averages 10 named storms, six of which become hurricanes. These storms are most likely to affect the Mobile Bay area from late August to early October. The Mobile area receives an average annual rainfall of 65 inches, among the highest for metropolitan areas in the continental United States This rainfall can be accentuated by hurricanes, tropical storms, and El Nińo events.

There have been great changes to Atlantic hurricanes in just the past 50 years, with storms developing and strengthening faster (Garner 2023). The results of the study suggest that the Atlantic Basin is already experiencing an increase in the overall frequency and magnitude of quickly intensifying tropical cyclone events as global temperatures continue to rise. Warming ocean waters serve as fuel for tropical cyclones that form in the Atlantic basin, making them twice as likely to go from a weak storm, a Category 1 hurricane or weaker, to a major hurricane in just 24 hours. New model-based research found that enhanced ocean surface warming in the eastern tropical Pacific could trigger large-scale shifts in upper atmosphere wind patterns. Heat-

[5] The PEIS can be found at: http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/

driven shifts in large-scale atmospheric circulation could escalate the risk of hurricanes making landfall on the Gulf Coast and southern Atlantic coast of the U.S. and amplify risks to coastal communities (Balaguru et al. 2023).

Research on greenhouse gas (GHG) emissions from aquaculture is a growing area of study. Differences and variability in GHG emissions from aquaculture are greatly influenced by the type and volume of species raised, farm location, type of production system, and associated environmental factors (Jones et al. 2022; Zhang et al. 2022; Chen et al. 2023). Typically, emissions of GHG are closely linked to the level of production, except in some cases such as bivalves where there is an inverse relationship (MacLeod et al. 2020). GHG emissions in the aquaculture production cycle come from sources including feed processing, production and supply of eggs, larvae, or other propagation, on-farm energy use, processing, storage, and shipment, among others. Upstream and downstream commercial processes have been found to contribute a significant proportion of overall GHG emissions from aquaculture, often more than on-farm operations themselves (Jones et al. 2022). Differences in these processes (particularly in downstream shipping methods), make it difficult to estimate emissions from any one "typical farm". Nevertheless, there are some general patterns and estimates of GHG emissions from different types of farms that can be used to infer impacts. Finfish produce greater emissions in large part because of the feed conversion ratio (amount of food needed to produce live weight gain), energy use in onshore systems, feed transfer, and product delivery. Bivalves (oysters, mussels, and clams) have lower emissions related to the fact that they are filter feeders and no energy is used for feed production once they leave the hatchery and enter the growing environment. Bivalves can also act as carbon sinks through sequestration in their shells. Seaweed has the lowest emissions as compared to finfish and bivalves, stemming from the hatchery and processing stages as well as shipping. Seaweeds can also serve as carbon sinks through export and sequestration of seaweed biomass in both coastal and deep water habitats. Seaweed and shellfish farms have the ability to sequester carbon, denitrify water and stabilize environments (Gentry et al. 2020). Increasing the overall carbon sink for a farming operation helps to mitigate the GHG emissions. Integrated multi-trophic farming operations offer a mechanism for adaptation to climate, whereby multispecies production and transport emissions and cost can consolidate GHG emissions.

### 3.1.4 Marine Protected Areas and National Marine Sanctuaries

A Marine Protected Area (MPA) is a designated area of the ocean that is legally protected to conserve marine life, habitats, and cultural resources. MPAs can be established by federal, state, tribal, territorial, or local laws. For the purposes of this EA, MPAs include National Marine Sanctuaries (NMS) defined under the National Marine Sanctuaries Act, Marine National Monuments under the Antiquities Act, National Estuarine Research Reserves under the Coastal Zone Management Act or Coastal and Estuarine Land Conservation Program, NOAA Fisheries gear restricted areas, National Parks and National Wildlife Refuges under the National Wildlife System Administration Act and National Wildlife Refuge System Improvement Act, state or local level protected areas and a variety of fishery management closures.[6] There are 295 MPAs, inclusive of seasonal and other closures and fishing gear restrictions, in the Gulf.[7] The Bon Secour National Wildlife Refuge is located 1.8 nm (3.3 km) north of the project area; it was established by Congress in 1980 for the protection of neotropical migratory songbird habitat and threatened and endangered species such as the green, loggerhead and Kemp's ridley sea turtles.

There are two National Marine Sanctuaries within the Gulf: the Florida Keys National Marine Sanctuary (FKNMS), which was designated in 1990, and which subsumed the Key Largo and Looe Key national marine sanctuaries that were designated in 1977 and 1981, respectively[8]; and the Flower Garden Banks National Marine Sanctuary (FGBNMS), which was designated in 1992, enlarged to include Stetson Bank in 1996, and expanded in 2021.[9]

The FKNMS protects 2,900 square nautical miles of waters surrounding the Florida Keys, from Biscayne Bay National Park to the Dry Tortugas, excluding Dry Tortugas National Park and northward to Everglades National Park. The shoreward boundary of the Sanctuary is the mean high-water mark. Within the boundaries of the sanctuary lie spectacular, unique and nationally significant marine resources, including Florida's Coral Reef Track, extensive seagrass beds, beautiful sandbars, mangrove-fringed islands and more than 6,000 species of marine life. The sanctuary also protects historic shipwrecks and other archaeological treasures.

The FGBNMS encompasses 17 reefs and banks located approximately 80-125 miles off the coasts of Texas and Louisiana in the northwestern Gulf. When first designated in 1992, the sanctuary consisted of only East and West Flower Garden Banks, home to some of the healthiest coral reefs in the world. In 1996, Stetson Bank also became part of the sanctuary, adding a different type of reef community teeming with marine life. In 2021, the sanctuary was expanded to its present size of 160 square miles to protect important shallow and deep reef habitats across an additional 14 banks, a combination of small underwater mountains, ridges, troughs, and hard-bottom patches. The habitats associated with these banks range from thriving shallow water coral reefs and algal-sponge communities, to deeper mesophotic reefs alive with black corals, algal nodules, and octocorals. These varied habitats provide havens for tropical reef fish and invertebrates, as well as manta rays, sea turtles, and sharks. The proposed action is not located in or within close proximity to either the FKNMS or the FGBNMS.

There is an ancient cypress underwater forest located about eight miles off the coast of Gulf Shores, Alabama. The forest dates to an ice age more than 60,000 years ago, when sea levels were about 400 feet lower than they are today. The project site is not located near this historic resource.

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6 MPA Classification

7 Gulf EEZ Seasonal and/or Area Closures and Marine Protected Areas

8 Florida Keys National Marine Sanctuary

9 Flower Garden Banks National Marine Sanctuary

### 3.1.5 Offshore Artificial Reefs

The natural bottom of offshore Alabama is a predominantly flat sand/mud bottom. This type of bottom attracts very few commercially or recreationally valuable fish and invertebrates. The Alabama Marine Resources Division (AMRD) manages a diverse artificial reef program.[10,11] There are several artificial reef permitted areas approximately (31.5 km) 17 nm or more to the south of the project area. The reefs have proven effective in increasing the biomass of fish populations including red snapper, gray triggerfish, sheepshead, and gray snapper by providing hard bottom habitat, increased foraging opportunities, shelter and spawning habitat with a vertical landscape in place of a featureless landscape of sand and mud. Encrusting organisms such as corals and sponges cover the artificial reef material and small marine animals take up residence. High quality reefs throughout Alabama's inshore, nearshore and offshore water bottoms maximizes the ecological stability and resiliency which allows the ecosystem to remain productive when subjected to disturbances such as hurricanes, increased fishing pressure and oil spills such as the Deepwater Horizon catastrophe. In 1994, one hundred M-60 military tanks were placed in water depths of 70-110 ft within the Don Kelley North and the Hugh Swingle Permit Areas located more than 8.6 nm (10 miles) south of Fort Morgan. The project site is not located near any artificial reefs.

## 3.2 Biological Environment

The biological environment refers to plant and animal communities and associated habitats that comprise or provide important support to critical life stages. The habitats and main environmental factors (i.e., temperature, depth, salinity, and bottom type) that influence species distribution and abundance vary greatly in the Gulf. This section discusses the biological setting and resources of the north central Gulf, such as birds, reptiles, marine mammals, marine invertebrates, plants, and fish species that can occur in the project area, and includes an assessment of species that are listed under the Endangered Species Act (16 U.S.C. §1531 et seq.) (ESA) and that may be present in the Gulf IMTA project area. The U.S. FWS jointly administers the ESA with the U.S. Department of Commerce NOAA Fisheries. In general, the U.S. FWS has primary responsibilities for terrestrial and freshwater organisms, and NOAA Fisheries has primary responsibilities for marine organisms. When available, information specific to the project area is presented; otherwise, information from the wider Gulf is used.

There are several ESA-listed species and their critical habitats present in the area being proposed for the Gulf IMTA project. Per Section 7(a)(2) of the ESA, consultation was initiated to determine if the proposed activities were likely to adversely affect ESA-listed species and critical habitat. It was determined that the proposed Gulf IMTA project activities may affect, but were not likely to adversely affect, the ESA-listed species and critical habitat. NOAA Fisheries prepared a Biological Evaluation to determine if the proposed IMTA project was likely to affect ESA-listed species and critical habitat and submitted a request for informal consultation to the NOAA Fisheries on March 10, 2025. On March 17, 2025, NOAA Fisheries provided their concurrence that no federally listed species or critical habitat would be adversely affected by the

[10] Alabama Artificial Reef Program

[11] Alabama Artificial Reefs Fishing Information Guide

IMTA project and recommended using best management practices specific to the project. A brief discussion of potentially affected ESA-listed species and critical habitat is provided below.

### 3.2.1 Fish, Elasmobranchs and Invertebrates[12, 13]

The Gulf has a taxonomically and ecologically diverse assemblage of fish and invertebrates because of its unique geologic, oceanographic, and hydrographic features. Felder and Camp (2009) reported that the Gulf has a total of 1,541 fish species in 736 genera, 237 families, and 45 orders. Fifty-one of these species are sharks and 42 are rays and skates (Ward and Tunnell Jr. 2017). The Gulf invertebrate assemblages are represented by over 13,000 species in 46 phyla and include recreationally and commercially valuable shellfish such as eastern oyster, blue crab, penaeid shrimp, spiny lobster, and stone crab. Fishes and marine invertebrates are distributed throughout the Gulf and they occupy all marine habitats.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary law that governs marine fisheries management in U.S. federal waters. Under the MSA, the Gulf of Mexico Fishery Management Council (GMFMC) has authority for fisheries in the Gulf, including key species like reef fish, shrimp, spiny lobster, coastal migratory pelagics, corals, and red drum, ensuring sustainable fishing practices through Fishery Management Plans (FMPs) developed based on the best scientific information available and public input. The MSA requires the identification and description of Essential Fish Habitat (EFH) and the designation of Habitat Areas of Particular Concern (HAPCs), specific areas within EFH that have important ecological function and/or are especially vulnerable to degradation. Additionally, the State of Alabama Marine Fisheries Section is responsible for collecting data and managing all commercial and recreational marine fisheries in Alabama waters. EFH is discussed further in Section 3.2.4.

Fishes, sharks, rays and skates are widely distributed throughout the Gulf and they occupy all marine habitats. The ESA-listed species of fish and elasmobranchs that could potentially occur in the project area include two threatened species: Gulf sturgeon (Atlantic sturgeon, Gulf subspecies) *(Acipenser oxyrinchus desotoi*) and Giant manta ray *(Mobula birostris)*.

Gulf sturgeon are anadromous fish and can be found from the Mississippi River in Louisiana, east to the Suwannee River in Florida where they inhabit both salt and freshwater habitats, annually cycling between the two (Wakeford 2001). Gulf sturgeon are ESA-listed as a threatened species (56 FR 49653, Sept. 30, 1991). Gulf sturgeon use the lower riverine, estuarine, and marine environment during winter months primarily for feeding and for inter-river migrations. Within the estuarine environment, Gulf sturgeon are typically found in waters 6.6-13.1 ft (2-4 m) deep and use depths outside this range (Fox et al., 2002). They spend the winter in the Gulf in sandy-bottom habitats six to 100 feet (1.82-30.48 m) deep, where their diet consists of marine worms, grass shrimp, crabs and a variety of other bottom-dwelling organisms. The IMTA system is not located in Gulf sturgeon critical habitat, but vessels may pass through Gulf sturgeon critical habitat when traveling from the dock to the project location.

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[12] Gulf Climate Vulnerability Analysis for Fishes and Invertebrates

[13] Biological Environmental Background Report Gulf OCS BOEM 2021-015

Giant manta rays occupy tropical, subtropical, and temperate oceanic waters and productive coastlines. In the Atlantic Ocean, giant manta rays have been observed as far north as New Jersey and are widespread in the Gulf. It is a migratory species, and seasonal visitors appear along productive coastlines with regular upwelling, in oceanic island groups, and near offshore pinnacles and seamounts. The giant manta ray was ESA-listed as a threatened species in 2018, originally under the taxonomic designation of *Manta birostris* (83 FR 2916, Jan. 22, 2018), which was revised to *Mobula birostris* in 2024 (88 FR 81351, Jan. 22, 2024). The spatio-temporal distribution of manta rays in the eastern U.S. is poorly understood but they are expected to be infrequently encountered as sightings data are limited (Farmer et al., 2022). Although the giant manta ray is not common in the Gulf, there is a small population of more than 70 individuals at the FGBNMS (Miller and Klimovich 2017). It is thought that FGBNMS is an important nursery areas for juvenile manta rays (Stewart et al., 2018).

The Alabama sturgeon (*Scaphirhyncus suttkusi*) is a slender freshwater fish and one of the rarest and most endangered fish in the nation and may be close to extinction. It was listed as an endangered species on May 5, 2000 (65 FR 26438). The Alabama sturgeon's historic range encompassed all major rivers below the Fall Line in the Mobile Basin, including the Alabama, Tombigbee, and Cahaba River drainages and therefore it is not within the project area.

Threatened species of corals, including Elkhorn coral (*Acropora palmata*), Staghorn coral (*Acropora cervicornis*), Rough cactus coral (*Mycetophyllia ferox*), Lobed star coral (*Orbicella annularis)*, Mountainous star coral (*Orbicella faveolata*) and Boulder star coral (*Orbicella franksi*), as well as the endangered Pillar coral (*Dendrogyra cylindrus*), are found in the Gulf, along the Mexico coast, in the Florida Keys and Caribbean. These species and their designated critical habitat are not in or near the Gulf IMTA project area.

### 3.2.2 Sea Turtles

There are five species of sea turtles that could occur within the action area: North Atlantic DPS green (T) (*Chelonia mydas)*, hawksbill (E) (*Eretmochelys imbricate)*, Kemp's ridley (E) (*Lepidochelys kempii)*, leatherback (E) (*Dermochelys coriacea )*, and Northwest Atlantic DPS loggerhead (T) (*Caretta caretta)*. These species are highly migratory and have a complex life history and encompass a diversity of ecosystems from terrestrial habitats where oviposition and embryonic development occur to developmental and foraging habitats in coastal waters (neritic zone) as well as in the open ocean (oceanic zone). Of all the sea turtle life stages, the biology of post-hatchling and early juvenile stages is the least understood (Carr 1986; Bolten et al. 1994). Though there are only seven extant species,[14] sea turtles exhibit a surprising diversity of life history traits. Three generalized sea turtle life history patterns have been identified and evaluated with respect to phylogenetic relationships and reproductive traits. Characteristics of the

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[14] Also olive ridley (*Lepidochelys olivacea*) found primarily in the Pacific and Indian Oceans and the Australian flatback sea turtle (*Natator depressus*) endemic to the sandy beaches and shallow coastal waters of the Australian continental shelf.

developmental stages (oceanic vs. neritic) and adult foraging stage (oceanic vs. neritic) are the primary differences that distinguish the three life history patterns (Bolten 2003).

Adult sea turtles are found throughout the Gulf and feed near the surface and within the water column. Sea turtles can be associated with hard bottom communities, depending on the species of sea turtles and the type of prey being pursued. While different life phases of sea turtles utilize the open waters of the Gulf, the use of water bottoms in deeper Gulf waters represent a fraction of sea turtles' habitat use. Juvenile sea turtles often are found in *Sargassum* mats floating on the surface.

The occurrence of ESA-listed sea turtle species in the action area is expected to be rare. The action area and vessel transit routes are located in Loggerhead sea turtle designated critical habitat and proposed green sea turtle critical habitat.

### 3.2.3 Marine Mammals

The U.S. Gulf marine mammal community is diverse and distributed throughout the northern Gulf waters. The Gulf's marine mammals include members of the taxonomic order *Cetacea*, including suborders *Mysticeti* (i.e., baleen whales) and *Odontoceti* (i.e., toothed whales), as well as the order *Sirenia* (i.e., manatee). All cetaceans (i.e., whales, dolphins, and porpoises), pinnipeds (i.e., seals, walrus, and sea lions), and sirenians (i.e., manatees and dugongs) within waters under the jurisdiction of the United States are protected under the Marine Mammal Protection Act (MMPA) (16 U.S.C. § 1361 et se1.), which is administered by NOAA Fisheries and the U.S. FWS. In addition several ESA-listed species are under either NOAA Fisheries jurisdiction or U.S. FWS jurisdiction (e.g., West Indian manatee (*Trichechus manatus*)).

Twenty-one species of cetaceans and one species of *Sirenia* regularly occur in the Gulf and are identified in the NOAA Fisheries Stock Assessment Reports (Hayes et al., 2018a; 2018b; 2022). Habitat-based cetacean density models are found in Roberts et al., (2016). Two cetacean species, the sperm whale (*Physeter macrocephalus*) and the Rice's whale, (*Balaenoptera ricei*) regularly occur in the Gulf and are listed as endangered under the ESA. The West Indian manatee (*Trichechus manatus*) is listed as threatened under the ESA (82 FR 16668, Apr. 5, 2017).

Bottlenose dolphins (not ESA-listed) (*Tursiops truncatus truncatus*) are currently managed by NOAA Fisheries as 36 distinct stocks that can be separated demographically within the Gulf. These include 31 bay, sound and estuary stocks, three coastal stocks, one continental shelf stock, and one oceanic stock (Hayes et al., 2018a). The common bottlenose dolphin Gulf coastal stocks inhabit coastal waters from the shore to the 65.6 ft (20 m) isobath. The northern Gulf Continental Shelf Stock inhabits waters from 65.6-656 ft (20 to 200 m). The Atlantic spotted dolphin (not ESA-listed) (*Stenella frontalis)* is commonly found on the shelf and shelf edge of the Gulf in continental shelf waters at 32.8-656 ft (10-200 m) deep and the northern Gulf Oceanic Stock occurs in waters seaward of the 200-m isobaths.

North Atlantic right whales (E) (*Eubalaena glacialis)* occur only rarely in the Gulf and their presence is not expected in the project area. There was one sighting of a mother and calf off Pensacola, Florida in March 2020, and a prior sighting from Panama City Beach in January 2018. Critical habitat has been designated for the species, but there is none in the Gulf (50 C.F.R. § 226.203; Hayes et al. 2018b).

Rice’s whale (E) (*Balaenoptera ricei),* formerly thought to be a Bryde’s whale Gulf subspecies, was listed as endangered in 2019 (84 FR 15446, Apr. 15, 2019). On August 23, 2021, NOAA Fisheries revised the taxonomy for this species and changed the name to Rice’s whale (86 FR 47022, Aug. 23, 2021). The ESA-status remains the same. On July 23, 2023, NOAA Fisheries published a proposed rule to designate critical habitat for Rice’s whale, between the 328-1312 ft (100-400 m) isobaths from Texas to the Florida Keys, and a final determination for critical habitat is still pending. Because of the shallow depth of the project area, and the current knowledge of Rice's whale distribution, Rice’s whale are highly unlikely to be found in the project area.

Other whales, such as the sperm whale, Gulf DPS (E) (*Physeter macrocephalus*), false killer whale (not ESA-listed) *(Pseudorca crassidents)* and killer whale (not ESA-listed) (*Orcinus orca*) are uncommon in the Gulf or usually observed offshore in deeper waters, so they would not be expected in the vicinity of the Action area.

### 3.2.4 Essential Fish Habitat (EFH)

The 1996 amendments to the MSA set forth a mandate for NOAA Fisheries and regional Fishery Management Councils to identify and protect important marine and anadromous fish habitat (see 16 U.S.C. § 1855(b)). The EFH provisions of the MSA support one of the nation’s overall marine resource management goals - maintaining sustainable fisheries. The GMFMC boundaries extend from Texas to the Gulf side of the Florida Keys. Atlantic Highly Migratory Species (HMS) are managed by NOAA Fisheries in federal waters of the U.S. EEZ, including the Gulf. Most of the Gulf coastal waters are designated as EFH, and NOAA Fisheries consultation is required for any federal activities that may adversely affect EFH.

The NOAA Fisheries Office of Aquaculture consulted with the NOAA Fisheries Southeast Regional Office Habitat Conservation Division (SERO HCD) on January 3, 2025 (NMFS Office of Aquaculture letter dated December 9, 2024) under the EFH provisions of the MSA. SERO HCD concurred with the Office of Aquaculture’s determination that the proposed activity may affect EFH, but is not likely to cause adverse effects to EFH. Best management practices (BMPs) would be applied and adhered to and potential adverse effects would be alleviated through avoidance and minimization efforts. SERO HCD did not object to the project as proposed, noting that no further consultation on effects to EFH is necessary unless modifications to the project are made. Additionally, SERO HCD has coordinated with the United States Army Corps of Engineers (ACOE) regarding the Joint Public Notice for a Rivers and Harbors Act (RHA) Section 10 permit for this project (SAM-2022-00749-JCC) and had no objection to a permit being issued for the project.

EFH for HMS managed by the NOAA Fisheries is identified in a consolidated Fishery Management Plan (FMP) and identifies geographic areas, rather than specific habitat types, as EFH (NOAA 2009). The Gulf is the only known spawning location for western Atlantic bluefin tuna. EFH for HMS was most recently updated through Amendment 10 to the HMS FMP (89 FR 27715, Apr. 18, 2024). Amendment 10 described EFH for 53 species in the HMS FMP, including many that have EFH designated in the Gulf. On April 18, 2024, NOAA Fisheries published a Notice of Availability of a 5-year review for Atlantic HMS EFH (89 FR 27715). Under the current Atlantic HMS FMP, NOAA Fisheries uses a two-phase process to update

HMS EFH. Phase 1 includes the development of a draft 5-year review, the public comment process, and the publication of a final 5-year review. If there is no new information that warrants updating essential fish habitat, NOAA Fisheries may choose to retain the previously designated Atlantic highly migratory species essential fish habitat. Based on the results of Phase 1, NOAA Fisheries has determined that new scientific information and data warrant the initiation of Phase 2 (i.e., a follow up action that implements the recommended updates to Atlantic highly migratory species essential fish habitat). The final 5-year review found new scientific information warranting updates to essential fish habitat for 40 of 53 HMS managed under the HMS FMP. Once available, draft and final Amendment 17 will be posted on the HMS website.

EFH for Red drum consists of all Gulf estuaries; waters and substrates extending from Vermilion Bay, Louisiana to the eastern edge of Mobile Bay, Alabama out to depths of 25 fathoms; waters and substrates extending from Crystal River, Florida to Naples, Florida between depths of 5 and 10 fathoms; waters and substrates extending from Cape Sable, Florida to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council between depths of 5 and 10 fathoms (1 fathom equals 6 feet).[15]

In the Gulf, Red drum occur in a variety of habitats, ranging from depths of about 43 m offshore to very shallow estuarine waters. They commonly occur in all the Gulf's estuaries where they are associated with a variety of substrate types including sand, mud, and oyster reefs. Estuaries are important to Red drum for both habitat requirements and for dependence on prey species which include shrimp, blue crab, striped mullet and pinfish. The GMFMC considers all estuaries to be EFH for Red drum. Schools of large Red drum are common in the deep Gulf waters with spawning occurring in deeper water near the mouths of bays and inlets, and on the Gulf side of the barrier islands. Spawning areas are Gulf wide from nearshore to just outside state waters. Fall and winter nursery areas include major bays and estuaries including Mobile Bay and Tampa Bay, year round.

EFH for reef fish consists of Gulf waters and substrates extending from the United States/Mexico border to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council from estuarine waters out to depths of 100 fathoms.[16]

EFH for shrimp consists of Gulf waters and substrates extending from the United States/Mexico border to Fort Walton Beach, Florida from estuarine waters out to depths of 100 fathoms; waters and substrates extending from Grand Isle, Louisiana to Pensacola Bay, Florida between depths of 100 and 325 fathoms; waters and substrates extending from Pensacola Bay, Florida to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council out to depths of 35 fathoms, with the exception of waters extending from

[15] Red drum EFH
[16] Reef Fish EFH

Crystal River, Florida to Naples, Florida between depths of 10 and 25 fathoms and in Florida Bay between depths of 5 and 10 fathoms.[17]

EFH for coastal migratory pelagic resources consists of Gulf waters and substrates extending from the United States/Mexico border to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council from estuarine waters out to depths of 100 fathoms.[18]

EFH for spiny lobster consists of Gulf waters and substrates extending from Tarpon Springs, Florida to Naples, Florida between depths of 5 and 10 fathoms; waters and substrates extending from Cape Sable, Florida to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council out to depths of 15 fathoms.

EFH for coral species consists of the total distribution of coral species and life stages throughout the Gulf including the East and West Flower Garden Banks off Texas, Florida Middle Grounds, southwest tip of the Florida reef tract, and predominant patchy hard bottom offshore of Florida from approximately Crystal River south to the Keys, and scattered along the pinnacles and banks from Texas to Mississippi, at the shelf edge.

NOAA designated *Sargassum,* a type of floating brown algae, as EFH in the Gulf because it provides important habitat for many species of fish, invertebrates, sea turtles, and sea birds. Under the Endangered Species Act, *Sargassum* has been designated as Critical Habitat for loggerhead sea turtles within two distinct areas in the U.S. South Atlantic and the Gulf (79 FR 39855, June 10, 2014; 50 C.F.R. 226.223).

A Habitat Area of Particular Concern (HAPC) is a defined subset of EFH that exhibits one or more of the following traits: rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to anthropogenic (or human impact) degradation. A HAPC can include a specific location (a bank or ledge, spawning location) or cover habitat that is found at many locations (e.g., coral or, nearshore nursery areas, or pupping grounds). ). In addition to the HAPC for bluefin tuna noted above, HAPCs have been designated in the Gulf for coral/coral reefs/hardbottom, *Sargassum*, spiny lobster, snapper/grouper, reef fish, penaeid shrimp, dolphin/wahoo, sea turtles and several coastal pelagic species. The HMS FMP also has identified a HAPC for western Atlantic bluefin tuna in the Gulf, due to this area being the primary spawning location of the stock. The project site is not located in any HAPCs.

[17] Shrimp EFH

[18] Coastal Migratory Pelagic Resources EFH

### 3.2.5 Sea Birds and Insects

The Gulf is a critical marine region that provides breeding, staging, migration, and wintering habitat for a wide variety of North America's birds, including sea birds (as defined by Croxall et al., 2012). Information remains sparse about seabird species composition, distribution, and abundance Gulf-wide.[19] A recent study found that around 76 percent of pelagic seabirds migrate through the Gulf to reach critical breeding and wintering habitats on lands outside the Gulf region (Michael et al. 2023). During migration, birds passing through the Action area can be exposed to environmental threats or adverse impacts by a variety of human-related activities including oil spills, fisheries interactions (i.e., gill-net entanglement, entrapment, and ingestion of marine debris), contaminants, habitat loss, bycatch, and human disturbance (Dias et al., 2019; Strongin et al., 2020). The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §703-712) protects over 800 species of migratory bird species from any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof, unless permitted by regulations (i.e., for hunting and subsistence activities). All species of seabird native to the Gulf are protected under the MBTA, with some classified as threatened, endangered, or candidate species under the ESA and under state law and designations.

Seabirds in the Gulf are classified under three orders: *Charadriiformes* (gulls and terns, and phalaropes), *Pelicaniforms* (frigatebirds and pelicans, tropicbirds, gannets and boobies); and *Procellariiforms* (storm-petrels and shearwaters). Common seabirds in the Gulf are ring-billed gull, laughing gull, common tern, Caspian tern, magnificent frigatebird, brown pelican, northern gannet, band-rumped storm-petrel, and Audubon's shearwater. Most seabirds in the Gulf are found along the continental shelf and adjacent coastal and inshore habitats and some (e.g., boobies, petrels, and shearwaters) are only found offshore around the deeper waters of the continental slope and Gulf basin. Seabirds are a highly mobile group that migrate great distances from their nest sites to forage, and some can circumnavigate the globe in the nonbreeding season, such as the albatrosses. Most seabirds congregate and forage in flocks consisting of various species, which are often associated with predatory fish and marine mammals during foraging events (Burger 2017; Michael et al. 2023).

The list of bird species below is not meant to be exhaustive, but rather represents a list of piscivorous (fish feeding) species that are seasonally abundant within nearshore waters of the northern Gulf and are likely to occur near the Action area (Personal communication Jeffrey S. Gleason, Ph.D., Gulf Migratory Bird Coordinator, U.S. FWS, July 2024). Plunge-diving species (piscivorous) include: Eastern Brown Pelican, Herring Gull, Royal Tern, Ring-billed Gull, Northern Gannet, Sandwich Tern, Brown Booby, Black Tern, Laughing Gull, Magnificent Frigatebird. Pursuit-diving Species (piscivorous) include Double-crested Cormorant and Common Loon.

### 3.2.6 Species under U.S. Fish and Wildlife Service Jurisdiction

Under Section 7 Provisions of the Endangered Species Act (ESA), NOAA Fisheries prepared a Biological Evaluation to determine if the proposed IMTA project was likely to affect ESA-listed species and critical habitat and submitted a request for informal consultation to the U.S. FWS

[19] Studying Seabirds of the Gulf of Mexico

Alabama Ecological Services Field Office on January 30, 2025. On March 5, 2025, the U.S. FWS provided their concurrence with NOAA Fisheries determination that no federally listed species or critical habitat would be adversely affected by the IMTA project and recommended using best management practices specific to the project. The following is a summary of NOAA Fisheries' consultation.

The U.S. FWS Information for Planning and Consultation Tool was used for analysis. Based on the analysis results, the ESA-listed species under the jurisdiction of the U.S. FWS that may occur within the boundaries of the project area, include: the endangered black-capped petrel (*Pterodroma hasitata*), the threatened West Indian Manatee (*Trichechus manatus*) and the candidate species Monarch Butterfly (*Danaus plexippus*). The U.S. FWS has identified the Monarch butterfly (*Danaus plexippus*) as a candidate species to be listed as endangered or threatened under the ESA and it may occur in the area during seasonal migrations. The black-capped petrel was recently ESA-listed as endangered (88 FR 89611, Dec. 28, 2023). This species has been observed in the northern Gulf but not near the action area.

NOAA Fisheries made the determination that the proposed activity may affect but is not likely to adversely affect the endangered black-capped petrel and the candidate species Monarch Butterfly. It was also determined that the proposed activity may affect but is not likely to adversely affect the Bald eagle and Golden eagle under the Bald and Golden Eagle Protection Act as Birds of Conservation Concern. Additionally, NOAA Fisheries determined that the proposed activity may affect but is not likely to adversely affect 14 bird species under the Migratory Bird Treaty Act. Some species may be negatively affected by the proposed action but any impacts would not rise to the level of reasonably foreseeable significant adverse (population-level) effects. The Nationwide Avoidance and Minimization Conservation Measures for Birds (Version 2, July 2024), would be applied to alleviate any potential adverse effects to bird species found within the proposed action area

NOAA Fisheries made the determination that the proposed activity may affect but is not likely to adversely affect the threatened West Indian Manatee (*Trichechus manatus*) which prefers shallow coastal waters, estuaries, and river mouths, usually staying within a few miles of land, however, they can occasionally be found further out depending on their foraging needs and the specific location. As discussed in Section 4.2.1.6 Vessel Strike, manatees as well as other marine mammals are at risk for vessel strike. Best management practices would be applied and adhered to, including but not limited to the, Standard Manatee Conditions for In-Water Activities.

### 3.3 Economic and Social Environment

This section describes the existing communities, businesses related to marine aquaculture, commercial fisheries, tourism and recreational fisheries, impacts to particular communities, and existing military and cultural and historic resources in the area of the proposed Gulf IMTA project. The Gulf IMTA discussed in this EA would be sited in state waters of Alabama, approximately 1.6-2.7 nm (3-5 km) seaward of the Fort Morgan peninsula and approximately 6.5 nm (12 km) southeast of Dauphin Island in the north central Gulf. The proposed location of the IMTA was developed based on the NOAA-led site suitability analysis and Mississippi-Alabama Sea Grant Consortium-facilitated engagement process with anglers, resource managers, researchers, and others in an effort to minimize user group overlap (Randall et al. 2025).

### 3.3.1 Coastal Communities

Coastal Alabama is composed of Mobile County (Dauphin Island, Bayou La Batre) and Baldwin County (Gulf Shores, Bon Secour) as well as the surrounding state waters in the Gulf. Baldwin County and Mobile County are the only two counties in Alabama which border the Gulf.

The Fort Morgan Peninsula is attached to the eastern mainland and extends westward between Mobile Bay and the Gulf. A large beach exists on the Gulf side, with numerous lagoons and marshes on the bayside (Handley et al. 2007). Bon Secour National Wildlife Refuge is also located on Fort Morgan Peninsula, consisting of approximately 7,000 acres of coastal lands and serves as an important habitat for threatened and endangered species like migratory birds, the endangered Alabama beach mouse, and loggerhead, green, and Kemp's ridley sea turtles. Mobile Point is located at the apex of a long, low, narrow, sandy peninsula between the Gulf on the south and Bon Secour Bay and Navy Cove on the north. The point is the eastern limit of the entrance into Mobile Bay, which it partially encloses. Mobile Point extends from Gulf Shores to the west, towards historic Fort Morgan at the tip of the peninsula. It is located in Baldwin County, Alabama. At its western tip is Fort Morgan, which faces Fort Gaines sitting across the inlet to the Mobile Bay, on Dauphin Island.

Baldwin County is located within the East Gulf Coastal Plain physiographic section of Alabama. The East Gulf Coastal Plain comprises Mesozoic and Cenozoic sediments (Tew and Ebersol 2013), whose deposition depressed the Gulf to its current elevation and created deep oil reserves in the Gulf and southwestern Alabama (Hine et al. 2013). The East Gulf Coastal Plain ecoregion is a broad flat coastal plain which stretches across southern Mississippi, southern Alabama, and the northwestern panhandle of Florida. This area is characterized with coastal dune and grassland vegetation along the northern Gulf, with vegetation consisting largely of herbaceous and embedded shrublands on barrier islands and other near-coastal areas where salt spray, saltwater overwash, and sand movement are important ecological forces.[20]

Dauphin Island is the easternmost island in the Mississippi-Alabama barrier chain that separates the Mississippi Sound from the Gulf and lies 8 km (4.3 nm) off the southern shore of Mobile County and 13 km (7 nm) northwest of the project site. It is a valuable microtidal barrier island (Froede 2007), meaning that wave and storm activity dominate the geomorphological processes of this island because of its sandy geologic foundation. The island is approximately 15 miles long and varies from 1.6 miles to 0.25 miles wide and acts as a protective barrier for the coastline. The islands and underlying alluvial deposits dissipate some of the energy of oncoming storms and help alleviate impacts on the Gulf coastline (Morton, 2008). Over the last century, the island has grown westward as a result of lateral wind deposition. Tidal inlets, produced by high energy storm events (hurricanes and tropical storms) have subdivided the spit into a series of islands (Nummedal et al. 1980). Nautical charts show that these inlets have closed, reopened, and changed location over time (Hardin et al. 1975).

The IMTA project would be sited in state waters of Alabama seaward of Fort Morgan. The Fort Morgan peninsula is located in Baldwin County, Alabama and is to the east of Dauphin Island, separated by the mouth of Mobile Bay, in Mobile County. Most of unincorporated Fort Morgan

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[20] DWH Oil Spill - Alabama TIG Final Restoration Plan and Environmental Impact Statement

is the site of the Bon Secour National Wildlife Refuge, while the nearest town is Gulf Shores to the east. Baldwin County is the largest county by total area in Alabama and Mobile County the fourth largest. Baldwin County has a higher median household income and lower poverty rate compared to both Mobile County and Alabama statewide. The U.S. Census estimates from 2022 provide the household income, poverty rate, and racial demographics of Mobile and Baldwin counties (U.S. Census Baldwin and Mobile).

### 3.3.1.1 Impacts to Other Communities

Disproportionate impacts are considered in federal actions, including under NEPA, so that people are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards. NOAA Fisheries Community Social Vulnerability Toolbox assesses poverty, population composition, and personal disruption as indicators of social vulnerability. A high rank in any of these indices can indicate a population that is more vulnerable to environmental or regulatory change (Jepson and Colburn 2013) Community Social Vulnerability Indicators for Dauphin Island, Bayou La Batre, Gulf Shores, and Bon Secour are shown in Table 4.

Table 4. Community Social Vulnerability Indicators

| | **Poverty** | **Population Composition** | **Personal Disruption** |
|---|---|---|---|
| **Dauphin Island** | Low | Low | Low |
| **Bayou La Batre** | High | Medium-High | High |
| **Gulf Shores** | Low | Low | Low |
| **Bon Secour** | Low | Low | Medium |

Source: NOAA Fisheries Social Indicators for Coastal Communities Map (https://www.st.nmfs.noaa.gov/data-and-tools/social-indicators/). Accessed June 13, 2023.

Fishing engagement and reliance indices portray the importance to or level of dependence on commercial or recreational fishing to coastal communities and are used in NEPA analyses to identify the communities that can be affected by regulatory change (Jepson and Colburn, 2013). The fishing engagement and reliance indicators for the communities of Dauphin Island, Bayou La Batre, Gulf Shores, and Bon Secour are provided in Table 5. The western Fort Morgan peninsula is not evaluated on the Social Indicators for Coastal Communities tool. These four communities are also contrasted in terms of commercial fishing engagement and reliance as well as recreational fishing engagement and reliance.

Table 5. Fishing Engagement and Reliance Indicators

| | Commercial Fishing Engagement | Commercial Fishing Reliance | Recreational Fishing Engagement | Recreational Fishing Reliance |
|---|---|---|---|---|
| **Dauphin Island** | Low | Low | High | High |
| **Bayou La Batre** | High | Medium-High | Medium | Medium |
| **Gulf Shores** | Low | Low | High | Medium |
| **Bon Secour** | Medium | Medium | Low | Low |

Source: NOAA Fisheries Social Indicators for Coastal Communities Map (https://www.st.nmfs.noaa.gov/data-and-tools/social-indicators/). Accessed June 13, 2023.

### 3.3.2 Business and Marine Economy

The only two counties on Alabama's Gulf coast are Baldwin and Mobile. Baldwin is the largest county in Alabama by area and is located on the eastern side of Mobile Bay. Mobile County is located in the southwestern corner of Alabama and it is the third-most populous county (population 411,640) in the state, followed by Baldwin County (population 253,507) (U.S. Census Bureau, 2024). The city of Mobile's deepwater port on the Mobile River has long been integral to the economy for providing access to inland waterways as well as the Gulf. Healthcare and social services along with retail trade are the largest employers in both Baldwin and Mobile counties. The marine economy refers to the fishing and marine-related industries in a coastal state and consists of two industry sectors: (1) seafood sales and processing and (2) transportation support and marine operations (NOAA NMFS 2023). Specific sectors relevant to aquaculture research and development include those associated with construction, transport, and deployment of the structural materials as well as cage stocking, grow-out operations, and harvesting of the products.

#### 3.3.2.1 Commercial Shipping and Vessel Traffic

The city of Mobile is the site of the only deep-water seaport in Alabama, the Port of Mobile. The geographic scope of impacts generated by the port terminals are broadly distributed. The construction and deployment of the IMTA system may utilize the Port of Mobile and navigation channels.

Military, commercial, institutional, and recreational activities take place simultaneously in the Gulf and have coexisted safely for decades. These activities coexist safely because established rules and practices lead to safe use of the waterways. There are existing navigation and vessel regulations and permitting processes in place that are designed to ensure that hazards to navigation and impacts on vessel traffic patterns are minimized to the extent feasible, like requirements for aquaculture gear to be an appropriately marked "private aid to navigation" (PATON) or the use of Local Notices to Mariners (LNM) before installation/construction activities. Operators of recreational and commercial vessels have a duty to abide by maritime regulations administered by the U.S. Coast Guard. There are a variety of vessel routing measures in the Gulf to ensure safety of navigation that shape existing traffic patterns, including traffic separation schemes, fairways, and corridors (Figure 7). Cargo vessels tend to follow typical routes offshore while passenger and recreational vessel transits are more dispersed. Vessel use of the predetermined routes in the Gulf is high and variable (Riley et al. 2021).

The NCCOS siting report analyzed potential user and spatial conflicts based on vessel traffic. Industry, navigation, and transportation accounted for seventeen data layers in the NCCOS Siting Report (Randall et al. 2025). These data come from the U.S. Coast Guard's collection of Automatic Identification System (AIS) vessel traffic data which includes ship name, purpose, course, and speed. Vessel traffic data was categorized by vessel type and the sum of vessel transits per grid cell was calculated (Randall et al. 2025). Data were analyzed regarding relative interference with navigation and navigation routes for potential site selection by NCCOS. The AIS 2019 total vessel count ranges from 2 to 84 vessels for the preferred Cluster 3-B (Randall et al. 2025).

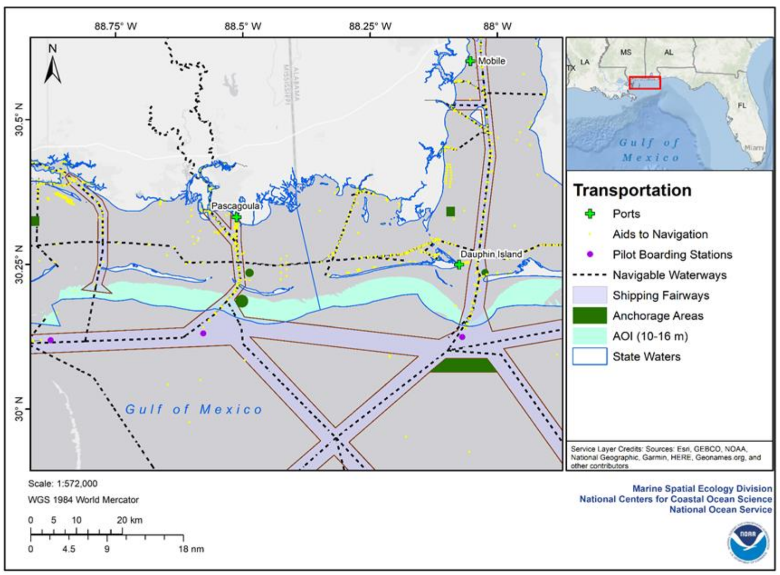


Figure 7. Navigation and Transportation Considerations for the Area of Interest

### 3.3.2.2 Commercial Fisheries, Aquaculture and Fishery Products

The commercial seafood industry consists of the commercial harvesting, processing, wholesaling, and retailing of seafood products. The Alabama Department of Conservation & Natural Resources manages commercial fisheries in state-owned waters and issues commercial saltwater fishing licenses to Alabama fishermen (AL Code § 9-12-113 (2023)). Alabama generally has liberal open fishing seasons and some species are subject to strict season, bag, and size regulations while other fish species, such as goliath grouper, nassau grouper and a variety of sharks and rays are strictly prohibited from fishing (NOAA, 2024).

Fort Morgan is the dividing point between two of the state's most important fisheries. To the south lies the Gulf, with reef species and big game fish. To the north, Mobile Bay has fish-filled shallow waters. Redfish can be caught in Mobile Bay year-round; kingfish (king mackerel), cobia, and many other fish species such as amberjack, mahi, marlin, and wahoo are caught in deeper waters 25-50 miles off shore of Fort Morgan.

- Seafood including shrimp, blue crabs, oysters, red snapper, vermillion snapper, king and spanish mackerel, flounder, menhaden, mullet, and sharks are among the many types of seafood harvested in Alabama. In particular, the area is located within a popular and valuable area of the Gulf for commercial shark harvest. Oyster harvesting is an active industry in Mobile Bay. Eastern oyster (*Crassostrea virginica*) has been identified for inclusion in the Gulf IMTA, but would not be sold or consumed per Alabama Department of Health. Alabama's shellfish aquaculture industry produces oysters (*Crassostrea virginica*) through off-bottom farming using adjustable long-line and floating cage systems.
- The value of the Alabama commercial oyster farms was estimated to be $3,200,000 based on wholesale prices
- The number of farmed single-market oysters harvested based on converting meat pounds was estimated at 5.2 million in recent years (Grice and Tarnecki 2024)
- One commercial hatchery and two commercial nurseries are operational in Alabama.
- Sixty-one acres were permitted for commercial oyster aquaculture with 45 acres used in production

The Alabama shrimp industry consists of wild-caught and farm-raised species, with wild-caught having a far bigger harvest. The waters of Alabama contain fifteen to twenty-two species of shrimp, but only three species make up the vast majority of shrimp that are eaten and found in commercial quantities in the Gulf from Texas to North Carolina: brown (*Farfantepenaeus aztecus*), white (*Litopenaeus setiferus*), and pink (*Farfantepenaeus duorarum*). The port of Bayou La Batre and Bon Secour of Gulf Shores are two important seafood ports. Seafood processing is a major industry in Alabama. In addition to processing seafood landed in the state, Alabama-based companies process seafood from other states.

The demand for shrimp has increased substantially in recent decades and about one-quarter of the seafood Americans eat is shrimp. The rising demand, however, has been met by ever-cheaper imports of farmed shrimp and consequently, the market price for U.S. wild-caught shrimp has plummeted. At the same time, costs of production for U.S. shrimp fleets—including fuel, labor, and vessel costs—continued to rise. These trends have created a difficult economic situation for the U.S. shrimp harvest industry and local economies for at least the last two decades (NOAA 2024). The NOAA Fisheries 2021 Report, Fisheries Economics of the United States, describes total economic impacts as the sum of direct, indirect and induced impacts including: jobs, sales, value-added, and income impacts from the seafood industry as well as the economic activity generated throughout each region's broader economy from this industry. To demonstrate how commercial fisheries landings affect the economy in a region, four different measures are commonly used: sales, income, value-added, and employment. The economic impact of the seafood industry in Alabama, without imports, in terms of the number of jobs available can be found using the NOAA's U. S. Fisheries Economics Gulf Alabama.

### 3.3.2.3 Tourism and Recreational Fishing

A significant portion of Alabama's tourism and recreation industry comes from coastal-based tourism and recreation. Alabama had 28.2 million visitors in 2021 spending a record amount of almost $20 billion. In 2022, the tourist and tourism industry spent $22.4 billion in Alabama's attractions and events (Department 2022). The most visited counties in the state were Baldwin, Jefferson, Madison, Mobile, and Montgomery with the Gulf Coast Region accounting for 45.6 percent of the state's travel-related earnings.

Economic impacts of recreational fishing are based on spending by recreational anglers and are commonly measured in terms of: sales, income, value-added, and employment. Sales impacts totaled $766.9 million, and income impacts generated $223.6 million in Alabama. Value-added impacts were $452.4 million. Finally, employment impacts from expenditures on saltwater recreational fishing in Alabama generated 7,681 jobs (NOAA NMFS 2023).

A study on coastal Alabama recreational live bait reported recreational fishing as a major industry, identifying recreational saltwater fishing as an integral part of the coastal Alabama economy as evidenced by the increase in the sale of fishing licenses since 1995 (Hanson et al., 2004). In addition, Red drum (*Sciaenops ocellatus*) is a common recreational fish targeted in Mobile Bay alongside mullet and flounder. Red drum are subject to recreational size, daily creel, and possession limits in state waters (Outdoor Alabama, 2023). Bay anglers generally fish from private boats, beaches, piers, and jetties, whereas offshore anglers tend to focus on a few naturally occurring and topographic highs such as the various artificial reefs and gas rig features located in and around the Bay and nearshore areas (Outdoor Alabama, 2023). While Red drum in federal waters are being managed under a GMFMC, Fishery Management Plan under which no harvest (recreational or commercial) is allowed in the federal waters of the Gulf (50 C.F.R. Parts 604 and 653), Alabama (and most Gulf states) have length and bag limits for Red drum and have designated Red drum as game fish in state waters. Alongside Red drum, spotted sea trout is an important game fish in Alabama and commercial fishermen are prohibited from possessing them, though they may be caught using a recreational license within adherence to all bag and creel limits. Alabama's Commercial Saltwater Fishing License includes Atlantic tripletail and allows commercial possession of three fish per license. In 2020, 267,000 spotted seatrout were harvested and 1,072,000 released and 224,000 Red drum were harvested and 727,000 released (NOAA NMFS 2023).

### 3.3.3 Military Activities

Spatial data layers included in the NCCOS suitability analysis included active national security areas, maritime navigation ocean industries, and natural resource management (Randall et al. 2025). Two submodel datasets related to national security were included: Special Use Airspace (SUAs) and Military Operating Area (MOAs) - Eglin Gulf Test and Training Range, Pensacola. Both received a score of one, which indicates high suitability relative to other grid cells for aquaculture. National security operational areas such as MOAs and SUAs were reviewed alongside other areas of national security interest in and around the Area of Interest. The MOA Eglin Gulf Test and Training Range, the MOA Pensacola as well as SUAs overlap with the Area of Interest. The information about the final site selection was sent to the Department of Defense

(DoD) Clearinghouse for a more specific analysis of the site with respect to defense use conflict. The DoD Navy component indicated that the IMTA site would be located in a restricted area because of significant Navy air activity. The Navy does not object to the project subject to the limitations and conditions agreed to by the DISL project proponents, confirmed via email dated December 12, 2024.

### 3.3.4 Cultural and Historic Resources

As defined in Section 106 of the National Historic Preservation Act (NHPA) (36 C.F.R. § 800.16[d]), the Area of Potential Effects (APE) is the geographic area, or areas, within which an undertaking can directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. NOAA Fisheries consulted with the Alabama Historic Commission, State Historic Preservation Officer, for the proposed action being funded, specifically, the deployment and establishment of the Gulf IMTA project in Alabama state waters and the prerequisite environmental sampling and water quality monitoring needed for finalizing site selection. Accordingly, the APE for this undertaking is defined as the depth and breadth of the seabed that could be affected by seafloor and ground-disturbing activities associated with site assessment and characterization activities and the temporary placement (i.e., deployment, maintenance, and decommissioning) of the IMTA and AquaFort platform within the project area. The APE for site assessment and characterization activities includes the discrete horizontal and vertical areas of the seafloor that can directly affect historic properties on or below the seafloor, if present. These activities include benthic sampling, bottom and nekton trawl surveys, installation of the IMTA system and the AquaFort, its mooring and vessel anchoring system.

An archaeological assessment was conducted per Section 106 of the NHPA and its implementing regulations, 36 C.F.R. 800, which requires an assessment of the potential impact of an undertaking on historic properties that are within a proposed project's APE (Hiroji 2022). The archaeological assessment survey observed no evidence of relict landforms that could have supported human occupation sites, and no areas are recommended for avoidance or investigation based on the prehistoric archaeological potential (Hiroji 2022a, 2022b).The archaeological assessment documented thirteen unidentified sidescan sonar contacts and nine unidentified magnetic anomalies within the Cluster 3B survey area. All unidentified sidescan sonar contacts and magnetic anomalies in Cluster 3B are interpreted as modern debris or natural features, likely associated with modern fishing, shipping, artificial reef development, or are geologic in origin and none are recommended for avoidance or investigation based on archaeological potential. Therefore, no areas were recommended for avoidance or further investigation based on the prehistoric archaeological potential.

The NHPA defines historic properties as the prehistoric and historic archaeological sites, structures, buildings, objects, or any other physical evidence of human activity that is included in, or eligible for inclusion in, the National Register of Historic Places. Federal laws and regulations protecting these properties include 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. There are nearly 2,200 members of the only federally recognized tribe of Poarch Creek Indians located in Atmore, Alabama and there are no land areas of federally recognized tribes in Baldwin or Mobile counties (BIA 2024).

The National Register of Historic Places has records of two listed sites in the Fort Morgan area (Figure 8). The U.S.S. Tecumseh is northwest of Fort Morgan in Mobile Bay. Sand Island Light is recorded southwest of Fort Morgan off Mobile Point at Latitude 30-18'N, Longitude 88-05'W. Both listings are outside the proposed siting in State waters of Alabama seaward of Fort Morgan at approximately 30°12'N, 88°20'W (30.2, -80.333) (Figure 8). Consultation with the Alabama State Historic Preservation Officer (SHPO) was completed pursuant Section 106 of the National Historic Preservation Act, with the SHPO concurring with NOAA's finding of no effect on April 12, 2024.

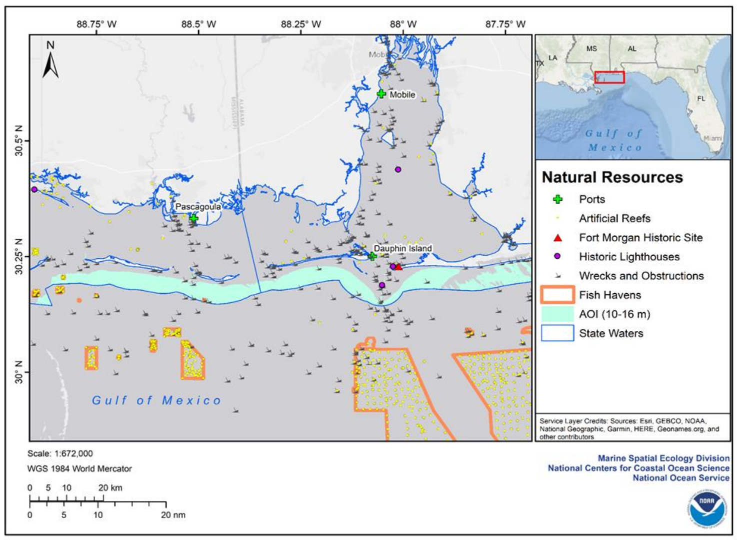


Figure 8. Natural and Cultural Resource Considerations for the Area of Interest

Source: NCCOS IMTA Siting Report. (Randall et al. 2025)

## 4.0 Environmental Effects

In accordance with NAO 216-6A, "when considering the proposed action of issuing a financial assistance award under NEPA, the decision maker must consider the impacts of the activities to be funded by the award." This chapter evaluates the environmental effects on the physical, biological, and socioeconomic resources that would result from the proposed action and the No Action alternatives described in Chapter 2.

In accordance with NOAA's companion manual for NAO 216-6A, the environmental effects analysis must analyze the impacts of the proposed action and the alternatives in clear terms and with sufficient information. NOAA Fisheries is utilizing the following definitions:

- Direct effects, which are caused by the action and occur at the same time and place.
- Indirect effects, which 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.
- Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from actions with individually minor but collectively significant effects taking place over a period of time.

The significance of the effects, in terms of the context of the proposed action, intensity of the effect and its duration (short-term, long-term), as well as the extent to which an effect is adverse at some points in time and beneficial in others are evaluated in this chapter.

- Long-term refers to a potential impact of long duration of weeks to years.
- Short-term refers to a potential impact of short duration lasting minutes to days.
- Minor is a relative term used to describe impacts to the structure or function of a resource that might be perceptible but are typically not amenable to measurement. These are typically localized to the project site but may in certain circumstances extend to beyond a project site.
- Moderate is a relative term used to describe impacts to the structure or function of a resource that are more perceptible and, typically, more amenable to quantification or measurement. These can be both localized, or may extend beyond a project site.
- Major is a relative term used to describe impacts that are typically obvious, amenable to quantification or measurement, and result in substantial structural or functional changes to the resource. These can be both localized, or may extend beyond a project site.
- Negligible is a relative term used to describe impacts that are below minor to the point of being barely detectable and therefore discountable. Factors for consideration include: procedures that use generally accepted industry standards or best management practices that have been tested and verified at the time an activity is proposed; whether an activity has understood or well-documented impacts at the time an activity is proposed; whether control and quality measures are in place (e.g., monitoring and verification; emergency

plans and preparedness); the direct, indirect, and cumulative effects of the proposed activity on a resource; and the context and intensity of expected discharges or deposits and disturbances to resources, like the submerged lands of any sanctuary, corals, and other living, cultural, and historical resources.

### 4.1 Resource Categories Eliminated from Further Analysis

A range of potential impacts associated with the IMTA project were evaluated using the best available information. Section 1.9 describes resources outside the scope of this EA. This section details resources for which the proposed action would have no impact. This includes climate and air quality because of the small scale of the project and limited emissions (Chapter 4.1.1, 4.1.4); closed areas, marine protected areas, national marine sanctuaries and artificial reefs because these resources are not located in or within close proximity to the action area (Chapter 4.1.2, 4.1.3); military activities as confirmed through the DOD clearinghouse process and subsequent discussions (Chapter 4.1.6); and cultural and historic resources because of the limited visibility of the project from shore and as confirmed through NHPA consultation (Chapter 4.1.7). The proposed action is not expected have a disproportionately high or adverse environmental or human health effects on particular communities given the project footprint and scope (Chapter 4.1.5). For all of these resources, the no action alternative would result in no impacts to baseline conditions because the project would not be funded and would not likely occur.

#### 4.1.1 Climate

The IMTA project could be vulnerable to more frequent storm events in the Gulf, however, mitigation measures in the operations and maintenance plan would minimize the potential for damage to the environment from such an event. Hurricane impacts on the IMTA project are minimized by selecting the months of October through May for IMTA deployment and operations. High seas are still possible during these months, so the entire system, including the AquaFort platform and mooring system, has been stress-modeled and designed to withstand extreme weather conditions. The IMTA structure was designed to withstand a worst-case storm condition as determined to be from the south consisting of waves with a significant height of 17 ft (5.3 m), a dominant period of 10.4 s, a near surface velocity of 1.57 ft/s (0.48 m/s) and a windspeed of 74.48 ft/s (50.78 mph). The results of using this condition as input to a numerical model were used to determine structure and mooring component capacity. Proper monitoring and maintenance of the mooring lines and attachments would be conducted regularly with divers and by ROV to inspect for wear, abrasions, and misalignment, and addressing potential weaknesses before any severe weather occurs. The IMTA system is also susceptible to fluctuations in salinity, temperature, dissolved oxygen and harmful algal blooms from extreme weather which can directly stress or alter the physiology of raised species.

Emissions of greenhouse gasses (GHGs) from the IMTA project are related to its operation, support facilities used for rearing the marine species, materials (feed), and vessels used for deployment and operation (see additional analysis in Section 4.1.4) . Seaweed and shellfish farms have the ability to sequester carbon, denitrify water and stabilize environments (Gentry et al. 2020; Halpern et al. 2012). There are some general patterns and estimates of GHG emissions from different types of farms that may be used to infer impacts. Finfish produce greater emissions in large part because of the feed conversion ratio (amount of food needed to produce live weight gain), energy use in onshore systems, feed transfer, and product delivery. Bivalves (oysters, mussels, and clams) have lower emissions because of the fact that they are filter feeders and no energy is used for feed production once they leave the hatchery and enter the growing environment. Bivalves can also act as carbon sinks through sequestration in their shells. Seaweed has the lowest emissions as compared to finfish and bivalves, stemming from the hatchery and processing stages as well as shipping. Seaweeds may also serve as carbon sinks through export and sequestration of seaweed biomass in both coastal and deep water habitats (Krause-Jensen and Duarte 2016). Increasing the overall carbon sink for a farming operation could help mitigate the GHG emissions.

Aquaculture is considered to make a minor contribution to greenhouse gas emissions although the extent to which this occurs depends on the species, size and location of facilities (Food and Agriculture Organization of the United Nations, 2009). Aquaculture emissions are orders of magnitude lower than that of other agriculture production (MacLeod et al. 2020, Halpern et al., 2022). Additional contributors to GHG emissions in the Gulf include oil and gas operations, commercial and recreational fishing operations, commercial shipping, and recreational boating. Relative to these aforementioned activities, emissions from Alternative 1 would have no impact on climate compared to other sources in the region.

### 4.1.2 Closed Areas, Marine Protected Areas, and National Marine Sanctuaries

There are two National Marine Sanctuaries within the Gulf: the Florida Keys National Marine Sanctuary (FKNMS) and the Flower Garden Banks National Marine Sanctuary (FGBNMS) (Section 3.1.4). In the Gulf, regulations outlined in 50 C.F.R. Part 622 define specific areas and seasons where fishing is prohibited to protect various species of Gulf reef fish in order to conserve and protect vulnerable reef fish populations. Similarly, there is a designated area within the Gulf where fishing for Atlantic HMS like tuna, billfish, sharks, and swordfish is restricted under regulations outlined in 50 CFR Part 635, essentially meaning this area is closed to fishing for these specific species because of conservation concerns, primarily focused on protecting spawning grounds for Atlantic bluefin tuna in the Gulf. The IMTA project site is not located in or within close proximity to either the FKNMS or the FGBNMS or these closed areas as defined in 50 C.F.R. Parts 622 and 635. Alternative 1 is therefore expected to have no direct or indirect impact on these resources.

### 4.1.3 Offshore Artificial Reefs

The Alabama Marine Resources Division (AMRD) manages a diverse artificial reef program (Section 3.1.5). These artificial reefs are composed of rocks, subway cars, ships, airplanes, specially designed concrete structures, and other objects placed on the ocean floor to enhance fish habitat.[21] The AMRD provides an interactive offshore reef map that provides information about the types of materials used to construct each reef and its boundaries. As recommended by the ACOE, a setback of 500 ft (152 m) is used to preserve ecosystems associated with the artificial reef and fish habitat. There are several artificial reef permitted areas approximately 17 nm or more to the south of the project site. Alternative 1 is expected to have no direct or indirect impact on these resources given this distance.

### 4.1.4 Air Quality

The U.S. EPA established National Ambient Air Quality Standards (NAAQS) (Clean Air Act (CAA) 1990 amended) which are set forth in 40 C.F.R. Part 50 for six common pollutants, known as criteria air pollutants, that are considered harmful to the public health and the environment (EPA 2019). These six criteria pollutants include carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, Particulate Matter, (particulate matter with an aerodynamic diameter less than or equal to 10 microns ($PM_{10}$) and particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$)), and lead (EPA 2024). The CAA requires state governments to develop plans to comply with NAAQS and states may establish their own Ambient Air Quality Standards. The Alabama Department of Environmental Management's Air Division administers the state's Air Pollution Control Program. Alabama's ambient air quality standards are based on the National Primary and Secondary Ambient Air Quality Standards.

There are no large sources of anthropogenic emissions expected to be released into the atmosphere from IMTA project activities which involve only small quantities of fuel for equipment and boating operations used mostly during transiting for scheduled maintenance, feeding, field assessment activities, as well as emissions produced as a result of electricity used in related land-based facilities. Vessels transiting for project work would be traveling slowly (10-20 kts) and generally transit to the work location and remain in the area until routine daily activities are completed; vessel trips would be coordinated to minimize unnecessary transits. There are an estimated 236 vessel round trips planned during the project over 5 years (less than 50 trips per year) (Table 2). The brief underway transit time (3-5 hours) for 1 vessel per round trip relative to the large number of recreational and commercial vessels using the north central Gulf. Data from the automated Identification System (AIS) provides the total vessel count (i.e., vessel traffic) of each vessel type (i.e., tanker, cargo, passenger, tug and tow, pleasure and sailing craft, and fishing vessels, within the project area during 2019, the most recent year available from the NOAA Office of Coastal Management (OCM) as shown in Figure 3 (NCCOS 2023). The impact on air quality because of the emissions generated by motor vessels used during the project (Alternative 1) would be direct, short term, and negligible.

[21] Alabama Artificial Reefs

#### 4.1.5 Impacts to Particular Communities

NOAA Fisheries is responsible for addressing ecosystem stressors that disproportionately and adversely impact particular communities who harvest fish and shellfish as a major supplementary source of dietary protein or that might disproportionately depend on shoreline fishing as a low-cost source of recreation. Regional coastal communities can potentially benefit from the advancement of knowledge and understanding gained from the IMTA project with information concerning the nutritional value that fish and shellfish cultivation and harvest provide. There are no disproportionately-impacted populations near the project site, but such populations may exist in communities living onshore near staging areas used for the deployment of the AquaFort and related project activities. Generally, dock space being used for vessels and equipment staging is either owned or leased by USM and DISL and any shared use of dock space would likely be negligible. Alternative 1 will not have a disproportionately high and adverse environmental or human health impact to these communities.

#### 4.1.6 Military Activities

With respect to military activities, the DoD Clearinghouse Navy component indicated that the IMTA project site would be located in a restricted area because of significant naval air activity. The Navy did not object to the project subject to the limitations and conditions agreed to by the DISL via email dated December 12, 2024. Alternative 1 will have no direct or indirect impact on military activities.

#### 4.1.7 Cultural and Historic Resources

The presence of the IMTA system and the associated operation of the project is not expected to result in adverse effects on onshore historic properties. Visibility from onshore locations would be short-term (lasting approximately 4 years), with the structure indistinguishable from lighted vessel traffic, navigation aids, and recreational and commercial activities; therefore, the project would not impact onshore historic resources through visual impacts. The Alabama Historical Commission (AHC 24-0545) concurred with NOAA Fisheries determination of no effect on historic properties by their letter dated April 12, 2024. Alternative 1 will have no direct or indirect impact on cultural and historic resources.

Although unlikely, archaeological remains could go undetected in the project area from the uncertainty of the acoustic geophysical data. If archaeological materials are encountered during construction (i.e., placement of the moorings) or other related activities, the procedures in 36 C.F.R. 800.13(b) would apply. All work would be suspended in the immediate area and the Applicant would notify NOAA Fisheries within 48 hours so an assessment of the materials can be carried out by qualified personnel.

### 4.2 Effects of Alternative 1 – Install, Operate, Monitor, Decommission, and Remove the Gulf IMTA at Site 3B

The proposed action is planned to be conducted seasonally from October through May beginning in 2025 through 2029. The proposed action, to install, operate, monitor, decommission, and remove the IMTA system and AquaFort platform, could potentially have a short-term adverse effect on the physical and biological environment at certain times during its implementation but it is not likely to have an overall significant effect. Seasonal deployment and operation of the IMTA system would be assessed and modified as discussed in this EA as needed based on environmental sampling results. The operation of the IMTA system and AquaFort could have a beneficial socio-economic effect.

#### 4.2.1 Effects of Alternative 1 on the Physical and Biological Environment

Activities that could result in impacts on the physical and biological environments are installation, operation, monitoring, decommissioning, and removal. The NCCOS siting analysis was conducted to minimize water column and benthic impacts by maximizing bottom depths and current flow through net enclosures within the limits appropriate for the project, avoiding sensitive biological communities, and limiting potential marine resource use conflicts (Price, et al. 2015; Markus 2024; Wickliffe et al., 2023). The subsequent BES indicated that the IMTA project will be sited over relatively uniform, sandy sediments composed of similar grain sizes in areas without complex habitats, significant buried rocks, or accumulation of unconsolidated sediments (Hiroji 2022a, 2022b).

The effects analyzed in this section include impacts to the seafloor and to water quality. Seafloor disturbances through anchoring and mooring can modify benthic habitat and community structure, such as loss of feeding areas for fish (Schratzberger et al. 2002; Broad et al. 2020). Participants at a Sea Grant Consortium-facilitated engagement event about the project expressed concern that transport of the structure and any emergency decommissioning could result in damage to a sandbar at the inlet off of Fort Morgan. The rearing and cultivation of Red drum (*Sciaenops ocellatus*), eastern oyster (*Crassostrea virginica*), and graceful red weed (*Gracilaria* spp.) could impact water and sediment quality through the release of nutrients or other substances into the water. As discussed below, the IMTA system is designed to regulate the organic particulate waste (feces or excess feed) from finfish culture with the benefit of filter feeding bivalves and macroalgal growth to minimize the impact on biological resources.

##### 4.2.1.1 Water and Sediment Quality

The Gulf IMTA project can affect water and sediment quality and modify the benthic habitat and community structure of the water column and sediment. The primary potential water quality characteristic that can be affected by aquaculture operations, specifically, fish culture, include dissolved nitrogen and phosphorus, turbidity, lipids and dissolved oxygen fluxes. Degradation of water quality parameters is greatest within the fish culture structures and improves rapidly with increasing distance from cages (Price et al. 2015). In an IMTA system, bivalves have an effective role in water quality control and can increase bacterial diversity and abundance by regulating dissolved oxygen, especially the abundance of heterotrophic bacteria that are important for water quality control (Kong et al. 2023). When farms are sited in well-flushed water, nutrient enrichment to the water column is generally not detectable. Nutrient spikes and declines in dissolved oxygen are sometimes seen following feeding, but there are few reports of long-term risk to water quality. Appropriate feed formulation and operational feeding efficiency improves digestion of feed and reduces feed waste and feces production, resulting in a decrease in nutrient loading (NOAA Technical Memorandum NMFS F/SPO-124, 2011; White 2013; Hasan 2013). The selected feeds for the various growth stages of the Red drum are detailed in Appendix B. The project proposes use of a Red Drum specific pellet mix. The feed characteristics would contain a balanced mix of essential nutrients; have a feed particle size and density that is acceptable to fish; be easy to handle both manually and automatically if using automated feeding equipment; be readily available to fish during feeding and not sink quickly.

The relatively small fish biomass to be raised (~ 4,000 kg Red drum, 4,000-6,000 oysters (50 oysters per SEAPA basket up to 80 baskets and 12 kg *Gracilaria* spp. during each production cycle) would result in small daily loading rates of discharged pollutants downstream of the AquaFort. Inorganic and organic discharges from the IMTA system would not likely accumulate over time as organic and inorganic materials are likely to be assimilated by macroinvertebrates living on the seafloor or be re-suspended and dispersed naturally.

The Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) permit protects water quality by regulating point source discharges to waters of the US. Aquaculture facilities can produce and discharge wastes (excess fish feed and fecal material) (40 C.F.R. § 122.2) and may need a NPDES permit under certain conditions. The State of Alabama administers the NPDES permit program for facilities in state waters (AL requirement for NPDES permit regulations referenced in Rules 335-6-6-.03 and 335-6-6-.10). NOAA Fisheries coordinated with the Alabama Department of Environmental Management (ADEM) regarding the need for a NPDES permit for the project. ADEM's determination that no NPDES permit is required for the project was transmitted to NOAA Fisheries via email correspondence on February 5, 2025.

Total solids deposition and organic enrichment of the seafloor sediments from unconsumed feed and fish feces can impact sediment quality and benthic communities (Price et al. 2015). In cases of extreme nutrient loading, solid wastes can result in burial of benthic habitats under the aquaculture structure. Because of the relatively small fish biomass to be raised in the AquaFort structure, small daily particulate and organic loading rates from food and fish wastes downstream of the cage are expected. The oceanographic conditions at the site would work to lift sediment particles ("stirring up") from the seabed or overcome the settling velocity of solids and essentially re-suspend, transport and widely disperse solid wastes into the water column and away from the area. It is expected that recorded current speed maximum values of 1.8 knots (0.92 m/s) at the project site coupled with sufficient depth (26 - 65 ft (8 - 20 m)) would be sufficient to minimize solids accumulating in the sediments and benthic communities proximate to the AquaFort structure. The siting of the IMTA takes advantage of water currents and depth to allow for the natural dispersion of residual particulate matter and inorganic waste and reduce its accumulation in large concentrations on the seafloor. Benthic communities could be further impacted by anchoring, scour and shading of the bottom by the structure.

Onsite cleaning of the IMTA net pen using pressure washing can release pollutants such as paint, copper and zinc, and fouling marine organisms (i.e., bacteria, algae, bryozoans and molluscs), into the water that ultimately settle in the sediments. These pollutants can be harmful to marine animals and plants, and debris from fouling organisms can increase turbidity in the water column. Maintenance cleaning would be performed monthly or as needed, depending on the degree of fouling over the seasons. The effects of maintenance cleaning on the water column and marine sediments would be short-term and currents and tides would quickly disperse any particulates in the water column. Copper from the CAM netting might leach into the environment and it can also be toxic at high concentrations (Grosell 2011). Studies have shown the absence of copper in sediments after one year of use of copper alloy mesh and net with copper antifouling paint (Kalantzi et al. 2016). Monitoring for copper within sediments may be conducted but it is unlikely to accumulate given literature studies on the topic and the small size and temporary nature of the proposed project.

Given the seasonal nature of deployments, the installation and removal of the structure and moorings, including anchors, chains, and cables, can add to water column turbidity, smother benthic plants and animals, abrade the seafloor and convert habitat to a different state (SEER 2022). Potential effects include:

- Physical effects on benthic habitat within the mooring footprint and transporting the structure to the deployment site as well as any emergency decommissioning process.
- Loss or conversion of a small amount of existing habitat.
- Mobile organisms' movement to new locations to avoid effects; sessile organisms possibly crushed or smothered directly at the anchoring installation site.
- Temporary benthic disturbance from displacement and suspension of seafloor sediment during placement of anchors and mooring subsequently redistributed through natural processes.
- Diversity and abundance of benthic organisms altered due to the presence of new hard substrate (e.g., cage, mooring lines) that could favor some organisms.

Physical and biological recovery rates vary depending on sediment type, installation method, local oceanographic processes, and types of species present. The recovery of benthic organisms and their habitat from physical disturbance depends on several factors, including the physical stability of the sea bed, the type of habitat, and the intensity of the disturbance (Dernie et al. 2003; Collie et al. 2000). There is some evidence that disturbance of the seabed can lead to the proliferation of small benthic species because they have faster life histories and can withstand the mortality imposed by seafloor disturbances and benefit from reduced competition or predation as populations of larger species are depleted (Jennings et al. 2001). Any accumulation of organic material would likely be assimilated by benthic macroinvertebrates. Given the seasonal nature of the project, benthic communities are expected to recover between deployments and after completion of the project.

Shallower waters with soft bottoms are more dynamic environments (e.g., have greater wave energy, current action, and natural variability) and tend to have faster recovery rates. Slowly lowering and removing anchors to the seafloor during deployment and decommissioning would minimize impacts to benthic substrate, animals and plants. Once the Aquafort has been secured, support vessels would tie-up to the AquaFort (instead of anchoring), thereby minimizing repetitive disturbance to the sea floor and water column. Decommissioning and removal of components can cause similar effects to those incurred during the establishment of anchors and moorings, including sediment disturbance. The effects are expected to follow the same recovery pattern as post-establishment of the mooring and anchoring system.

Given the extensive siting study and siting of the project in conditions that minimize impacts to water and sediments as well as the limited term, seasonal nature of the project, the potential adverse effects related to water and sediment quality and benthic biota would be direct, short-term and minor.

Multiple planned environmental sampling events over the course of the Gulf IMTA project are designed to gather physical and biological baseline information on the benthic habitat and associated community before establishment of the IMTA system, and monitor changes during operation throughout four grow-out cycles, and one year after decommissioning. Environmental monitoring activities at the project site and control sites could also impact sediments and benthic marine life. The proposed environmental sampling protocol includes data collection of benthic macroinvertebrate and in fauna community structures, sediments and seawater, and fish surveys to quantify community structure of fish and macroinvertebrates (nekton) at the proposed project site and two of the three control sites. Previous environmental survey results indicate that all sites are unvegetated, sandy bottom types containing no nursery fish or macroinvertebrate habitats.

Implementation of careful procedures and methods for deployment of the mooring and anchoring system (i.e., slowly transporting the structure and lowering gear), and conducting environmental biota sampling using methods informed by the Gulf Southeast Area Monitoring and Assessment Program SEAMAP (Eldridge 1988) would minimize the potential impacts on water and sediment quality. Indirect impacts to biological communities could occur through harvesting of marine organisms for fish feed, but analysis of this potential effect is considered outside the scope of this EA. Given that the proposed action would occur in an area that has undergone extensive siting analyses to ensure proper depth, currents, and temperature, operational procedures would be in place to prevent poor feeding practices, seasonal fallowing would occur, the area impacted is small and does not include sensitive habitats, and environmental monitoring would be used to detect any potential changes to water and sediment quality, the potential adverse effects related to water and sediment quality and benthic biota would be direct, short-term and minor to negligible.

#### 4.2.1.2 Escapes

The native, wild-caught broodstock and the first-generation fingerlings from that broodstock, would not undergo any genetic modification or selective breeding, and would not pose a competitive risk to wild stock. In the event, fish escape from damaged nets caused by weather events like severe storms, from predators damaging nets, or during harvesting operations, there is no possibility of genetic contamination or weakening if any escaped fish spawned with wild individuals. Therefore, there is no risk for non-indigenous stock to become established because the Red drum were sourced from local populations.

The project is designed to minimize the potential for escape. The AquaFort's primary net is a copper alloy mesh (CAM) with a 1.37 in (35 mm) mesh size.[22] CAM is the toughest netting on the market and it would be difficult for predators to penetrate because of its strength and mesh size; it is impact resistant and designed to survive storm events if completely submerged. Routine inspections of the netting and mooring components, and good maintenance can dramatically reduce unintentional escapes as well as careful handling of fish during harvesting. More details on the rearing and harvesting of Red drum are provided in Section 4 of the Operations Procedures and Structural Components of the Alabama State Waters IMTA Project (Appendix B).

Triploid oysters are nearly 100% sterile and would not become reproductive during grow out (Section 2.4.2). The oysters used in the project are the same species of native Eastern oyster and feed selectively the same as native oysters. Eastern oysters (*Crassostrea virginica*) used in the IMTA system would be harvested at the end of the grow-out cycle and would not be sold for consumption. The oysters would likely be placed in a suitable area for restoration.

A native species of *Gracilaria* spp. collected offshore from the Gulf would be used in the project. The initial seed would be placed in an outdoor recirculating aquaculture system with artificial seawater. The algae would be quarantined for a minimum of two weeks for treatment and mitigation of epiphytic growth of diatoms which can negatively impact seaweed cultivation by reducing light availability for the macroalgae to photosynthesize. Post-quarantine, the macroalgae would be placed into 25 L SEAPA baskets and moved to an outdoor recirculating aquaculture system production tanks and then later deployed to the IMTA system. Because the macroalgal species is native to this area, there are no concerns regarding potential reproduction during cultivation in the AquaFort.

If escape of individual fish or genetic materials were to occur, the number of individuals or genetic materials would be small compared to natural populations. Currents would also serve to dissipate and distribute any escaped fish or genetic material. Given that measures have been taken to prevent escape of individual fish, all source populations are from the Gulf, and escape of genetic materials from oysters or macroalgae is extremely unlikely, the potential adverse effects related to escapes would be negligible.

#### 4.2.1.3 Disease Transmission

The potential for the transmission of pathogens and parasites is of particular concern in all animal populations and production systems. Because water flows freely between the farm fish and wild fish, site selection identified desired parameters to decrease the potential risk of disease and transmission. Factors such as appropriate water flow, depth and temperature, and absence of wild fish populations, are expected to minimize disease. To mitigate paths of disease introduction, after Red drum are collected from the wild, they would be quarantined, examined for infection or parasite presence and then transferred into several indoor

[22] Innovasea

recirculating aquaculture systems. Once the fingerlings are ~50 g, they would be ready for stocking at the IMTA site. In aquaculture systems, fish health would be managed by following standard procedures to ensure optimal growing conditions, such as observing stock densities not exceeding 20 $kg/m^3$ (1.25 $lbs/ft^3$), removal of dead fish regularly, quickly minimizing stress (i.e., from stocking, nursery net removal), and examining fish for disease or parasite infestation.

All stocking of live aquatic organisms, regardless of life stage, must be accompanied by an Official Certificate of Veterinary Inspection signed by a licensed and accredited veterinarian attesting to the health of the organisms to be stocked is included in accordance with 40 C.F.R. § 125.123(a) and 125.123(d)(3) and 40 C.F.R. § 125.3. TCMAC has previously used Louisiana State University Aquatic Diagnostic Lab for third party certification to confirm health and fitness of animals for all their live animal releases; these services are available as needed. Once Red drum fingerlings are transferred into the IMTA system, fish would be monitored daily, either by on site workers or remotely, and procedures for removing sick or dead fish would be implemented. Fish feed production includes methods to eliminate contaminant organisms.

Oysters would be held in the laboratory for a number of weeks and screened for disease before use in the AquaFort. Pathology tests would be conducted before placing the oysters in the AquaFort. Any disease that could become present in the oysters during the growing season would come from the environment. Oysters would be routinely monitored for disease, with diseased oysters immediately removed if detected. Algae would be quarantined for a minimum of two weeks for treatment.

Given that measures have been taken to prevent disease transmission and animals and macroalgae will be monitored and screened for disease throughout the project, the potential adverse effects related to disease transmission on wild populations would be negligible.

#### 4.2.1.4 Predator and Other Species Congregation and Deterrents

Artificial structures can alter natural habitat and ecosystems and attract other marine life. Fish (including sharks) aggregate around manmade structures to find refuge from currents and predators, increase feeding opportunities, and cover for young immature marine animals and fish (Reubens et al. 2013). Thus, offshore aquaculture structures (e.g., cages), artificial reefs, oil and gas platforms, and wind farm structures that attract and support marine life can act as fish aggregating devices (FADs).

Aquaculture structures have the potential to not only attract marine life, but provide nutrients (i.e., excess fish feed) to numerous fish and benthic organisms. For example, visual surveys (pre and post-installation) at one aquaculture site in Puerto Rico showed species richness and abundance of wild species increased after the finfish aquaculture grow-out structures were deployed (Alston et al. 2005). Scavenging and depredation in hook and line fisheries by dolphins in the Gulf is well documented and can result in injury and/or mortality to dolphins (NOAA 2022 Report to Congress).

Aquaculture structures can potentially attract sea turtles. Sea turtles are commonly reported at artificial reefs (submerged structures) because they can provide various ecological functions, such as foraging and sheltering habitat. The increased abundance of species can provide foraging opportunities for sea turtles transiting the region. In areas with minimal hard bottom habitat or structural relief, aquaculture structures can provide important inter-nesting habitat for sea turtles (Barnette 2017). The IMTA system also has the potential to attract recreational fisherman to the site whereby bycatch can occur from recreational hook and line fishing. Increases in recreational fishing effort around the pens can lead to increases in dolphin hook and line interactions.

Subsurface predators (i.e., large piscivorous fish and marine mammals) are attracted to concentrated food sources. There is a possibility that if the animals are fed or are successful at extracting fish from divers or from the pen, marine mammals, such as dolphins, and sharks might become conditioned and change their behavior to spend more time milling around the net waiting for an opportunity to scavenge fish (Bevilacqua et al., 2016). This could increase the animal's risk to a vessel strike or gear entanglement (Bechdel et al. 2009; Powell and Wells 2011; Samuels and Bejder, 2004; Wells and Scott, 1997). To minimize conditioning of dolphins to the pen, all operations staff would be instructed to refrain from making food available to dolphins, monitor dolphin activity during stocking and feeding operations and remove dead or discarded fish from the net pen and transport discards to shore for proper disposal. The copper alloy predator defense containment mesh (CAM) has a 35 mm (1.37 in) mesh size (Innovasea©) and is used to deter subsurface predators. The jump net used for juvenile Red drum, manufactured by Maccaferri KikkoNet, is polyethylene terephthalate (PET) with a 1.77-in (45 mm) mesh size. The KikkoNet is only in place for a short period and is within the CAM netting, so any stretching of the KikkoNet is not a cause for concern. The PET monofilaments are double twisted in a hexagonal mesh, offering resistance to cutting and abrasion. These characteristics can be expected to prevent predators from breaking and entering the net enclosures. Additional details are provided in the Protected Species Monitoring Plan (PSMP).

Above surface predators (i.e., diving birds) would be deterred by custom-made bird netting that would cover both pens. These bird nets would be secured to the handrails on the platform to prevent access to birds. If evidence of bird roosting is found on the AquaFort handrails during the IMTA deployment period, roosting deterrents such as plastic bird spikes would be installed to restrict predation attempts by diving birds on stocked fish. Proper management of stocking and feeding operations, routine cleaning of the CAM netting to reduce biofouling, disposal of dead and discarded fish, and monitoring of ESA-listed species, marine mammals, and bird around the project location would reduce the effects of the project that may occur by the structure acting as a FAD.

Potential adverse effects to ESA and MBTA listed species were considered through informal consultation with the Services. Given the small size and limited duration of the project and the safeguards in place, significant impacts to marine species would not occur. The potential for injury to or behavioral changes in marine mammals, sea turtles, or birds from the structure acting as a FAD is considered adverse, direct, minor and short-term.

#### 4.2.1.5 Entanglement

Marine animals transiting near the IMTA system could possibly become entangled within the IMTA system mooring and anchor lines and nets, or entangled in lines and trawling nets used for environmental sampling. The AquaFort contains multiple safety features in its structural design to limit entanglement. The mooring system would follow a strategy similar to that used on deployed open ocean aquaculture structures to minimize the risk of marine animal entanglement by using mooring lines that are either heavy chain or large diameter rope, designed to be tensioned to at least 1000 lbs (Fredriksson et al. 2004). This same strategy would be utilized in mooring the AquaFort with a steamer chain and 1-½" diameter mooring lines. The AquaFort platform and mooring system has been designed to maintain tension on all moorings under all operating conditions. The two anchor crown lines would have break away links although large mammal interactions are not expected in the region. The plate added to the bride will serve to deter sea turtle flipper impingement. In situ observations and video monitoring would allow for regular surveillance of any interactions between marine animals and the IMTA system. Large marine predators, such as bottlenose dolphins, would be deterred by the CAM net which would likely thwart repeated attempts and further reduce the risk of entanglement at the IMTA site.

Tow lines used for environmental sampling are designed not to loop or tangle during changes in vessel speed. The applicants applied for an exemption from including a Turtle Excluder Device in the trawl through NOAA. Prior to trawling during daylight hours, trained visual observers would survey the area surrounding the vessel for 15 minutes to ensure that no protected species are visible at the surface before the initiation of the trawl. Each trawl would be conducted for five minutes with tow speeds around 3.4 mph (5.5 km/h). The potential for entanglement in the line, cables or sampling gear is considered negligible.

Due to its weight, CAM provides resistance to deformation and assures that there is sufficient pen volume available for fish, even under the pressure of strong waves and currents. CAM is difficult for predators to penetrate because it is inherently stiff and resists bending and deformation when subjected to high energy conditions. The chain-link CAM netting is stiff, making entanglement unlikely. This net type is typically hung with pickets in the vertical (warp) direction. In this orientation, wires (called pickets) are structurally independent of its interconnected/linked neighbors. Thus, if any single picket fails, the structural integrity of the net chamber is maintained. The strength of CAM and mesh configuration deters predator attacks (especially those predators that can bite through traditional netting) and improves the net integrity.

The potential adverse effects from entrapment in the AquaFort mooring and anchor lines or netting or in the sampling tow is considered a direct, short-term, minor effect that is unlikely to occur. Informal consultation with the Services on the potential effects to ESA and MBTA listed species has been completed.

#### 4.2.1.6 Vessel Strikes

Vessels of any size and type can strike and kill or injure marine life. The operating vessels used in this project and their activities are summarized in Table 2. As the density of vessels increases in areas utilized by marine animals (i.e., dolphins, sea turtles, rays), so do incidents of vessel strike injury or mortality. Marine animals can be challenging for vessel operators to see. Many marine animals are not able to detect a vessel, nor move out of the way of an approaching vessel. Marine mammals, sea turtles, and protected fish like sturgeon and giant manta rays are some of the species struck by vessels and often injured or killed (NOAA, 2024).

Gulf sturgeon are demersal fish, spending most of their time near the bottom of the water column. They are susceptible to vessel strike if a deep draft vessel encounters the animals at the sea floor or if the sturgeon moves up into the water column or is drawn into the vessel's propeller. Ports and shallow navigation channels are expected to be the areas of highest risk for vessel interaction with this benthic-dwelling species. Alternatively, sturgeon are known to frequently jump out of the water (Sulak et al. 2002). During jumping episodes, when sturgeon are located at or near the surface of the water, they can be even more vulnerable to strikes from smaller vessels powered by outboard engines. Considering that the proposed vessels used for the Project would mainly be transiting to the project location, the presence of Gulf sturgeon adults and sub-adults in the Action area is expected to be limited to rare, transient individuals, which can move away from project vessels.

Giant manta rays are also highly susceptible to vessel strikes because of the large amount of time they spend at the surface. During daytime periods, when zooplankton remain at greater depth or within the benthos and are subsequently inaccessible, mantas can remain in surface waters at preferred temperatures, perhaps foraging, undergoing social interactions, cleaning or cruising (Burgess 2017). While spending significant time at the surface, manta rays are especially susceptible to severe injuries from vessel strikes and from contact with propellers (McGregor et al., 2019; Stevens and Froman, 2019). Though manta rays are known to heal from vessel strike injuries fairly rapidly, similar to other elasmobranchs, the recovery time can lead to reduced health and fitness (Strike et al. 2022).

Sea turtles are at risk of being struck by vessels as they surface to breathe or as they rest, bask, or feed near the surface or in shallow water. Sea turtles are struck by boats in high vessel traffic areas, such as passes and inlets. In the southeastern United States, adult sea turtles are particularly vulnerable to vessel strikes during nesting season when they congregate near nesting beaches, and often breed or rest near the surface. Vessel strikes can cause crushing fractures, lacerations, and loss of limbs or fins. Conservation measures include go-slow zones accompanied by boater education is a way to minimize vessel-related sea turtle mortality (Fuentes et al. 2021; Welsh and Witherington 2023).

All species of marine mammals are at risk of vessel strike including whales, dolphins, pinnipeds, and manatees. Researchers have documented vessel collisions with whales along every U.S. coast. Whales are at particular risk when their core habitats overlap with areas of dense, fast-transiting vessel traffic. Marine mammals can be seriously injured or killed and large whales can damage vessels or seriously injure people. Vessel strikes can be prevented by modifying shipping routes to avoid areas where whales congregate, using technology to alert ship captains to nearby whales, implementing mandatory speed limits, and creating dynamic slowdown zones (Wiley et al. 2011; Kelley 2020).

There would be a minimal increase in boat traffic (approximately 236 boat trips over a four year period) transiting from home port to the IMTA project site over the duration of the project (Table 2) when compared to vessel traffic in the region. Vessel traffic associated with the IMTA project would minimally increase the volume of vessel traffic within the area and represents a very small contribution to overall vessel traffic (i.e., recreational and commercial). Vessels would travel at slow speeds and generally transit to the work location and remain in the area until routine daily activities are completed. These vessels would cover short distances between defined operational and in situ sampling locations.

There is a low probability that collisions with vessels associated with the IMTA project would kill or injure marine mammals given the low probability of these animals being in the area of transiting vessels and the number of trips and duration of the project relative to the large number of recreational and commercial vessels using the north central Gulf daily. Given the expansiveness of the waterway corridor for transiting vessels and surrounding the IMTA system, reduced vessel speeds and project duration, and implementation of SERO vessel strike and avoidance measures and Standard Manatee Conditions for In-Water Activities (U.S. FWS 2011), the potential adverse effects from vessel traffic on marine organisms would be direct, short-term and minor to negligible and unlikely to occur. Informal consultation with the Services on the potential effects to ESA listed species has been completed.

#### 4.2.1.7 Noise

The acoustic environment of the Gulf is composed of a combination of natural and anthropogenic noise sources that emit sound into the air and water. Sources of ambient noise encompass a broad spectrum of frequencies, and includes sound sources like wind and wave activity, precipitation related noise (e.g., rain, hail, thunder), geological events (e.g., seismic activity, underwater landslides) and biological noises (e.g., marine mammals, fish, crustaceans). These natural sources of noise can vary greatly in frequency and distribution, but the frequency of natural noises is generally greater in shallower water depth (less than 656 ft [200 m]) compared to deeper waters (BOEM 2014). Anthropogenic sources of noise in the Gulf can be directly attributed to the industrial and recreational uses of the area and include transportation (e.g., vessels and aviation), construction and dredging, energy exploration and development, scientific research and explosions from military activities.

The proposed action would result in a short-term, negligible increase in noise mostly by the vessels’ engines while deploying and decommissioning the IMTA system (including placement of mooring system, chains and anchors); vessels transiting for routine activities as described in Section 2.6, Table 2; the use of sampling equipment in each sampling area and during trawling (deployment of nets); feeding of caged fish; and maintenance cleaning of nets with pressure washers on a monthly basis (or as needed) depending on the degree of biofouling over the seasons. The noise generated by vessel engines, including ancillary vessel support equipment, mooring placement and maintenance activities can cause injury or behavioral responses in marine species and can be a potential route of effect on some marine species.

The impact on the overall noise environment due to funding the proposed project (Alternative 1) would be adverse, direct, short term, and negligible to minor.

Vessel noise associated with the project activity may occur at a frequency that overlaps with the hearing ranges of marine organisms, including ESA-listed species. Behavioral responses such as fleeing and avoidance to active acoustic sound sources are the most likely direct effect for the majority of turtle and fish resources exposed to noise. NOAA Fisheries Southeast Region's protected species construction conditions[23] would be implemented at all times during applicable construction phases of the project (i.e., placement of moorings and anchors, moving equipment and vessel movement). Additional noise above baseline will occur over a short duration and limited area, impacts are too small to be measured and therefore insignificant. When the IMTA Aquafort is decommissioned at the end of 2029, and the project is completed, no noise impacts will exist; therefore, the project will not result in an overall increase in noise risk to ESA-listed species and marine animals in the action area. The adverse effects of noise on marine organisms are expected to be direct, short-term, and minor to negligible. Informal consultation with the Services on the potential effects to ESA listed species has been completed.

#### 4.2.1.8 Avian Interactions and Deterrents

Potential impacts to seabirds can be due to the physical structure, presence of fish, and associated activities (i.e., stocking, harvesting operations, and routine maintenance operations) that would attract migratory seabirds as well as other migratory birds. Seabird mortality can occur particularly during feeding time because of their attraction to both the pelleted feed itself floating at the surface and/or the surface disturbance created by high-density fish taking pelleted feed at the surface. A combination of bird deterrent devices (i.e., stiff rubber vertical spikes and netting) would keep birds from using the site by limiting the amount of surface area available for perching, loafing, and roosting. Seabirds would be deterred from predation on fish by the customized bird netting that would cover the AquaFort platform. The netting would be of sufficient "thickness" so that plunge-diving seabirds would be prevented from detecting high density schooling fish (particularly during feeding time) from above. If there is any interaction or injury to seabirds and birds become trapped in the netting or cage, the project staff would suspend all surface activities, including stocking, harvesting and routine maintenance operations and implement appropriate steps to disentangle the bird. Best management practices would be applied and adhered to, including but not limited to, the Nationwide Avoidance and Minimization Conservation Measures for Birds (U.S. FWS Version 2, July 2024) would be used to alleviate any potential adverse effects to bird species found within the proposed action area. Any potential adverse effects from the proposed action on birds, including those listed under MBTA, can be considered direct, short-term and minor to negligible. Informal consultation with the Services on the potential effects to ESA and MBTA listed species has been completed.

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[23] SERO NMFS Protected Species Construction Conditions

#### 4.2.1.9 Essential Fish Habitat Interactions

The Gulf is identified as EFH for species managed by the GMFMC and is covered in the Gulf States Fisheries Management Plan for shrimp, Red drum, Reef fish, Spiny lobster, Coral and Coral reef, and Coastal Migratory Pelagics. (Note: Spiny Lobster, Coral and Coral Reef species do not occur in the action area). Highly migratory species (HMS) also have EFH identified in the Gulf. Adult distribution of these species varies seasonally in the Gulf and HMS are commonly associated with hydrographic features. Many of these species are of commercial and recreational importance, and all of them spend a portion of their life cycle within the waters of the Gulf (e.g., bluefin and yellowfin tuna). NOAA Fisheries lists the species, EFH categories and designations, and habitat areas of particular concern (HAPCs) in their Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies: Gulf of Mexico Region (NMFS 2010).

The NOAA Fisheries Office of Aquaculture consulted with SERO HCD on January 3, 2025 (NOAA Fisheries Office of Aquaculture letter dated December 9, 2024) under the EFH Provisions of the MSA. SERO HCD concurred with the Office of Aquaculture’s determination that the proposed activity may affect EFH, but is not likely to cause adverse effects to EFH. No further consultation on effects to EFH is necessary unless modifications to the project are made. Additionally, SERO HCD has coordinated with the ACOE regarding the Joint Public Notice for a RHA permit for this project (SAM-2022-00749-JCC) and had no objection to a permit being issued for the project.

### 4.2.2 Effects of Alternative 1 on the Economic and Social Environment

Overall, the proposed action is not expected to have an adverse socio-economic impact because the project is small in scale in terms of the relative size of the structure, the amount of seafood production, and project timeline. Alternative 1 could have beneficial, direct and indirect, short and long-term, effects through training and increasing skills and knowledge in the field of aquaculture production, product distribution and market price determination. Research could also contribute to improving production time to market, lessening reliance on wild fisheries to feed people, and minimizing the collection of wild broodstock.

#### 4.2.2.1 Coastal Communities

The Gulf IMTA project would be sited about 1.6 nm (3 km) offshore in state waters of Alabama, seaward of the Fort Morgan peninsula and approximately 7 nm (13 km) southeast of Dauphin Island in the north central Gulf. Most of Fort Morgan is the site of the Bon Secour National Wildlife Refuge and the nearest town is Gulf Shores to the east. Dauphin Island located at the mouth of Mobile Bay, in Mobile County lies to the west. Commercial and recreational fishing, tourism, minority and low-income populations along Alabama’s Gulf coast are important characteristics of these coastal communities that would not be impacted because the project is short-term and confined to a small offshore area.

People residing on the Fort Morgan Peninsula as well as Dauphin Island and the coastal communities of Mobile Bay would not be impacted by the presence of the Gulf IMTA project.

The AquaFort platform would be imperceptible by persons from the shoreline because of its low profile and relative size, making it indistinguishable from lighted vessel traffic from distances at least 19 nm (35 km) away. Project support vessels would be indistinguishable from existing vessel traffic and result in a nominal increase in existing vessel traffic over the approximately 4-5 year span of project activities. Increased vessel traffic associated with the deployment and operation of the IMTA system and AquaFort platform (Alternative 1) could result in direct, short-term, minor effects to nearby communities.

#### 4.2.2.2 Business and Marine Economy

This project is not expected to have an adverse socio-economic impact on current commercial seafood production or producers in the Gulf because the IMTA is a short-term, small-scale project to demonstrate the feasibility of growing multitrophic animals in warm waters. The amount of product (i.e., Red drum or *Gracilaria* spp.) harvested over four production cycles is inconsequential compared to current commercial markets for fish. There is currently no commercial marine finfish or seaweed culturing in Alabama state waters. The number of Red drum fish (4,000 kg each year during the 4 year project) that would be harvested and sold are negligible in comparison to the large commercial fishing industry in the Gulf. In 2022, there were 21 tons of Red drum commercial landings in Mississippi (compiled from the NOAA Fisheries Annual Commercial Landings Statistics). Red drum commercial landings in Alabama are not available.[24] Alternative 1 would have negligible effects on the seafood market or any other marine economy sector given the small amount of seafood production and limited project timeline.

### 4.3 Effects of the No Action Alternative

Under the No Action Alternative, NOAA Fisheries would not fund the Gulf IMTA project and the installation of the AquaFort platform and operation of the IMTA system in the waters of the north central Gulf. In this case, the No Action Alternative would mean that baseline conditions at the location of the preferred site for the IMTA system would remain unchanged from existing conditions described in Chapter 3 because the project would not occur.

#### 4.3.1 Effects of the No Action Alternative on the Physical and Biological Environment

The No Action alternative would result in no change to resources in the physical and biological environment, including those listed in Chapter 3, because NOAA Fisheries would not fund the Gulf IMTA project, resulting in none of the activities detailed in the proposed action. Consequently, there would be no disturbance to the water column or impacts to the

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[24] According to NMFS Annual Commercial Landing Statistics, all annual and monthly landing summaries will return only non-confidential landing statistics. Most summarized landings are non-confidential, but whenever confidential landings occur, they have been combined with other landings and usually reported with "unc" for unclassified (i.e., "finfishes, unc" or "shellfishes, unc"). Total landings by state include confidential data and will be accurate, but landings reported by individual species can, in some instances, be misleading due to data confidentiality.

benthic habitat from the placement of moorings and anchors or from environmental sampling. The operation and maintenance of the IMTA system and its related impacts (i.e., turbidity, particulates, solids deposition and organic enrichment of the seafloor sediments from unconsumed feed and fish feces, potential marine mammal, sea turtle or bird entanglement) would not occur. As discussed in Section 3.2, marine animals that might likely occupy, forage, transit and migrate through the Action area would not be impacted and essential fish habitat (Section 3.2.4) would remain unchanged.

### 4.3.2 Effects of the No Action Alternative on the Social and Economic Environment

The No Action alternative could have an adverse, direct and indirect, short and long-term, negligible to minor effect to social and economic resources by hindering the growth and development of the marine economy in the region. Under the No Action alternative, NOAA Fisheries would not fund the Gulf IMTA project, resulting in none of the activities detailed in the proposed action.

## 4.4 Cumulative Effects

In accordance with NEPA, this EA considers the incremental effects of the proposed action when added to other past, present, and reasonably foreseeable future Actions, regardless of what agency (federal or non-federal) undertakes such other Actions. Cumulative effects can result from individually minor, but collectively significant impacts from Actions taking place over time. This analysis considers cumulative impacts related to the preferred Alternative 1, funding the Gulf IMTA project and installing the AquaFort platform in the waters of the north central Gulf for four grow-out cycles of Red drum, oysters and macroalgae during 2025 through 2029. Based on the size, scale and duration of the IMTA project, cumulative impacts are not expected to be significant as discussed below. The temporal scope is based on funding the IMTA project over the next 5 fiscal years (through 2029). The affected area of this proposed action encompasses state waters off of Alabama in the Gulf. For more information about the area in which the effects of this Proposed Action will occur, please see Chapter 3, Affected Environment, which describes these important resources and other relevant features of the human environment. The environmental consequences are analyzed in detail in Chapter 4. A brief summary of relevant past, present and foreseeable future actions applicable to the proposed action is provided.

There are thousands of actions occurring in the Gulf on an annual basis. It is not possible, nor necessary to list all of them here, but the actions that have the potential to combine with the proposed action to cause cumulative effects are discussed below. The environment of the Gulf is affected by anthropogenic and natural processes. Human activities affecting the Gulf include oil and gas extraction, commercial and recreational fishing, and altered freshwater inflows, among others. Natural processes include hurricanes, nearshore current patterns, and sediment dynamics (McKinney et al. 2021). Anthropogenic related activities can generally be acted upon through various management actions, while natural processes are beyond management intervention. Forces affecting the Gulf's human environment have been described in previous cumulative effect analyses (e.g., U.S. Navy 2018; BOEM 2023).

Presently, there are no proximate aquaculture projects being proposed for the north central Gulf. There are two offshore aquaculture projects currently being proposed in federal waters off the coast of Florida, Manna Fish Farms, Pensacola, FL and Ocean Era, off Longboat Pass-Sarasota Bay, FL. Neither of these projects are fully permitted and operational; moreover, they are a substantial distance from the IMTA system proposed in Alabama state waters.

Oil and gas structures in the Gulf create a large network of standing structures, interconnected by hundreds of miles of pipelines. This network effect adds to the value of the structures as an artificial reef ecosystem. Many common species are present on the structures over wide areas. According to the National Centers for Environmental Information, since the first offshore drilling began in 1942, about 6,000 oil and gas structures have been installed in the Gulf. These structures range in size from single well caissons in 10-ft water depths to large, complex facilities in water depths up to almost 10,000 ft. About 3,500 structures currently stand in the Gulf; of these, over 3,200 remain active. In the 1990s, structures installed in the 1960s and 1970s became uneconomical to operate and were removed. In 2010, BOEM issued guidance that focused on removing inactive structures. It is estimated that the number of standing structures is expected to be down by over 29 per cent in 2023 (Sinclair 2011).

In 2024, British Petroleum US was given approval for the Kaskida project (located 250 miles southwest of New Orleans in the Gulf, which features a new floating production platform with the capacity to produce 80,000 barrels of crude oil per day. Production is expected to start in 2029.

The Alabama Port Authority has begun the final phase of its six-stage Mobile Harbor Modernization Project, which started in May 2021. This expansion is complemented by the Port of Mobile's ongoing channel deepening and widening project, led by the ACOE, which will increase the Mobile Ship Channel depth to 50 feet, allowing the terminal to accommodate larger vessels carrying more significant cargo volumes. Once completed, the Port of Mobile will become the deepest port in the Gulf, reaching a depth of 50 feet and featuring a new three-mile passing lane designed for larger post-Panamax vessels.

Rising ocean temperatures, ocean acidification, harmful algae blooms, and changes in weather patterns may impact the region, aquaculture production and the IMTA project. Consequently, the Applicant for the proposed action may adapt the project using available options in the short-term by making necessary adjustments in their production practices during the project timeframe. This may include: removing the Aquafort and harvesting the fish, shellfish and algae in anticipation of a severe storm event (i.e., hurricane), increasing monitoring of fish and shellfish health to prevent impact from disease, removing diseased or dead fish, changing fish feed or modifying feeding schedule and taking other adaptive decision-making steps using scientific methods as warranted.

The effects from many other actions have been analyzed in other NEPA documents (U.S. Navy 2018; BOEM 2023). They include detailed analysis of cumulative effects on the human environment. Many of these actions are expected to increase above the present level and would likely contribute impacts to the human environment. In general, the effects of all these types of actions on the socioeconomic environment are variable and positive, except climate. In general, the effects of fishery-related actions are positive as they ultimately act to restore/maintain the stocks at a level that will allow the maximum benefits in yield and recreational fishing opportunities to be achieved. In general the effects of military readiness activities/operations, and offshore industrial activities/infrastructure (including oil/gas and renewable energy development) are negligible to moderate on all resources areas.

As stated in the effects analysis of this EA, the proposed project could have minor effects on water and sediment quality. The proposed project is designed to minimize water quality impacts by integrating multiple species and siting the project in areas with adequate currents, sandy sediments and absence of complex benthic habitat. Open water environments are expected to have adequate water flow and enrichment to the water column might not be detectable during environmental sampling. Solid waste generated during the operation and maintenance of the IMTA system and its effect on the waters and deposition on sediments proximate to the project would not contribute to cumulative effects on the environment because: 1) extractive bivalve species (oysters) and macroalgae can feed on the organic and inorganic effluents generated by the fed species (Red drum), 2) organic material would most likely re-suspend and be dispersed without accumulating in any concentration on the seafloor or would be assimilated by invertebrates living on the bottom, 3) the size, scale and duration of the project would minimize organic and inorganic discharges from cultivating fish in a confined area, and 4) removal of all the sources of disturbance (i.e., AquaFort, moorings and anchors, operation and maintenance activities) would allow recovery of surviving organisms during periods of non-disturbance and after final decommissioning. In addition, proper siting helps to avoid important benthic and sensitive habitats, and find areas with sufficient depth and current flow to reduce nutrient concentrations associated with aquaculture operations to levels compatible with the ecological carrying capacity of a region. Effective feeding practices and monitoring can play key roles in minimizing environmental impacts associated with unconsumed feeds and fish waste from marine finfish aquaculture operations. Moreover, continued improvements to fish feed formulations can increase feed efficiencies and minimize waste from unconsumed feeds.

Certain discharges (i.e., wastewater) from support vessels and the generation of solid wastes and debris from the operation of the IMTA system are prohibited from entering the Gulf waters. All wastes would be properly managed to avoid impacts to water quality. Other potential sources of organic and inorganic discharges near the proposed site can be from point source discharges such as land-based wastewater treatment and industrial discharges, discharges from septic tanks and non-point source discharges from stormwater. It is unlikely that any pollutants from land-based discharges would reach the proposed facility in concentrations that would accumulate at the site. Other impacts to water and sediment quality would be associated with spills related to other vessel activities, such as, cargo ship spills, fuel spills from shipwrecks or ship loss from storms. It is unlikely that the inorganic and organic discharges from the IMTA system would combine with these other discharges because the proposed site was selected in an area with enhanced currents and water flow. Cumulative impacts from waste deposition on coastal communities are not expected.

As previously discussed in Section 4, aquaculture can potentially impact biological resources through marine animal disturbance, entanglement, vessel strikes and other effects. The potential for behavioral disturbance to marine animals is considered to be relatively low because the project area and related project and vessel activities are temporary and proportionately small in scale relative to the numerous other activities that occur in the north central Gulf (i.e., commercial and recreational fishing, shipping fairways, oil and gas activity). Marine animals that might likely occur, occupy, forage, transit and migrate through the area would be able to find sufficient space to move through the area without substantial obstruction. The AquaFort's small footprint is similar in size and depth of an Olympic size swimming pool, and would not be expected to interfere with transiting marine animals which could easily swim around the structure nor exclude essential habitat in any significant amount.

None of these aforementioned activities overlap with the project, or have effects that compound or alter the effects of this action. The small scale of the AquaFort platform and the IMTA system is not precedent setting or predictive of decision-making for commercial scale aquaculture operations. Because of the small scale of the IMTA demonstration project, its temporary operation, and implementation of BMPs, the proposed action is not expected to have significant cumulative effects on biological resources.

Based on the analysis of individual effects to the human environment from the proposed action, as discussed in Chapter 4, the IMTA demonstration project has a limited potential for cumulative impacts to the physical, biological, economic and social environments. Any minor effects of the proposed action, when combined with other past actions, present actions, and reasonably foreseeable future actions are not expected to be significant. The effects of the proposed action will continue to be monitored through the collection of data by the applicants.

### 4.5 Summary and Conclusion

NOAA Fisheries considered a range of potential environmental impacts associated with funding the IMTA project and evaluated relevant concerns and factors to determine which resource categories would not be significantly impacted by the establishment of the IMTA demonstration project. The proposed action would have no impact on: climate and air quality because of the small scale of the project and limited emissions; closed areas, marine protected areas, national marine sanctuaries and artificial reefs because these resources are not located in or within close proximity to the action area; military activities as confirmed through the DOD clearinghouse process and subsequent discussions; and cultural and historic resources because of the limited visibility of the project from shore and as confirmed through NHPA consultation. The proposed action is not expected to have disproportionately high or adverse environmental or human health effects on particular communities given the project footprint and scope (Chapter 4.1.5). The proposed action could have adverse, but not significant or cumulative, potential effects to some physical and biological resources as detailed in Chapter 4.2 as follows: adverse direct, short-term and minor to negligible effects to water and sediment quality and benthic biota; negligible impacts to biological resources due to escapes; adverse direct, minor and short-term impacts to biological resources because of aggregation of marine life; and adverse direct, short-term and minor to negligible effects to marine organisms from vessel traffic, entrapment, and noise on marine organisms. Informal consultation with the U.S. FWS and NOAA Fisheries SERO PRD on the potential effects to ESA and MBTA listed species has been completed and concurrence with our determination and findings that no federally listed species or critical habitat would be adversely affected by the project was received. The SERO HCD concurred with our determination that the proposed activity may affect EFH, but is not likely to cause adverse effects to EFH.

The proposed action was evaluated for effects on social and economic resources as detailed in Chapter 4.3. An archeological survey conducted by the Applicant and NOAA Fisheries consultation with the Alabama Historic Commission, State Historic Preservation Officer (SHPO), did not recommend areas for avoidance or investigation based on the prehistoric archaeological potential and no effect on historic or cultural resources. Alternative 1 could have beneficial, direct and indirect, short and long-term, impacts on social and economic resources through training and increasing skills and knowledge in the field of aquaculture production, product distribution and market price determination.

Under the No Action alternative, NOAA Fisheries would not fund the Gulf IMTA project, resulting in none of the activities detailed in the proposed action. The No Action alternative would result in no change to resources in the physical and biological environment, including those listed in Chapter 3, because NOAA Fisheries would not fund the Gulf IMTA project, resulting in none of the activities detailed in the proposed action. Consequently, there would be no disturbance to the water column or impacts to the benthic habitat from the placement of moorings and anchors or from environmental sampling. The operation and maintenance of the IMTA system and its related impacts (i.e., turbidity, particulates, solids deposition and organic enrichment of the seafloor sediments from unconsumed feed and fish feces, potential marine mammal, sea turtle or bird entanglement) would not occur. Marine animals that might likely occupy, forage, transit and migrate through the Action area would not be impacted and essential fish habitat (Section 3.2.4) would remain unchanged. The No Action alternative could have an adverse, direct and indirect, short and long-term, negligible to minor effect to social and economic resources by hindering the growth and development of the marine economy in the region.

## 5.0 Relevant Environmental Laws

The Anadromous Fish Conservation Act (16 U.S.C. §757a-f) authorizes the Secretaries of Commerce and/or Interior to enter into cooperative agreements with the states for the conservation, development, and enhancement of the Nation's anadromous fishery resources. Pursuant to such agreements, the federal government may undertake studies and activities to restore, enhance, or manage anadromous fish, fish habitat, and passages. The Act authorizes federal financial assistance awards to the states or other non-federal entities to improve spawning areas, install fish-ways, construct fish protection devices and hatcheries, conduct research to improve management, and otherwise increase anadromous fish resources.

The Animal Health Protection Act (7 U.S.C. § 8301 et seq.) manages potential diseases in animals and the effects of diseases on animals.

The Clean Air Act (42 U.S.C. § 7401 et seq.) is a comprehensive law that regulates sources of air emissions. It directs the EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

The Clean Water Act (CWA) (33 U.S.C. §1251 et seq.) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under Section 404 of the CWA, a permit is required from the U.S. Army Corps of Engineers before filling, constructing on, or altering a jurisdictional water or wetland (see 33 U.S.C. 1344). Under Section 402 of the CWA, permits are required from the U.S. Environmental Protection Agency or states with approved programs for discharges of pollutants other than discharges of dredged or fill material into waters of the United States. Discharges of stormwater into the waters of the U.S. from municipal or industrial facilities require Section 402 permits (see 33 U.S.C. 1342(p)).

The Coastal Zone Management Act (CZMA) (16 U.S.C. §1456 and 15 C.F.R. part 930) provides for the management of the nation's coastal resources, including the Great Lakes. The goal of the Act is to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." The CZMA requires that federal actions which have reasonably foreseeable effects on any coastal use (land or water) or natural resource of the coastal zone be consistent with the enforceable policies of a state's federally approved coastal management program. In addition, the CZMA requires non-federal applicants for federal authorizations and funding to be consistent with enforceable policies of state coastal management programs.

The Endangered Species Act (ESA) (16 U.S.C. §1531 et seq.) protects and recovers imperiled species and the ecosystems upon which they depend. Under the ESA, species may be listed as either endangered or threatened. "Endangered" refers to a species that is in danger of extinction throughout all or a significant portion of its range. "Threatened" refers to a species that is likely to become endangered within the foreseeable future. The ESA also provides for the designation and protection of critical habitat, specific geographic area(s) that contains those physical or biological features (I) essential to the conservation of a threatened or endangered species, and (II) which may require special management considerations or protection. Section 7(a)(2) of the ESA requires federal agencies, in consultation with the U.S. Fish and Wildlife Service or the NOAA Fisheries, to ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat.

The Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.) directs the Service to investigate and report on proposed federal actions that affect any stream or other body of water and to provide recommendations to minimize impacts on fish and wildlife resources.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. § 1801 et seq.) is the primary law governing marine fisheries management in U.S. federal waters. First passed in 1976, the MSA fosters long-term biological and economic sustainability of our nation's marine fisheries in the U.S. Exclusive Economic Zone. Key objectives of the MSA are to 1) prevent overfishing; 2) rebuild overfished stocks; 3) increase long-term economic and social benefits; 4) use reliable data and sound science; 5) conserve EFH (as added by the 1996 Sustainable Fisheries Act), and 6) ensure a safe and sustainable supply of seafood. The MSA includes provisions concerning the identification and conservation of EFH, which is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NOAA Fisheries, and NMFS must provide conservation recommendations to federal and state agencies regarding actions that would adversely affect EFH.

The Marine Mammal Protection Act (MMPA) (16 U.S.C. §1361 et seq.) protects all marine mammals, including cetaceans (i.e., whales, dolphins, and porpoises), pinnipeds (i.e., seals, walrus, and sea lions), sirenians (i.e., manatees and dugongs), sea otters, and polar bears within waters under the jurisdiction of the U.S. The MMPA provides for an incidental take authorization to be obtained for the unintentional "take" of marine mammals incidental to otherwise lawful activities. The term "take" means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §703-712) protects over 800 species of migratory bird species from any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof, unless permitted by regulations (i.e., for hunting and subsistence activities).

The National Aquaculture Act of 1980 (16 U.S.C. §2801 et seq.) promotes aquaculture in the United States by, among other things, "encouraging aquaculture activities and programs in both the public and private sectors of the economy that will result in increased aquaculture production, the coordination of domestic aquaculture efforts, the conservation and enhancement of aquatic resources, the creation of new industries and job opportunities, and other national benefits."

The National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. §300101 et seq.), as amended in 1992, requires that responsible agencies taking action that may potentially affect any property with historic, architectural, archeological, or cultural value that is listed on or eligible for listing on the National Register of Historic Places (NRHP) comply with the procedures for consultation and comment issued by the Advisory Council on Historic Preservation. The responsible agency also must identify properties affected by the action that are listed on or potentially eligible for listing on the NRHP, usually through consultation with the state historic preservation officer. Under the provisions of Section 106 of the NHPA, the Secretary of the Interior has compiled a national register of sites and buildings of significant importance to United States history.

The National Marine Sanctuaries Act (NMSA) (16 U.S.C. §1431 et seq.) authorizes the Secretary of Commerce to designate and manage areas of the marine environment with special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, archeological, educational, or esthetic qualities as National Marine Sanctuaries. The NMSA provides the NOAA Office of National Marine Sanctuaries (ONMS) with authority to comprehensively manage uses of the National Marine Sanctuary System and protect its resources through regulations, permitting, enforcement, research, monitoring, education and outreach. Section 304(d) requires interagency consultation between NOAA and federal agencies that are "likely to destroy, cause the loss of, or injure" any sanctuary resource. ONMS has the authority to issue permits for any activity conducted in a National Marine Sanctuary that is otherwise prohibited by sanctuary regulations.

The Rivers and Harbors Act (33 U.S.C. § 401 et seq.) evaluates proposed structures and work in or affecting navigable waters, including the Outer Continental Shelf (see also Outer Continental Shelf Lands Act, 43 U.S.C. § 1331 et seq.).

## 6.0 List of Preparers

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Contractor support at ECO49 (Anne Southam, Sue Ban, Mike Payne; Gisellle Schmitz (subcontractor))

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