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CORRESPONDENCE

From: Region2 MPRSA <Region2_MPRSA@epa.gov>

Subject: Notice of Intent and Public Scoping: Dredged Material Management Options in the New York Bight

Date: June 13, 2025 at 8:57:41 AM EDT

To: Region2 MPRSA <Region2_MPRSA@epa.gov>

Dear Stakeholder:

We are writing to invite you to attend a virtual meeting to learn about and provide input on alternatives that the EPA is considering for continued ocean management of dredged materials currently suitable for deposition in the New York Bight. The New York Bight is defined as the Atlantic Continental Shelf waters off Long Island, New York, and New Jersey.

In June 2023, the U.S. Army Corps of Engineers-New York District (Army Corps-NYD) assessed dredged material management needs and capacity over the next 20 years and demonstrated a continued need for an ocean alternative for managing suitable quality dredged materials to ensure the safe and efficient function of the Port of New York and New Jersey into the future. Army Corps-NYD requested that the EPA formally begin a process to evaluate possible alternatives and identify environmentally sound and economically feasible alternatives to continue appropriate management of ocean-suitable dredged material deposited in waters of the inner New York Bight.

The EPA is soliciting input from the public, non-government organizations, and industry, along with federal, state, and local governments, on the range of alternatives considered, specific environmental issues to be evaluated in the environmental assessment document, and the potential effects of alternatives for managing dredged material suitable for deposition on the seabed in the New York Bight. The EPA is sharing this Notice of Intent (NOI) to prepare a review and assessment consistent with the National Environmental Policy Act (NEPA) that considers New York Bight dredged material management options.

As a stakeholder in the NY/NJ Harbor region, the EPA invites you to participate in the public input process (scoping) for this important effort. We will conduct two virtual scoping meetings, on June 24 (1:00 - 3:00 PM) and June 26 (4:00 - 6:00 PM), and accept written comments until 11:59 PM on July 14th, 2025. Please send written comments to the email address provided below. Registration and additional information on the project and its progress can be accessed through the links provided in the NOI.

For links to the NOI and more information on Ocean Dredged Material Management in Region 2, please visit:<https://www.epa.gov/marine-protection-permitting/region-2-ocean-dredged-material-management-new-york-bight-atlantic>

If you have specific questions about this public input process and phase, please email Region2_MPRSA@epa.gov.

Thank you for your continued interest in the Port of New York and New Jersey and the health of our ocean environment. We look forward to hearing from you.

Water Division

U.S. EPA, Region 2



Submitted via regulations.gov

June 16, 2025

Kelly Hammerle
Bureau of Ocean Energy Management (VAM-LD)
45600 Woodland Road
Sterling, VA 20166-9216

**Re: Request for Information and Comments on the Preparation of
the 11th National Outer Continental Shelf Oil and Gas Leasing
Program MAA104000 (Docket No. BOEM-2025-0015)**

Dear Ms. Hammerle,

Conservation Law Foundation (CLF) submits these comments on the Bureau of Ocean Energy Management's (BOEM) request for information (RFI) on the 11th National Outer Continental Shelf (OCS) Oil and Gas Leasing Program (National OCS Program).¹ Our organization opposes any new oil and gas leasing and resulting exploration, development, and production activities (collectively, "leasing") in U.S. ocean waters, including all of the OCS waters previously withdrawn by a prior President or a Congressional moratorium. These comments, however, focus on the North Atlantic Outer Continental Shelf Planning Area ("Planning Area"²). For nearly fifty years, CLF and other regional advocates have opposed and prevented oil and gas development off our shores in recognition that such development could have a devastating impact on our marine ecosystem and the coastal communities that depend upon it. We urge BOEM to exclude the Planning Area from the 11th National OCS Program.

Founded in 1966, CLF is a non-profit, member-supported organization with offices in Massachusetts, Rhode Island, Maine, New Hampshire, Vermont, and Connecticut. CLF's mission is to protect and restore New England's environment for the benefit of all people for generations to come. We use law, science, and the market to create solutions that preserve our natural resources, build healthy communities, and sustain a vibrant economy. We work to forge lasting solutions to

¹ Request for Information and Comments on the Preparation of the 11th National Outer Continental Shelf Oil and Gas Leasing Program MAA104000, 90 Fed. Reg. 17972 (Apr. 30, 2025).

² The Planning Area is 92.32 million total OCS acres and is adjacent to Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York and New Jersey. BOEM, *Atlantic OCS Facts and Figures: Offshore Natural Gas and Oil Operations*, <https://www.boem.gov/oil-gas-energy/atlantic-ocs-facts-and-figures> (last visited June 12, 2025).

some of the toughest environmental challenges in the region. Since its founding, CLF has taken on powerful opponents who pollute the region's air, land, and water and harm its wildlife. CLF members live, recreate, and do business throughout New England. CLF and its members would be directly impacted by oil and gas leasing in the Planning Area.

Any consideration of oil and gas leasing, exploration and development in the Planning Area contravenes collective regional advocacy that has successfully prevented oil and gas drilling in the region. CLF has actively and vigorously opposed offshore oil and gas exploration in the North Atlantic, both in U.S. waters and in Canada, since Lease Sale 42 was first announced in 1977. In 1978, CLF partnered with the Gloucester Fishermen's Wives Association and the Commonwealth of Massachusetts to block oil exploration on Georges Bank—a thriving part of our region's ocean ecosystem that supports vibrant marine life. CLF won the first successful injunction against offshore drilling in the United States.³ CLF worked with Canadian conservation and fisheries counterparts to ensure that Canadian OCS leasing, exploration, and development activities along the Scotian Shelf and on or near Georges Bank and the Gulf of Maine have matched U.S. actions. CLF has also supported Section 12(a) withdrawals by former Presidents George H.W. Bush, Clinton, George W. Bush, Obama and Biden of large tracts of ecologically sensitive and valuable continental shelf. United efforts of New England's congressional delegation have blocked funding for leasing off New England. These efforts continue today.

The Northeast U.S. Continental Shelf that contains the Planning Area is home to some of the most productive ecosystems and renowned fishery resources in the world. The area is characterized by a unique undersea topography of deep basins, shallow banks, ledges, and submarine canyons amid powerful tidal currents. These habitats fuel a remarkable diversity of marine mammals, fish, seabirds, turtles, and invertebrates. Its unique habitats and biodiversity support a coastal economy characterized by commercial and recreational fishing, recreational boating, shipping, and tourism.

Oil and gas development activities would wreak havoc on the marine ecosystem and the coastal economy. It would fuel and exacerbate the climate crisis by extracting and ultimately burning more fossil fuels and threaten the communities that depend on a healthy marine ecosystem, including commercially and recreationally important fisheries, coastal tourism businesses, and recreation. The climate impacts that already affect the North Atlantic include increased precipitation, more frequent and more severe storms, a heightened risk of heat-related illnesses, and sea level rise. Opening the Planning Area to oil and gas drilling would further jeopardize frontline, coastal, working waterfront, and environmental justice communities.

³ *Conser. Law Foundation v. Sec'y of the Interior*, 790 F.2d 965 (1st Cir. 1986).

CLF opposes oil and gas leasing in the Planning Area for the following reasons:

- (1) Leasing is unlawful, because the entire Planning Area has been withdrawn from offshore oil and gas drilling by either prior presidential and/or congressional actions;
- (2) New oil and gas development is unnecessary to achieve national energy objectives;
- (3) The Outer Continental Shelf Lands Act (OCSLA) Section 18(a)(2)(A)–(H) factors weigh against new leasing in the Planning Area; and
- (4) A Programmatic Environmental Impact Statement under the National Environmental Policy Act (NEPA) is not being prepared consistent with prior National OCS Program development.

While not discussed in this letter, similar issues arise throughout the entire Atlantic OCS.

DISCUSSION

I. OCSLA Governs Oil and Gas Resources on the Outer Continental Shelf.

Management of the oil and gas resources of the (OCS) is governed by the Outer Continental Shelf Lands Act (OCSLA); an Act that establishes mandated procedures for leasing, exploration, development, and production of those resources that BOEM must follow.⁴ Section 18 of OCSLA requires the preparation, and periodic revision of a five-year National OCS Program.⁵ The program then dictates when and where leases may occur. The plan, however, does not approve leases.

We are currently at the first of five stages in this process—BOEM’s publication of a Request for Information and Comments (RFI).⁶ BOEM requests information and comments on all 27 OCS Planning Areas and then winnows down the potential leasing areas.⁷ The proposed leases sales must “indicat[e] . . . the size, timing, and location of leasing activity which [the Secretary] determines will best meet national energy needs for the five-year period following its approval or reapproval.”⁸

Sections 18(a)(1); (a)(2)(A), (B), (G), and (H); and (a)(3), each require BOEM to examine environmental and ecological costs of leasing, beginning at this first

⁴ 43 U.S.C. § 1331 et seq.

⁵ 43 U.S.C. § 1344(a).

⁶ See *California v. Watt*, 668 F.2d 1290, 1297, 1299 (D.C. Cir. 1981) (this first stage has “important practical and legal significance”).

⁷ 90 Fed. Reg. at 17,973–74; see also 30 C.F.R. § 556.202.

⁸ 43 U.S.C. § 1344(a); 30 C.F.R. § 556.100.

stage.⁹ Under Section 18(a)(1), management of the OCS must be “conducted in a manner which considers economic, social, and environmental values of the renewable and nonrenewable resources” in the OCS, and the potential impact to these resources of oil and gas development activities.¹⁰ Ultimately, the timing and location of exploration, development, and production of oil and gas, to the extent it even occurs, must be based on the consideration of eight Section 18(a)(2) factors related to the environmental, social, and economic costs of oil and gas leasing activities on the marine, coastal, and human environments.¹¹ Finally, Section 18(a)(3) requires selecting the timing and location considering the “proper balance between the potential for environmental damage, the potential for the discovery of oil and gas, and the potential for adverse impact on the coastal zone.”¹²

II. BOEM cannot lease planning areas previously withdrawn from future oil and gas leasing by prior presidential or Congressional actions.

1. The North Atlantic Planning Area is unavailable for leasing

BOEM must exclude the Planning Area in the 11th National OCS Program, because this entire area is protected from oil and gas leasing and development activities by past Presidential withdrawal and/or Congressional moratorium.

Areas withdrawn by a prior president are unavailable unless and until Congress makes them available. While OCSLA Section 12(a) authorizes the President to withdraw previously unleased public lands from disposition, including from leasing,¹³ it does not authorize a subsequent president to unilaterally ignore or reverse a prior President’s withdrawals.¹⁴

On January 5, 2025, President Biden withdrew more than 625 million acres of federal waters from future oil and gas leasing under his Section 12(a) authority stating that “the environmental and economic risks and harms that would result from drilling in these areas outweigh their limited fossil fuel resource potential.”¹⁵ This withdrawal encompassed the entire Atlantic OCS, including the

⁹ 30 C.F.R. § 556.202.

¹⁰ 43 U.S.C. § 1344(a)(1).

¹¹ 43 U.S.C. § 1344(a)(2)(A)–(H).

¹² 43 U.S.C. § 1344(a)(3).

¹³ 43 U.S.C. § 1341(a) (there is a long bipartisan history of presidential withdrawals under OCSLA 12(a). Beginning in 1960, President Eisenhower withdrew areas of the Key Largo Coral Reef Preserve, now part of Florida Keys National Marine Sanctuary. Since then, Presidents Nixon (through his Secretary of the Interior), H.W. Bush, Clinton, W. Bush, Obama, Biden, and even President Trump have all issued withdrawals).

¹⁴ *League of Conserv. Voters v. Trump*, 363 F. Supp. 3d 1013, 1020–31 (D. Alaska 2019), vacated and remanded as moot sub nom., *League of Conserv. Voters v. Biden*, 843 F. App’x 937 (9th Cir. 2021); see *contra* 90 Fed. Reg. at 17,974.

¹⁵ FACT SHEET: President Biden Protects Atlantic and Pacific Coasts from Offshore Oil and Gas Drilling, THE WHITE HOUSE, (Jan. 6, 2025), <https://bidenwhitehouse.archives.gov/briefing->

North Atlantic Planning Area. None of the areas in this withdrawal were scheduled for future leasing under the Department of the Interior’s current Five-Year Program for the 2024–2029 period (“2024–2029 Program”), nor do any of these areas in the Atlantic OCS have any current oil and gas development activity.

President Biden’s withdrawals reaffirmed prior withdrawals made by President Obama.¹⁶ Although President Trump issued Executive Order (EO) 14148 on January 20, 2025, seeking to reverse President Biden’s withdrawal of these federal waters,¹⁷ this purported revocation exceeds his constitutional and statutory authorities and is unlawful. In 2017, President Trump similarly sought to revoke President Obama’s 2016 withdrawals in the Northern Bering Sea, Atlantic Ocean, and Arctic Ocean (EO 13788).¹⁸

2. *Stellwagen Bank National Marine Sanctuary and the Northeast Canyons and Seamounts Marine National Monument are unavailable for leasing*

Areas afforded additional protection through prior presidential and/or Congressional actions, and therefore unavailable for leasing, also include the Stellwagen Bank National Marine Sanctuary and the Northeast Canyons and Seamounts Marine National Monument. Both were created in recognition of their national significance.

The Stellwagen Bank National Marine Sanctuary cannot be leased because President George W. Bush used his OCSLA Section 12(a) authority to withdraw all Sanctuaries designated prior to July 14, 2008.¹⁹ Oil and gas leasing, exploration, or development activities are also incompatible uses of national marine sanctuaries and are expressly prohibited by the National Marine Sanctuaries Act.²⁰ Under its regulations, oil and gas leasing activities are expressly prohibited in the

room/statements-releases/2025/01/06/fact-sheet-president-biden-protects-atlantic-and-pacific-coasts-from-offshore-oil-and-gas-drilling/.

¹⁶ See Mem. on Withdrawal of Certain Areas of the United States OCS Offshore Alaska From Leasing Disposition, DCPD201500059 (Jan. 27, 2015); EO 13754, 81 Fed. Reg. 90669, (Dec. 9, 2016); Mem. on Withdrawal of Certain Portions of the United States Arctic OCS From Mineral Leasing, DCPD201600860 (Dec. 20, 2016).

¹⁷ Initial Rescissions of Harmful Executive Orders and Actions, EO 14148 (Jan. 20, 2025), <https://www.federalregister.gov/documents/2025/01/28/2025-01901/initial-rescissions-of-harmful-executive-orders-and-actions>.

¹⁸ The U.S. District Court for the District of Alaska concluded the 2017 revocation was unlawful. *League of Conservation Voters*, 363 F. Supp. 3d at 1030, *vacated as moot and remanded sub nom.* 843 F. App’x 937 (9th Cir. 2021). No prior President has even attempted to reverse a prior withdrawal without an express end date.

¹⁹ Mem. on the Modification of the Withdrawal of Areas of the United States OCS from Leasing Disposition, (July 14, 2008), <https://www.govinfo.gov/content/pkg/WCPD-2008-07-21/pdf/WCPD-2008-07-21-Pg985.pdf> (reaffirming President Clinton’s 1998 withdrawal).

²⁰ 16 U.S.C. § 1436 (prohibiting activities that would “destroy, cause the loss of, or injure any sanctuary resource managed under law or regulations for that sanctuary”); § 1441 (permitting only activity compatible with the purposes of the sanctuary).

Sanctuary.²¹

Similarly, oil and gas leasing and development cannot occur in the Northeast Canyons and Seamounts Marine National Monument because in 2016 President Obama used his Antiquities Act authority to withdraw the Monument.²² Undertaking any disruptive energy exploration and development, including oil and gas leasing activities is prohibited because of the deleterious impacts on the marine ecosystem.

III. Oil and Gas Leasing in the North Atlantic Planning Area is Unnecessary.

New oil and gas leasing is unnecessary to meet the nation’s future energy needs and will only exacerbate our nation’s climate crisis. Under OCSLA, BOEM is required to develop a lease program that “shall consist of a schedule of proposed lease sales . . . which [the Secretary] determines will best meet national energy needs.”²³

Rather than a determination of what best meets our national energy needs, the 11th National OCS Program is predicated on a manufactured “national energy emergency” contained in President Trump’s January 20, 2025, executive orders, (EO 14154, 14156) issued to “[u]nleash[] American Energy.”²⁴ BOEM states that its “analysis of . . . the energy needs” will rely on the “U.S. Energy Information Administration’s [(EIA)] projections of national energy needs;”²⁵ however, the EIA reports that the U.S. already produces more energy than it consumes. Notably, the U.S. has been a net total energy exporter to other countries every year since 2019—with energy exports hitting a report high as recently as 2023 (crude oil accounting for 66-percent of total energy exports).²⁶ The increase means the U.S. has shifted into the “world’s largest crude oil and natural gas producer today.”²⁷ The same EIA report concludes that U.S. energy production has outpaced energy consumption over the past 50 years, making an energy emergency implausible.²⁸

As we face increasing energy demand, we need to transition to renewables and improve energy efficiency, rather than increase fossil fuel development. In 2021, the International Energy Agency called for an end to all new fossil fuel

²¹ 15 CFR § 922.142.

²² 54 U.S.C. § 320301; Proclamation No. 9496, 81 Fed. Reg. 65161 (Sept. 15, 2016).

²³ 43 U.S.C. § 1344(a).

²⁴ *Declaring a National Energy Emergency*, THE WHITE HOUSE (Jan. 20, 2025), <https://www.whitehouse.gov/presidential-actions/2025/01/declaring-a-national-energy-emergency/>; *Unleashing American Energy*, THE WHITE HOUSE (JAN. 20, 2025), <https://www.whitehouse.gov/presidential-actions/2025/01/unleashing-american-energy/>.

²⁵ 90 Fed. Reg. at 17,974.

²⁶ U.S. EIA, *U.S. energy facts explained*, <https://www.eia.gov/energyexplained/us-energy-facts/imports-and-exports.php> (last visited May 30, 2025).

²⁷ U.S. EIA, *U.S. energy production has increased faster than energy consumption over the past 50 years*, IN-BRIEF ANALYSIS, (Oct. 29, 2024), <https://www.eia.gov/todayinenergy/detail.php?id=63544>.

²⁸ *Id.*

leasing globally by 2025.²⁹ Additionally, nearly every North Atlantic state adjacent to the Planning Area have already adopted binding emissions reduction targets.³⁰ Rather than increase our fossil fuel dependence and oil and gas production, the Northeast must accelerate policies to limit the use of fossil fuel energy resources and drastically reduce its greenhouse gas emissions to achieve its target. These policies include increasing renewable energy generation and electrifying our heating and transportation sectors. New oil and gas leasing, exploration or development activities run counter to this goal of achieving state targets. Moreover new oil and gas leases would not even be operational for a decade,³¹ by which time clean energy could be well on its way to satisfying expected energy needs.³²

Future oil and gas leasing will also fuel the climate crisis already occurring in the North Atlantic. The region's coastal and marine habitats are experiencing unprecedented changes including ocean warming, marine heatwaves, sea level rise, and ocean acidification.³³ In fact, sea surface temperatures are rising faster in the Gulf of Maine than 97% of the global ocean.³⁴ These changes have led to significant shifts in the distribution and seasonality of marine species (plants and animals) and to decreased ocean productivity.

IV. The OCSLA Section 18 factors weigh heavily against leasing in the North Atlantic Planning Area.

BOEM must consider all eight Section 18(a)(2) factors when determining the timing or location of leasing activity.³⁵ These eight factors weighed against offering leases in the Planning Area during the development of the current 2024–2029 Program (and it was removed),³⁶ and they continue to weigh against oil and gas

²⁹ International Energy Agency, *Net Zero By 2050 A Roadmap for the Global Energy Sector*, (May 18, 2021), https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroBy2050-ARoadmapfortheGlobalEnergySector_CORR.pdf.

³⁰ See Center for Climate and Energy Solutions, *U.S. State Greenhouse Gas Emissions Targets*, <https://www.c2es.org/document/greenhouse-gas-emissions-targets/> (last accessed June 16, 2025).

³¹ BOEM, *2019-2014 National OCS Oil and Gas Leasing Program Draft Proposed Program*, 6-1 (Jan. 2018), <https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/Leasing/Five-Year-Program/2019-2024/DPP/NP-Draft-Proposed-Program-2019-2024.pdf> (hereinafter “2019–2024 Draft Proposed Program”) (“OCS projects can take 10 years or more from lease award to initial production”).

³² *Temporary Withdrawal of All Areas on OCS from Offshore Wind Leasing and Review of the Federal Government's Leasing and Permitting Practices for Wind Projects*, The White House (Jan. 20, 2025), <https://www.whitehouse.gov/presidential-actions/2025/01/temporary-withdrawal-of-all-areas-on-the-outer-continental-shelf-from-offshore-wind-leasing-and-review-of-the-federal-governments-leasing-and-permitting-practices-for-wind-projects/>.

³³ Whitehead, J.C et al., *Fifth National Climate Assessment*, Ch. 21. Northeast, U.S. GLOBAL CHANGE RESEARCH PROGRAM, (2023), <https://doi.org/10.7930/NCA5.2023.CH21>.

³⁴ Gulf of Maine Research Institute, *2022 Gulf of Maine Warming Update: Second-Hottest Year on Record*, (Feb. 15, 2023), <https://gmri.org/stories/warming-22/>.

³⁵ 43 U.S.C. § 1344(a)(2)(A)–(H); *Watt*, 668 F.2d at 1313–15 (vacating for failure to properly consider Section 18 factors in determining the timing and location of leasing activity).

³⁶ 87 Fed. Reg. 40,859, 40,860 (July 8, 2022) (“There are no potential lease sales scheduled for planning areas in the . . . Atlantic Region”).

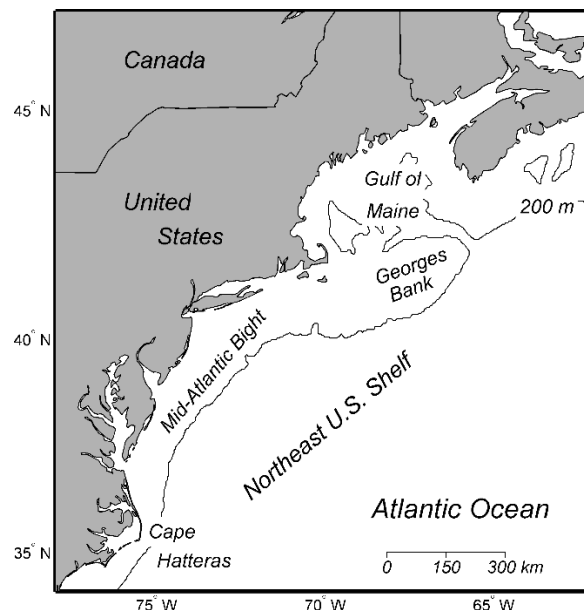
leasing and development in the Planning Area for the following reasons.

A. Geographical, geological, and ecological characteristics

The first factor BOEM must consider is the “[e]xisting information concerning the geographical, geological, and ecological characteristics of [OCS] regions.”³⁷ BOEM has already evaluated information “to estimate the potential presence and amount of technically recoverable oil and gas resources on the OCS,”³⁸ and determined that the oil and gas resource recovery potential in the Planning Area is extremely low relative to the extraordinary risk that any exploration of undiscovered oil and gas resources would cause to this region’s ocean resources.

i. Ecological characteristics

The Planning Area is contained within the Northeast U.S. Continental Shelf (a BOEM ecoregion extending from the U.S.-Canada border to Cape Hatteras, North Carolina).³⁹



*Map of the Northeast U.S. Continental Shelf Large Marine Ecosystem.*⁴⁰

It is a highly productive marine environment whose waters are influenced by the mixing of the Labrador Current and the Gulf Stream, supporting a diversity of

³⁷ 43 U.S.C. § 1344(a)(2)(A).

³⁸ 2019–2024 Draft Proposed Program, *supra* note 31 at 4.

³⁹ BOEM, *2024–2029 National OCS Oil and Gas Leasing Program Final Programmatic EIS*, fig. 2-4 (Sept. 2023), https://www.boem.gov/sites/default/files/documents/oil-gas-energy/leasing/2024-2029NatOCSoilGasLeasing_FinalPEISVol1_0.pdf (hereinafter “2024–2029 Final Programmatic EIS”); 2019–2024 Draft Proposed Program, *supra* note 31 at 7-26.

⁴⁰ NOAA, *Technical Documentation, State of the Ecosystem Report*, <https://noaa-edab.github.io/tech-doc/> (last visited June 13, 2025).

species and habitats including feeding, breeding and resting grounds, as well as migratory corridors⁴¹ for a multitude of species (*see infra* § IV.G). Impacts to these habitats and species from oil and gas leasing activities would be detrimental to all the marine resources in the region.

The region’s geological and seafloor environment comprises sandy sediments and hard bottom features, as well as deep, cold-water coral reefs, and submarine canyons.⁴² Along the coast, estuaries, tidal rivers, marshes, and stream habitats support a wide variety of “aquatic, estuarine, and marine communities, including habitat and nursery areas for juvenile fish, shellfish, bird, and other wildlife.”⁴³ The Planning Area also has a high proportion of essential fish habitat, including within canyons, seamounts, banks, and ledges.⁴⁴

In turn, the highly productive, temperate Planning Area and its habitats support a robust diversity of species. There are 39 species of marine mammals that occur within the “western North Atlantic Ocean,” including 7 species of baleen whales, 27 species of toothed whales and dolphins, and 4 species of seals.⁴⁵ Numerous species of resident and migratory birds include shearwaters, storm petrels, gulls, fulmars, and Atlantic puffins. Commercially important fish species include Atlantic cod, various species of flounder, mackerel, herring, haddock, lobster, and sea scallops.⁴⁶

Of particular importance to CLF is the designated critical habitat in the Gulf of Maine for the endangered North Atlantic right whale.⁴⁷ This species continues to trend towards extinction, with only approximately 370 individuals in the population, including fewer than 70 reproductive females.⁴⁸ The species is currently experiencing unsustainable levels of mortality and serious injury from vessel strikes and entanglement in fishing gear, and recovery is further hindered by underwater noise pollution and climate change-driven shifts in the distribution of its primary prey, *Calanus finmarchicus*.⁴⁹ The species is unable to withstand any further loss or

⁴¹ Species with migratory routes in the North Atlantic Planning Area include baleen whales, like humpback and right whales that follow zooplankton blooms (particularly in the Gulf of Maine), as well as harbor seals and gray seals. Migrating birds also use the Atlantic Flyway. *See* 2024–2029 Final Programmatic EIS, *supra* note 39 at 127, 134.

⁴² 2024–2029 Final Programmatic EIS, *supra* note 39 at 124.

⁴³ *Id.* at 132.

⁴⁴ *Id.* at 131.

⁴⁵ *Id.* at 128.

⁴⁶ 2019–2024 Draft Proposed Program, *supra* note 31 at 7-27.

⁴⁷ *Id.* at 7-29.

⁴⁸ NOAA Fisheries, *North Atlantic Right Whale: Population Status*, <https://www.fisheries.noaa.gov/species/north-atlantic-right-whale> (last updated May 12, 2025).

⁴⁹ NOAA Fisheries, *2017–2023 North Atlantic Right Whale Unusual Mortality Event*, <https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2025-north-atlantic-right-whale-unusual-mortality-event> (last updated April 24, 2025).

disturbance due to oil and gas development.⁵⁰

In addition to the North Atlantic right whale, there are other threatened and endangered species in the Planning Area, including whales (blue, fin, sei, sperm, and North Atlantic right whales), turtles (green, leatherback, loggerhead and Kemp’s ridley turtles), fish (Atlantic salmon, Atlantic sturgeon, Shortnose Sturgeon), and birds (red knot, roseate tern, wood stork, black-capped petrel, and piping plover). All of these species would be put at greater risk if oil and gas leasing activities occurred.

ii. *Geological and geophysical*

The 43 exploratory wells drilled in the Planning Area between 1976–1984 led to “no commercial discoveries.”⁵¹ The last lease sale held anywhere in the Atlantic OCS was in 1983; there are currently no active oil and gas leases in the region, and there has been no oil and gas development in the U.S. North Atlantic since.⁵² In its RFI, BOEM asserts that:

analysis suggests that portions of the Atlantic OCS could contain significant oil and gas resource potential, with a mean undiscovered resource volume of more than 10 [billion barrels of oil equivalent (BBOE)]; however, current geological and geophysical (G&G) information regarding that potential is based largely on data collected in the 1970s and early 1980s. Tremendous advances in instrumentation and technology to acquire and analyze G&G data have been made in the intervening decades.⁵³

There is no support for this assertion.

The most recent assessment of the undiscovered technically recoverable resources determined that of these ~“10 billion barrels” of oil, the amount economically recoverable was at least less than half this amount for the entire Atlantic OCS.⁵⁴

⁵⁰ The Potential Biological Removal level for the species is now 0.7, meaning that not even a single individual can be lost to human activities each year if the species is to avoid extinction.

⁵¹ 2019–2024 Draft Proposed Program, *supra* note 31 at 4-9; BOEM, *2021 National Assessment of Undiscovered Oil and Gas Resources of the U.S. Outer Continental Shelf*, 39 (Dec. 2021), https://www.boem.gov/sites/default/files/documents/oil-gas-energy/2021-NA_1.pdf.

⁵² 90 Fed. Reg. 17,974.

⁵³ *Id.*

⁵⁴ BOEM, *2021 Assessment of Technically and Economically Recoverable Oil and Natural Gas Resources of the U.S. Atlantic Outer Continental Shelf*, figs. 18–19, 49–52, (2021), https://www.boem.gov/sites/default/files/documents/regions/atlantic-ocs-region/2021%20Atlantic%20Assessment%20Final_508_0.pdf (“the Atlantic is a frontier basin with

The entirety of the Atlantic OCS contains just 7% of the nation’s total unleased undiscovered economically recoverable resources.⁵⁵ A report from Oceana estimates that the Atlantic planning areas’ *entire* supply is only capable of meeting our nation’s oil demand for less than seven months, and gas demand for less than six months.⁵⁶ Of this total, the Planning Area contains only 3% of the estimated undiscovered economically recoverable resources.⁵⁷ Only 1.73 BBOE of economically recoverable resources lie within the North Atlantic.⁵⁸

Of the two primary ecological production units in the Planning Area—the Gulf of Maine and Georges Bank⁵⁹—there is no indication that there is oil and gas in the Gulf of Maine and both should be precluded from any consideration because together they comprise one of the most productive continental shelf ecosystems in the U.S. (*see infra* § IV.G).

In response to BOEM’s intent to “receive new” geological and geophysical (G&G) applications “in the near future,”⁶⁰ CLF also opposes any new, unnecessary G&G permit applications in the Planning Area. Seismic surveys or exploratory drilling can injure or kill fish, sea turtles, and marine mammals. Baleen and toothed whales would experience physical and behavioral disturbance from the low-frequency, high-intensity nature of the sounds. The large geographic scope of any surveys necessitates that these impacts would be widespread.

B. *Equitable sharing of costs and benefits*

The second factor BOEM must consider is “an equitable sharing of developmental benefits and environmental risks among the various regions”⁶¹ This factor considers the sharing of benefits and risks in coastal areas that produce oil and gas.⁶² This factor also weighs against oil and gas leasing, exploration and development in the Planning Area because the environmental costs of oil and gas leasing activities far outweigh any potential benefits.

As stated by NOAA, “[o]il spills can happen anywhere oil is drilled,

no oil and gas infrastructure and an overwhelming majority of resources in deep and ultra-deepwater, far off shore;” at the highest price point only 45.5% of the undiscovered technically recoverable resources would be economic); BOEM, *2021 National Assessment of Undiscovered Oil and Gas Resources of the U.S. Outer Continental Shelf*, *supra* note 51 at 28.

⁵⁵ 2019–2024 Draft Proposed Program, *supra* note 31 at 5-14.

⁵⁶ Oceana, *Clean Coast Economy Report: State Fact Sheet: Massachusetts’ Clean Coast Economy*, 2 (March 2018), <http://usa.oceana.org/sites/default/files/4046/massachusetts.pdf>.

⁵⁷ 2019–2024 Draft Proposed Program, *supra* note 31 at 5-14.

⁵⁸ BOEM, *2021 National Assessment of Undiscovered Oil and Gas Resources of the U.S. Outer Continental Shelf*, *supra* note 51 at 54.

⁵⁹ 2024–2029 Final Programmatic EIS, *supra* note 39 at 268–269.

⁶⁰ 90 Fed. Reg. at 17,974.

⁶¹ 43 U.S.C. § 1344(a)(2)(B).

⁶² 2019–2024 Draft Proposed Program, *supra* note 31 at 8-1.

transported, or used.”⁶³ It is not possible for either BOEM or the oil and gas industry to assure against such devastating events. Since 1969, U.S. waters have experienced thousands of oil spills, including at least 44 oil spills of more than 420,000 gallons of oil (deepwater horizon, the largest spill to date, involved nearly 134 million gallons of oil).⁶⁴ Nearly 8 million gallons spilled when the Argo Merchant ran aground off the coast of Nantucket Island in strong winds and high waves in 1976.⁶⁵ The threat of an oil spill in the Planning Area would have significant long-term and population-level effects on marine resources, cultural and maritime heritage, vulnerable coastal communities, the fishing industry, and the recreation and tourism industries.⁶⁶ In the short term, disruption to these coastal communities and industries for even a season will inflict incalculable economic and social damage.

Aside from the risk of an oil spill, oil and gas leasing, exploration, and development activities risk chronic oil and gas pollution impacts that would devastate marine life, habitats and sustainable fisheries. For example, there would be impacts to benthic communities from drilling and cuttings, cabling, and offshore construction; increased noise pollution injuring or disturbing fish, sea turtles, and marine mammals; increased vessel traffic leading to an increase in ship strikes of sea turtles and whales; and other marine disturbances associated with oil and gas leasing activities.⁶⁷ Oil and gas leasing, exploration and development in this region would put our multi-billion dollar marine economy at catastrophic risk.⁶⁸

Opening the North Atlantic to oil and gas drilling would also exacerbate the climate crisis and related risks to frontline coastal, working waterfront, and environmental justice communities. Increased greenhouse gas emissions would also increase risks to environmental justice communities’ health, safety, and property.

C. Regional and national energy markets

The third factor BOEM must consider is “[t]he location of such regions with respect to, and the relative needs of, regional and national energy markets.”⁶⁹ This

⁶³ NOAA, *Oil Spills*, <https://www.noaa.gov/education/resource-collections/ocean-coasts/oil-spills>, (last updated Feb. 25, 2025).

⁶⁴ NOAA, *Largest Oil Spills Affecting U.S. Waters Since 1969*, <https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/largest-oil-spills-affecting-us-waters-1969.html>, (last updated Apr. 14, 2025).

⁶⁵ NOAA, *Emergency Response and Assessment 40 Years after Argo Merchant*, (Dec. 12, 2016), <https://response.restoration.noaa.gov/emergency-response-and-assessment-40-years-after-argo-merchant>.

⁶⁶ 2024–2029 Final Programmatic EIS, *supra* note 39 at 157.

⁶⁷ 2024–2029 Final Programmatic EIS, *supra* note 39 at 111-113.

⁶⁸ NOAA, *NOAA Regional and State Report on the U.S. Marine Economy, Northeast Region*, OFFICE FOR COASTAL MANAGEMENT, 6 (2024), <https://coast.noaa.gov/data/digitalcoast/pdf/econ-report-regional-state.pdf>; see also National Ocean Economics Program (NOEP), *Ocean Economy Data* (2021), <https://www.oceaneconomics.org/NOEP/Market/ocean/oceanEcon.asp>.

⁶⁹ 43 U.S.C. § 1344(a)(2)(C).

factor weighs against oil and gas leasing and development in the Planning Area because not only do the associated risks outweigh any potential benefits, but the region's energy market demands, and infrastructure does not correspond with new oil and gas leases, despite the purported "energy emergency" (*see supra* § III).

The Planning Area does not have the regional infrastructure necessary for new oil and gas leasing and development. A network of pipelines, trains, trucks, barges, and subsea cables would be required just to transport the oil and gas resources to prospective refineries. Currently the East Coast only has 7% of the U.S. refining capacity, as compared to 52% in the Gulf Coast.⁷⁰ Building that infrastructure and transporting what little product could be produced would only exacerbate the climate change impacts we face.

Instead, the Northeast region requires continued investment in responsibly developed, renewable energy. Without a substantial renewable energy buildout, the region's states will not meet their binding climate obligations. Transitioning to a clean energy economy will require drastically increasing the production of land-based and offshore wind as well as solar energy.

D. Other uses of the OCS

The fourth factor that BOEM must consider is "[t]he location of such regions with respect to other uses of the sea and seabed, including fisheries, navigation, existing or proposed sealanes, potential sites of deepwater ports, and other anticipated uses of the resources and space of the [OCS]."⁷¹ The catastrophic risks of oil and gas leasing activities to the Planning Area's marine life, habitats and their fisheries and ocean related industries weigh heavily against leases in this Planning Area.

Coastal communities in the Northeast have long depended on a healthy ocean ecosystem. The Planning Area supports numerous businesses that make up the region's valuable marine economy. NOAA's most recent report on the Northeast marine economy finds that, as of 2021, ocean resources support more than 250,000 jobs and \$23.7 billion in economic activity.⁷² More than 66% of these jobs and \$11.6 billion of this economic activity come from the tourism and recreation sector including the whale watching, recreational fishing, and seabird viewing industries.⁷³ The top five waterfront and marine recreation activities are beachgoing, scenic enjoyment, swimming/body surfing, biking/hiking, and wildlife

⁷⁰ 2019–2024 Draft Proposed Program, *supra* note 31 at 6-10.

⁷¹ 43 U.S.C. § 1344(a)(2)(D).

⁷² NOAA, *NOAA Regional and State Report on the U.S. Marine Economy, Northeast Region*, OFFICE FOR COASTAL MANAGEMENT, 6 (2024), <https://coast.noaa.gov/data/digitalcoast/pdf/econ-report-regional-state.pdf>; *see also* National Ocean Economics Program (NOEP), *Ocean Economy Data* (2021), <https://www.oceaneconomics.org/NOEP/Market/ocean/oceanEcon.asp>.

⁷³ NOAA, *Economics: National Ocean Watch*, OFFICE FOR COASTAL MANAGEMENT, <https://coast.noaa.gov/digitalcoast/data/enow.html> (last updated June 15, 2025).

viewing.⁷⁴ Today, nearly 4 million people visit the Cape Cod National Seashore and its 40 miles of pristine eastern-facing beaches each year,⁷⁵ and this is just one beach along the east coast.

The Planning Area includes fisheries that provide “much of the fish and shellfish consumed in the United States.”⁷⁶ These fisheries are wholly dependent on access to healthy, abundant and marketable fish and shellfish. Approximately 74% of all commercial landings in the Atlantic Region are generated by Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island.⁷⁷ In 2022, New England’s commercial fisheries landed more than \$1.4 billion (447.2 million pounds) in fish and shellfish.⁷⁸ Massachusetts’ commercial fisheries alone generated nearly 214,000 jobs, contributing \$8.2 billion to U.S. GDP in 2022.⁷⁹ In 2022, Massachusetts commercial fishermen landed more than \$670 million in fish and shellfish.⁸⁰

The Planning Area also includes some of the largest ports on the east coast which “handle roughly 10 percent of the United States’ total imports and exports.”⁸¹ For example, the port of Boston is New England’s only full-service container terminal, supporting \$8.2 billion in economic impact annually with 66,000 jobs.⁸² It’s main terminal services 2,500 businesses and 15 million people based on the 2.3 metric tons of cargo passing through it.⁸³ The Port of Portland contributes approximately \$800 million of total economic output via industrial marine, commercial fishing, recreational, and tourism activities.⁸⁴ And the port of New

⁷⁴ Kite-Powell, H.C. et al., *Northeast Ocean Planning Baseline Assessment: Marine Resources, Infrastructure, and Economics*, CENTER FOR THE BLUE ECONOMY, 9-2016: 87 (2016), <https://cbe.miiis.edu/publications/19/>.

⁷⁵ Reece, Susan, *Tourism to Cape Cod National Seashore contributes \$730 million to local economy*, National Park Service (Aug. 28, 2024), [https://www.nps.gov/caco/learn/news/tourism-to-cape-cod-national-seashore-contributes-\\$730-million-to-local-economy.htm](https://www.nps.gov/caco/learn/news/tourism-to-cape-cod-national-seashore-contributes-$730-million-to-local-economy.htm).

⁷⁶ 2019–2024 Draft Proposed Program, *supra* note 31 at 6-28.

⁷⁷ 2024–2029 Final Programmatic EIS, *supra* note 39 at 135.

⁷⁸ NMFS, *Fisheries Economics of the United States*, 10 (Nov. 2024), <https://s3.amazonaws.com/media.fisheries.noaa.gov/2024-11/FEUS-2022-SPO248B.pdf>; NOAA Fisheries, *Landings Data Tool*, <https://www.fisheries.noaa.gov/foss/f?p=215:200:28638797097255>: (last visited June 14, 2025).

⁷⁹ NMFS, *Fisheries Economics of the United States* at *supra* note 78.

⁸⁰ NMFS, *Annual Commercial Landings Statistics*, https://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html (NMFS landings revenues are reported as nominal values (current at the time of reporting). The percentage increase in the dollar value of landings is in nominal terms (not adjusted for inflation)).

⁸¹ 2019–2024 Draft Proposed Program, *supra* note 31 at 6-28.

⁸² PORT OF BOSTON, *About*, <https://www.massport.com/conley-terminal/about-the-port> (last visited June 16, 2025).

⁸³ PORT OF BOSTON, *Port of Boston Statistics*, <https://www.massport.com/conley-terminal/about-the-port/port-statistics> (last visited June 16, 2025).

⁸⁴ AECOM, *City of Portland Assessment of the Waterfront and Marine Economy*, CITY OF PORTLAND, ii (Jul. 2020), <https://content.civicplus.com/api/assets/c4bf4bc4-4f3d-4936-aa67-88f6d5cbea26?cache=1800>.

Bedford's, has consistently led the nation in seafood landings by value, with a dockside value in 2023 of \$363.3 million. An oil spill would inflict incalculable ecological, economic and social damage on these ports and fisheries.

While the Planning Area offers little promise for the development of oil and gas, it offers significant renewable wind resources that would create an order of magnitude more jobs and greater energy supplies for the region and the nation. Offshore wind development has been underway in the region since 2010. An analysis of offshore wind power potential on the U.S. continental shelf (excluding Alaska) concluded that it was capable of producing more than twice the total U.S. electrical demand on a completely renewable basis.⁸⁵ Of all the areas around the country, the North Atlantic had among the highest wind power potential of any region in the country.

E. Industry Interest

The fifth factor BOEM must consider is “[t]he interest of potential oil and gas producers in the development of oil and gas resources as indicated by exploration or nomination.”⁸⁶ Although BOEM has not yet received comments from companies who may be interested in exploration and development it must nevertheless consider this factor, which also weighs against oil and gas leasing.

Oil and gas leases are not economically viable in the Planning Area. For example, during the 2023–2028 National OCS Oil and Gas Leasing Program the only potential lease block even identified on the U.S. Atlantic OCS was ultimately relinquished because of “unfavorable economic conditions.”⁸⁷ With a lack of infrastructure, low prices, and regional opposition, oil and gas leasing and development in the OCS remains unprofitable. Oil and gas leasing, exploration and development will also create direct conflicts with the Planning Area's coastal economy for little payoff.

F. Laws, goals, policies of affected states

The sixth factor BOEM must consider are the “laws, goals, and policies of affected States which have been specifically identified by the Governors of such States as relevant matters for the Secretary's consideration.”⁸⁸ Although it is early in this process, the Northeast states have a long history of united, regional opposition to any oil and gas development in the Planning Area.

In response to the Draft Proposed Program for the 10th National OCS Program, BOEM received “more than 2 million comments from stakeholders,

⁸⁵ National Renewable Energy Laboratory, *2016 Offshore Wind Energy Resource Assessment for the United States*, NREL/TP-5000-66599, 39, <https://www.nrel.gov/docs/fy16osti/66599.pdf>.

⁸⁶ 43 U.S.C. § 1344(a)(2)(E).

⁸⁷ BOEM, *Draft Economic Analysis Methodology*, 5-29 (July 2022), https://www.boem.gov/sites/default/files/documents/oil-gas-energy/national-program/Draft_Economic_Analysis_Methdology_2023-2028ProposeProgram_July2022.pdf.

⁸⁸ 43 U.S.C. § 1344(a)(2)(F).

including governors, Federal agencies, state agencies, local agencies, energy and non-energy industries, Tribal governments, non-governmental organizations.”⁸⁹ During the development of the 10th National OCS Program, twelve state Attorneys General (including ME, MA, RI, CT, and MD) wrote on behalf of their governors or state agencies⁹⁰ and 10 Governors (including CT, RI, MA, NY, and NJ) wrote to oppose leases in Planning Area.⁹¹ In response to this “input from governors and the public,” as well as consideration of the Section 18(a) factors, BOEM removed the Planning Area in the 10th National OCS Program.⁹²

Currently, nearly every Governor along the East Coast has expressed bipartisan “concerns about expanded oil and gas drilling off their coastline.”⁹³ Additionally, members of Congress have also consistently sought to exclude the Planning Area from oil and gas exploration. On April 22, 2025, bi-partisan group of Representatives introduced legislation to bar offshore drilling along the entire Atlantic OCS (the Clean Ocean and Tourism Anti-Drilling Act, The New England Coastal Protection Act, Defend Our Coast Act, and Florida Coastal Protection Act). In a joint statement introducing The New England Coastal Protection Act,⁹⁴ members of congress stated that “[e]xpanding drilling in the Atlantic would harm New England’s key industries, and significantly increase the chance of environmental disaster in the region.”⁹⁵ This is only the most recent effort to block oil and gas development in the region that dates back to the 1970s.

G. Environmental sensitivity and marine productivity

The seventh factor BOEM must consider is the “relative environmental sensitivity and marine productivity” of the Planning Area.⁹⁶ BOEM conducted an environmental sensitivity analysis in the 10th National OCS Program. Given the Planning Area’s score (based on the “vulnerability and resilience of species,

⁸⁹ 87 Fed. Reg. at 40,860.

⁹⁰ BOEM, *2024–2029 National OCS Proposed Final Program*, at A-5 (Sept. 2023), https://www.boem.gov/sites/default/files/documents/oil-gas-energy/leasing/2024-2029_NationalOCSProgram_PFP_Sept_2023_Compliant.pdf (hereinafter “2024–2029 Proposed Final Program”).

⁹¹ Ltr. to Sec. Ross and Sec. Zinke from 10 Governors, (Dec. 20, 2018), available at: https://usa.oceana.org/wp-content/uploads/sites/4/17335/20181220_multistate_seismic_testing.pdf.

⁹² 87 Fed. Reg. at 40,860 (“There are no potential lease sales scheduled for planning areas in the . . . Atlantic Region”).

⁹³ FACT SHEET: President Biden Protects Atlantic and Pacific Coasts from Offshore Oil and Gas Drilling, The White House, (Jan. 6, 2025), <https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2025/01/06/fact-sheet-president-biden-protects-atlantic-and-pacific-coasts-from-offshore-oil-and-gas-drilling/>.

⁹⁴ Congressman Seth Magaziner, (April 22, 2025), *Magaziner & Whitehouse Introduce Bipartisan New England Offshore Drilling Ban*, Press Release, (Apr. 22, 2025), <https://magaziner.house.gov/media/press-releases/magaziner-whitehouse-introduce-bipartisan-new-england-offshore-drilling-ban>.

⁹⁵ *Id.*

⁹⁶ 43 U.S.C. § 1344(a)(2)(G).

habitats, and potential ecosystem change impacts”⁹⁷), this factor also weighs heavily against oil and gas leasing, because of its uniquely productive and sensitive natural resources and oceanographic and ecological features.

During the development of the 10th National OCS Program, BOEM determined that the Planning Area supported the second highest marine “annual net primary” productivity of all OCS planning areas.⁹⁸ This productivity is a function of multiple and interconnecting physical features, ocean currents, and processes that mix to bring deep nutrient-rich waters to the surface,⁹⁹ as well as the influx of continental shelf waters from the Labrador Current¹⁰⁰ moving south and the Gulf Stream moving north.

The Planning Area contains the Gulf of Maine, considered one of the most productive ecosystems in the world. Known as a “sea within a sea,” it is characterized by a unique undersea topography of deep basins, shallow banks, and ledges and by powerful tidal currents, which mix the cold waters of the North Atlantic with the freshwater of 60 rivers draining into the Gulf. This fuels a biological engine that supports some 3000 species of wildlife, including marine mammals, fish, birds, turtles, and invertebrates.

Also within the Planning Area is Georges Bank, a world-renowned resource of the highest importance for sustained fish and shellfish production. Commercially important species in the area include Atlantic cod, haddock and other groundfish, lobster, scallops, and many others. Because of its productivity, a number of other threatened and endangered species feed there including North Atlantic right whales and loggerhead, kemp’s ridley, and leatherback turtles.¹⁰¹ For decades, the U.S. and Canada (with shared management responsibilities) have responded to the threats of oil and gas development on Georges Bank, and Canada has had a moratorium on drilling since 1988 (its current Georges Bank moratorium extends to 2032).

These oceanographic attributes make the entire Planning Area especially vulnerable to oil and gas pollution (as well as containment chemicals), because the same currents that contribute to its high productivity also expose marine life at the most sensitive stages of their life cycle (e.g. fish larvae) to additional threats. Any catastrophic discharge event from an oil or gas well would inevitably be drawn into and carried along with one or more of these directional water currents. The oceanographic features, deep waters, and violent weather characteristic of this Planning Area significantly increase the risk of a catastrophic spill and make

⁹⁷ 2019–2024 Draft Proposed Program, *supra* note 31 at 6.

⁹⁸ *Id.* at 7–53–54.

⁹⁹ Townsend, D., *Oceanography of the Northwest Atlantic Continental Shelf*, ch. 5 in *The Sea*, ed. By Robinson and Brink, 120 (2006), <https://doi.org/10.1016/j.pocean.2023.103030>.

¹⁰⁰ 2024–2029 Final Programmatic EIS, *supra* note 39 at 124–125.

¹⁰¹ Integrated Ecosystem Assessment, *Georges Bank*, <https://www.integratedecosystemassessment.noaa.gov/regions/northeast/georges-bank>, (last visited May 30, 2025).

mitigation extremely difficult.

H. Environmental and predictive information

Finally, BOEM must consider the “relevant environmental and predictive information for different areas of the [OCS].”¹⁰² To do so BOEM considers the “stressors and associated potential impacts” including “the potential severity of impact,”¹⁰³ for which the Planning Area’s marine resources are too valuable and sensitive to risk with oil and gas leasing activities.

In the development of the 10th National OCS Program, BOEM determined that “[i]f development occurs” impacts from oil and gas leasing activities “would be expected to be high, comparable to other areas with no existing oil and gas leasing activities.”¹⁰⁴ BOEM anticipated severe impacts associated with oil and gas associated activities to nearly every marine resource in the Planning Area.¹⁰⁵ BOEM ultimately determined that the “potentially significant impacts and costs to society” outweighed the resource potential and net benefits and did not include the Planning Area in the potential lease sales.¹⁰⁶

For all the reasons stated above, the Section 18 factors indicate that environmental costs and adverse impacts in the Planning Area associated with oil and gas activities would significantly outweigh any benefit.

V. BOEM should prepare a Programmatic Environmental Impact Statement to adequately inform the development of the 11th National OCS Program.

While BOEM should not consider new leases in the Planning Area for all the reasons above, regardless, BOEM should complete a programmatic environmental impact statement (EIS) under NEPA, 42 U.S.C. §§ 4321 et seq. A programmatic EIS is essential to analyze the potential environmental impacts of oil and gas leasing activities in OCS waters—an action with a broad geographic scope—and to effectively avoid or manage those impacts. BOEM stated in the RFI that “in lieu of a NEPA analysis, BOEM will prepare an environmental analysis document.”¹⁰⁷ BOEM dangerously breaks from its own longstanding precedent of historically and consistently preparing a programmatic EIS at this stage in the leasing process to inform the entirety “of the development of the National OCS Program,” as well as any “future NEPA analysis” that may be required.¹⁰⁸

¹⁰² 43 U.S.C. § 1344(a)(2)(H).

¹⁰³ 2019–2024 Draft Proposed Program, *supra* note 31 at 6.

¹⁰⁴ BOEM, *2023-2028 Draft Programmatic EIS*, at v, (July 2022), <https://www.boem.gov/sites/default/files/documents/oil-gas-energy/national-program/2023-2028-NationalOCSoilGasLeasingDraftPEISVol1.pdf>.

¹⁰⁵ 2024–2029 Final Programmatic EIS, *supra* note 39 at 233.

¹⁰⁶ 2024–2029 Proposed Final Program, *supra* note 90 at 8.

¹⁰⁷ 90 Fed. Reg. at 17,976.

¹⁰⁸ BOEM, *2023-2028 Draft Programmatic EIS*, *supra* note 103 at 3.

BOEM's decision to not conduct a NEPA review at this stage will preclude decision-makers, states, and the public from necessary information to ensure the full impacts of oil and gas leasing, exploration, and development are avoided, and that alternatives are analyzed. The RFI is the first point at which BOEM can eliminate risks imposed by oil and gas leases, reduce costs and eliminate harms that could occur at further stages.¹⁰⁹ Given the National OCS Program's "pyramidal" structure,¹¹⁰ initiating NEPA review at subsequent stages of the process is insufficient to protect from environmental harm.

At a minimum, early NEPA review is paramount to support the agency's required OCSLA Section 18 analysis. BOEM's failure to initiate a NEPA review at this stage will limit the information available to the agency, decision-makers, and the public regarding the required OCSLA Section 18 analysis, and may impede the agency's ability to fully comply with Section 18.

* * *

For the reasons outlined above, Conservation Law Foundation strongly opposes any oil and gas leasing activities in the North Atlantic Planning Area, and we urge BOEM to remove the Planning Area from consideration. We thank BOEM for the opportunity to provide these comments.

Sincerely,



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¹⁰⁹ *Ctr. for Sustainable Econ. v. Jewell*, 779 F.3d 588, 595 (D.C. Cir. 2015) ("The key national decisions as to the size, timing, and location of OCS leasing—as well as the basic economic analyses and justifications for such decisions—are made at this first stage.")

¹¹⁰ *California v. Watt* (Watt II), 712 F.2d 584, 588 (D.C. Cir. 1983) (as it "proceed[s] from broad-based planning to an increasingly narrower focus as actual development grows more imminent).



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

June 18, 2025

Tim Powell
Director of Permitting
Williams/Transcontinental Gas Pipe Line Company, LLC
2800 Post Oak Boulevard (77056)
P.O. Box 1396
Houston, Texas 77251-1396

Re: Transcontinental Gas Pipe Line Company, LLC (Transco)
Northeast Supply Enhancement Project
FERC Docket No. CP17-101-000
Request to Reinitiate Essential Fish Habitat Consultation

Dear Mr. Powell:

Reference is made to the June 3, 2025, letter from WSP requesting reinitiation of essential fish habitat (EFH) consultation under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) for the Northeast Supply Enhancement (NESE) Project (FERC Docket No. CP17-101). Transcontinental Gas Pipe Line Company, LLC (Transco) is recommencing development of the NESE project, a proposed 26-inch diameter natural gas pipeline from Middlesex County, NJ to the Rockaway Delivery Lateral pipeline in Queens County, NY, crossing Raritan Bay, Lower New York Bay, and the Atlantic Ocean. The Federal Energy Regulatory Commission (FERC), the lead federal agency for this project, has designated Transco as its non-federal representative for the EFH consultation and WSP is acting on behalf of Transco.

EFH consultation with us under the MSA was initially completed in 2018. Since that time, the certificate of public convenience and necessity, authorizing Transco to construct and operate the project has expired. According to WSP's letter, Transco has filed a "Petition for Expedited Reissuance of Certificate Authority" with FERC and has re-submitted a Joint Application to the US Army Corps of Engineers' New York District for permits under Section 10 and 14 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection, Research and Sanctuaries Act. Transco has also re-submitted an application to the NOAA Fisheries' Office of Protected Resources for an Incidental Harassment Authorization under the Marine Mammal Protection Act. WSP's letter also requests confirmation that the findings and EFH conservation recommendations issued for this project in 2018 and 2019 remain unchanged.

A copy of our May 14, 2018, letter which includes our initial EFH conservation recommendations (CRs) is attached. FERC provided a response to those CRs on June 12, 2018. A summary of the CRs was also in the final Environmental Impact Statement for the project dated January 2019. On February 11, 2019, Transco requested reinitiation of consultation and modification of some of the original CRs due to project refinements. In our attached July 28,



2019, letter we issued modified CRs based upon coordination and additional information on the construction activities and project schedule.

Since the original consultation was completed, EFH has been designated in the project area for additional federally-managed species including the common thresher shark (*Alopias vulpinus*), sand tiger shark (*Carcharias taurus*), smoothhound shark (*Mustelus mustelus*), and white shark (*Carcharodon carcharias*). Impacts to their EFH were not considered in the original EFH assessment. Based upon Transco's declaration that the activities proposed to install and operate the NESE project remain unchanged from those described during the previous consultations and our evaluation of the potential adverse effects of those actions on the EFH designated since 2018, we have determined that all EFH CRs issued in our May 14, 2018, letter, and the subsequently modified CRs in our July 28, 2019, letter remain valid and should be applied to the proposed project. No additional CRs are needed based upon the newly identified highly migratory species EFH at the project site.

Please note that Section 305(b)(4)(B) of the MSA requires you to provide a written response to us within 30 days after receiving our EFH conservation recommendations. The response must include a description of measures proposed for avoiding, mitigating, or offsetting the impact of the activity on EFH, as required by section 305(b)(4)(B) of the MSA and 50 CFR 600.920(j). In the case of a response that is inconsistent with our conservation recommendations, you must explain your reasons for not following the recommendations, including the scientific justification for any disagreements with us over the anticipated effects of the action or the measures needed to avoid, minimize, mitigate, or offset such effects.

Please note that a distinct and further EFH consultation must be initiated pursuant to 50 CFR 600.920(j) if new information becomes available or if the project is revised in such a manner that affects the basis of our determination above. Lastly, while our EFH regulations at 50 CFR 600.920 (c) allow a federal agency to designate a non-federal representative to conduct an EFH consultation, it should be noted that the federal agency, in this case FERC, remains ultimately responsible for compliance with sections 305(b)(2) and 305(b)(4)(B) of the MSA.

If you have any questions or need additional information, please contact Kira Dacanay in our New Jersey field office at (732) 872-3003 or kira.dacanay@noaa.gov.

Sincerely,



Karen M. Greene
Mid-Atlantic Branch Chief
Habitat and Ecosystem Services Division

Attachment: NMFS' May 14, 2018 letter
NMFS' July 28, 2019 letter

cc. FERC - J. Wachholder, A. Plummer
WSP - S. MacLeod
NJDEP - M. Resnick, K. Davis
USACE - S. Ryba, C. Minck
NYDOS - R. Rerres, P. Bayzon
NYDEC - J. Socrates, C. Bauer
EPA - M. Finocchiaro
AFMSC - R. Beal
MAFMC - C. Moore
NEFMC - C. O'Keefe
USFWS - M. Ciappi, R. Conover, S. Papa
NMFS PRD - J. Crocker, J. Morris



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

MAY 14 2018

Joanne Wachholder
Acting Chief, Gas Branch 2
Division of Gas – Environment and Engineering
Federal Energy Regulatory Commission
Office of Energy Products
Washington, DC 20426

RE: Docket No. CP17-101-000; Transcontinental Gas Pipe Line Company, LLC; Northeast Supply Enhancement Project; Raritan Bay, Lower New York Bay, Atlantic Ocean

Dear Ms. Wachholder:

We have reviewed the March 2018 essential fish habitat (EFH) assessment and Draft Environmental Impact Statement (DEIS) for the Transcontinental Gas Pipe Line Company (Transco), LLC's Northeast Supply Enhancement Project. Although the project includes actions in both terrestrial and aquatic ecosystems, our comments focus on section of the pipeline between Middlesex County, NJ and the Rockaway Delivery Lateral pipeline in Queens County, NY which crosses Raritan Bay, Lower New York Bay, and the Atlantic Ocean. This portion of the project includes:

- the Madison Loop, 3.4 miles of 26- inch diameter natural gas pipeline loop in Middlesex County, NJ;
- the Raritan Bay Loop, 23.5 miles of 26 inch diameter natural gas pipeline loop in Middlesex and Monmouth Counties, NJ and Richmond and Queens Counties, NY; and
- ancillary facilities in Middlesex County, NJ and Richmond County, NY.

The pipeline will be constructed by a combination of trenching techniques including dredging with an environmental bucket, horizontal directional drilling (HDD), jet trenching and hand jetting. The project also includes onshore temporary impacts to 2.82 acres of tidal wetlands from the open trenching pipeline installation and the dredging of HDD entry and exit pits at two of the proposed HDD sites. Within the open water construction areas, side-casting is proposed for materials excavated with an environmental bucket dredge in depths greater than 15 ft; materials dredged from depths less than 15 ft would be placed at the Historic Area Remediation Site (HARS) or a state-approved upland location. Backfilling of the trench after the pipeline is laid will result in temporary disturbance to benthic habitat in these open water areas. Dredging activities would directly impact 117.2 acres of benthic habitat. Sediment modeling estimates that 1091 acres would be indirectly impacted by the suspension and redeposition of at least 0.3 cm of sediment.

Magnuson Stevens Fisheries Management and Conservation Act (MSA)

The project area has been designated as EFH for a number of federally managed species



including Atlantic butterfish (*Peprilus triacanthus*), Atlantic mackerel (*Scomber scombrus*), Atlantic sea herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), black sea bass (*Centropristis striata*), clearnose skate (*Raja eglanteria*), cobia (*Rachycentron canadum*), king mackerel (*Scomberomorus cavalla*), little skate (*Leucoraja erinacea*), red hake (*Urophycis chuss*), scup (*Stenotomus chrysops*), Spanish mackerel (*Scomberomorus maculatus*), summer flounder (*Paralichthys dentatus*), windowpane flounder (*Scophthalmus aquosus*), winter flounder (*Pseudopleuronectes americanus*), and winter skate (*Leucoraja ocellata*).

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires the lead federal action agency to consult with us on any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect EFH. In turn, we must provide recommendations to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH. The EFH regulations, 50 CFR Section 600.920, outline that consultation procedure. Our regulations also allow a federal agency to designate a non-federal representative to conduct the EFH consultation. However, the federal action agency remains ultimately responsible for compliance with sections 305(b) (2) and 305(b) (4) (B) of the MSA. For this project, the Federal Energy Regulatory Commission (FERC) is the lead federal agency for the purposes of MSA compliance. FERC has designated Transco its non-federal designee for this consultation.

The EFH final rule published in the Federal Register on January 17, 2002 defines an adverse effect as "any impact which reduces the quality and/or quantity of EFH" and further states that:

An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

We have reviewed the EFH assessment for this project. The assessment adequately assesses many of the impacts of the project on EFH associated with the project activities in Raritan Bay, lower New York Harbor, and the Atlantic Ocean. Impacts to NOAA resources, including winter flounder, anadromous species and blue crab (*Callinectes sapidus*), have been evaluated. However, impacts from contaminated sediments identified in the Morgan Loop section of the project have not been fully considered.

Dredging and other activities associated with the Morgan Loop are proposed to occur within the Raritan Bay Slag Superfund site. There is a risk of increasing the contaminant load in the water column when contaminated sediments are resuspended during activities such as dredging, thereby impacting aquatic resources. Discussions are ongoing between USEPA and the applicant regarding project activities in this area. We agree that Transco should file the following information with you prior to the close of the comment period:

- any additional chemical sampling results of the dredge material proposed for disposal,
- the final volume of dredge material for disposal,
- the locations of the final onshore and offshore dredge disposal sites, and

- the final offshore supplemental backfill source sites.

We request that you keep us apprised of the outcome of those discussions so that we may evaluate the need for further analyses of impacts to our resources.

Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305 (b) (4) (A) of the MSA, we recommend the following EFH conservation recommendations be incorporated into the project:

1. No dredging from 1/1 to 5/31 of each year in depths 20 ft or less including deeper waters within a 500 ft buffer of the 20 ft depth contour to minimize adverse effects to winter flounder early life stages and their EFH.
2. No dredging or pile-driving from 3/1 to 6/30 of each year from MP 12 to MP 15 to minimize impacts to migrating anadromous species including alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*), prey species for a number of federally managed species.
3. No dredging from December 1 through April 30 of each year in Ambrose Channel and Chapel Hill Channel including a 500 foot buffer on either side of each channel to protect overwintering blue crabs.
4. Provide to the New York and New Jersey state shellfisheries 30 day notice prior to the commencement of construction activities in shellfish areas to allow commercial harvest of shellfish in project area.
5. Provide documentation from USEPA that the levels of contamination in the sediments within the Raritan Bay Slag Superfund site do not pose a risk to aquatic resources.
6. Within 30 days of completion of the HDD activities (i.e., demobilization of the offshore HDD support vessel) and lowering of the offshore pipe, Transco should conduct a post-installation survey and begin backfill as necessary to meet the cover requirements for the HDD exit pit and pipeline facilities.
7. A five year post-construction monitoring plan should be developed to monitor the recovery of the bathymetry and benthic community for benthic habitat impacted by this project and provided to us for review. Annual monitoring reports should be provided to our office for the duration of the plan.
8. All areas of temporary impacts to wetlands should be restored and monitored to ensure restoration success. A restoration and monitoring plan should be provided to us for review.
9. Develop a frac-out plan for the horizontal directional drilling components of the project.
10. All barges and vessels associated with the project must float at all tidal stages.

Evaluations of other lower-impact project activities are also ongoing, and we are working with other federal and state agencies to determine if the conservation recommendations listed above can be further refined. For example, Transco is currently analyzing the size of areas of ensonification that could result from project activities near migratory corridors for anadromous fish species including alewife and blueback herring. We will continue to work with you and with Transco as the plans for this project progress and additional details on the in-water work and impacts to wetlands are more fully defined. As additional information on the project schedule and construction details are developed, we will evaluate whether or not the full, recommended seasonal restrictions are warranted, or if there are other options to minimize adverse effects to our resources.

Please note that Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to the EFH conservation recommendations, including a description of measures you have adopted to avoid, mitigate, or offset the impact of the project on EFH. In the case of a response that is inconsistent with these conservation recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects pursuant to 50 CFR 600.920(k).

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920(1) if new information becomes available or the project is revised in such a manner that affects the basis for the above EFH conservation recommendations.

Endangered Species Act

Our Protected Resources Division will be providing comments on this project separately. Questions regarding the status of their review should be directed to Julie Crocker at (978) 282-8480 or julie.crocker@noaa.gov.

We look forward to our continued coordination with your office on this project as it moves forward. If you have any questions or need additional information, please do not hesitate to contact Ursula Howson in our Highlands, NJ field office at ursula.howson@noaa.gov or (732) 872-3116.

Sincerely,



Louis A. Chiarella,
Assistant Regional Administrator
Habitat Conservation Division

cc: NY ACOE – S. Ryba, N. Handell
PRD – J. Crocker
SED – V. Vecchio, G. Power, J. Pellegrino
NEFMC – T. Nies
MAFMC – C. Moore
ASMFC – L. Havel
EPA – L. Knutson
USFWS – C. Popolizio
NYSDEC – K. Gaidasz
NJDEP – K. Davis
NOAA NEPA



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

July 28, 2019

A. Eric Howard, Chief
Acting Chief, Gas Branch 2
Division of Gas – Environment and Engineering
Federal Energy Regulatory Commission
Office of Energy Products
Washington, DC 20426

RE: Docket No. CP17-101-000; Transcontinental Gas Pipe Line Company, LLC; Northeast Supply Enhancement Project; Raritan Bay, Lower New York Bay, Atlantic Ocean

Dear Mr. Howard:

In May 2018, we provided your office comments on the March 2018 essential fish habitat (EFH) assessment and Draft Environmental Impact Statement for the Transcontinental Gas Pipe Line Company (Transco), LLC's Northeast Supply Enhancement Project (NESE). The aquatic portion of the Transco NESE pipeline runs between Middlesex County, NJ and the Rockaway Delivery Lateral pipeline in Queens County, NY, crossing Raritan Bay, Lower New York Bay, and the Atlantic Ocean and includes:

- the Madison Loop, 3.4 miles of 26- inch diameter natural gas pipeline loop in Middlesex County, NJ;
- the Raritan Bay Loop, 23.5 miles of 26-inch diameter natural gas pipeline loop in Middlesex and Monmouth Counties, NJ and Richmond and Queens Counties, NY; and
- ancillary facilities in Middlesex County, NJ and Richmond County, NY.

Transco proposes to construct the subaqueous portions of the pipeline using a combination of trenching techniques including an environmental bucket dredge, horizontal directional drilling (HDD), jet trenching, and hand jetting. Dredging activities would directly impact 117.2 acres, and indirectly impact 1,091 acres of benthic habitat. The project also includes onshore temporary impacts to 2.82 acres of tidal wetlands.

Our May 2018, letter included a number of EFH conservation recommendations provided pursuant to Section 305 (b)(4)(A) of the Magnuson Stevens Fishery Conservation and Management Act (MSA) to avoid, minimize, and offset adverse impacts to EFH that will result from the construction of the proposed project. At that time, the construction schedule and methods had not yet been fully defined by Transco. As a result, we agreed to reevaluate our EFH conservation recommendations as additional information was provided to us by Transco as they refined their construction schedule and methods and provided us with a more detailed evaluation of the effects of the construction activities on aquatic resources. We have reviewed



the additional information provided by Transco and have evaluated their request for modifications to some of our EFH conservation recommendations. Listed below are our original EFH conservation recommendations, the proposed modification and our rationale for accepting the proposed changes.

Original EFH conservation recommendation:

No dredging or pile-driving from 3/1 to 6/30 of each year from MP 12 to MP 15 to minimize impacts to migrating anadromous species including alewife and blueback herring, prey species for a number of federally managed species.

Proposed modification:

Allow dredging between MP 12.5 to MP 15.3 and pile/platform installation at the Morgan HDD pit (MP12.5) from 6/1 to 6/30/20.

Because it is expected that anadromous species will have moved upstream past this area before June 1, we agree with this proposed modification.

Original EFH Conservation Recommendation:

No dredging from December 1 through April 30 of each year in Ambrose Channel and Chapel Hill Channel including a 500 foot buffer on either side of each channel to protect overwintering blue crabs.

Proposed modification:

Allow backfilling and pipeline reinstatement to continue into timing restriction, from 12/1/20 to 12/10/20 at Ambrose East and West HDD pits (MP 29.5 and MP 30.4) and from 12/1/20 to 1/1/21 at MP 25.

Because it is expected that blue crabs will avoid settling in these disturbed areas due to the on-going construction activities, we agree with this proposed modification.

Please note that as stated in our previous letter, Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to our EFH conservation recommendations, including a description of measures you have adopted to avoid, mitigate, or offset the impact of the project on EFH. In the case of a response that is inconsistent with these conservation recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects pursuant to 50 CFR 600.920(k).

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920(1) if new information becomes available or the project is revised in such a manner

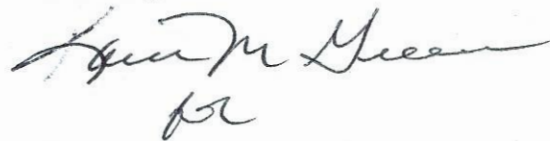
that affects the basis for the above modifications to the original EFH conservation recommendations.

Endangered Species Act

Our Protected Resources Division will be proving comments separately. Questions regarding the status of their review should be directed to Julie Crocker at (978) 282-8480 or julie.crocker@noaa.gov.

Our comments above pertain only to the proposed modifications to our EFH conservation recommendations. We understand that there are a number of outstanding issues related to the project's consistency with New York and New Jersey's Coastal Zone Management programs. Our comments above are not intended to indicate that we endorse the proposed project or affect either state's permitting authorities. If you have any questions or need additional information, please do not hesitate to contact Karen Greene in our Highlands, NJ field office at karen.greene@noaa.gov or (732) 872-3023.

Sincerely,

A handwritten signature in dark ink, appearing to read "Louis A. Chiarella", with a stylized flourish underneath.

Louis A. Chiarella
Assistant Regional Administrator
for Habitat Conservation

cc: NY ACOE – S. Ryba, N. Handell
FERC – C. Allen
PRD – J. Crocker
NYSDEC – K. Gaidasz
NJDEP – K. Davis



June 26, 2025

The Honorable Donald J. Trump
President of the United States
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dear Mr. President,

The Nation's eight Regional Fishery Management Councils (Councils) are charged under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) with managing, conserving, and utilizing fishery resources throughout the entire Exclusive Economic Zone (EEZ) of the United States. In implementing this charge, the Councils are required to account for the effects of management actions on United States fishermen and fishing communities.

The Council Coordination Committee, which consists of the senior leaders of these Councils, wrote to you in 2017 to raise concerns with the designation of marine monuments under the Antiquities Act of 1906 and the effects of those designations on the nation's fisheries and on domestic fisheries management. We greatly appreciate your continued attention to this topic.

We continue to affirm the Council Coordination Committee's 2016 Resolution on Marine National Monuments (attached), in which we recommend that fisheries management within U.S. EEZ waters under any monument designations continue to be developed, analyzed, and implemented through the MSA process. Decisions to close areas of the EEZ through Executive action under authorities such as the Antiquities Act of 1906 may not account for the MSA statutory requirements to achieve Optimum Yield (OY) from the Nation's fishery resources and may negatively affect domestic fishing jobs and recreational fishing opportunities and undermine the Regional Fishery Management Councils' efforts to develop and implement robust management measures.

Through implementation of the MSA, the United States is the global leader in the successful conservation and management of fishery resources and associated marine environment in a proactive sustainable manner. Spatial management is one of the tools utilized by the Councils. The Council Coordination Committee's Area-Based Management Working Group identified over 600 individual spatial habitat and fisheries conservation measures that have been implemented through the Council process to protect

Caribbean

Chair: Carlos Farchette
Executive Director:
Miguel Rolón

Gulf

Chair: Jonathan Dugas
Executive Director:
Dr. Carrie Simmons

South Atlantic

Chair: Trish Murphey
Executive Director:
John Carmichael

Mid Atlantic

Chair: P. Weston Townsend
Executive Director:
Dr. Christopher Moore

New England

Chair: Rick Bellavance
Executive Director:
Dr. Cate O'Keefe

North Pacific

Chair: Angel Drobnica
Executive Director:
David Witherell

Pacific

Chair: Brad Pettinger
Executive Director:
Merrick Burden

Western Pacific

Chair: William Sword
Executive Director:
Kitty M. Simonds

approximately 60% of the Nation's ocean waters. The Councils use a public process, in a transparent and inclusive manner, and rely on the best scientific information available, as required by the MSA. As a result, we ensure sustainable seafood for U.S. consumers, promote economies of coastal communities, and maintain the social-cultural fabric of our nation's recreational, commercial, and subsistence fishing communities.

Designations of marine national monuments that prohibit fishing have disrupted the ability of the Councils to manage fisheries throughout their range as required by MSA. Our experience with marine monument designations to date is that they are counterproductive to domestic fishery goals, as they have displaced and concentrated U.S. fishing effort into less productive fishing grounds and increased dependency on foreign fisheries that are not as sustainably managed as U.S. fisheries. The removal of American fishing vessels from U.S. waters eliminates their ability to act as watchdogs over U.S. fishing grounds threatened by foreign fishing and other incursions. For all of these reasons and more, we believe fisheries management decisions should be made through the robust process established by the MSA and successfully used for nearly fifty years to ensure opportunities for sustainable American fisheries.

America has made significant progress in curbing illegal, unregulated, and unreported (IUU) fishing and minimizing our nation's dependence upon seafood imports. We look forward to your continued support of our nation's sustainable fisheries, fishing jobs, and safeguarding of our fishery resources in the U.S. EEZ and management through the MSA.

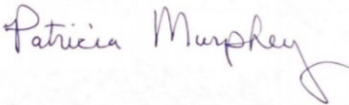
Respectfully,



Rick Bellavance, NEFMC



P. Weston Townsend, MAFMC



Trish Murphey, SAFMC



Carlos Farchette, CFMC



Jonathan Dugas, GFMC



Taulapapa William Sword, WPFMC



Brad Pettinger, PFMC



Angel Drobnica, NPFMC

CC: Laura Grimm, NOAA Administrator
Eugenio Piñeiro Soler, NOAA Fisheries Assistant Administrator



New England
Fishery Management
Council



MID-ATLANTIC FISHERY
MANAGEMENT COUNCIL



Outcomes Statement and Recommendations

Council Coordination Committee

MARRIOTT BEACH RESORT

ST. THOMAS, U.S.V.I.

MAY 24-26, 2016

Marine National Monuments

The Council Coordination Committee (CCC) notes the successes of the Magnuson-Stevens Fishery Conservation and Management Act in managing fishery resources of the United States as well as the marine ecosystems of the United States Exclusive Economic Zone (EEZ) and the CCC recognizes that there have been a number of proposals regarding the designation of new, or the expansion of existing, Marine National Monuments within the U.S. EEZ.

Whereas, the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) was originally passed by Congress in 1976 for the specific purpose of sustainably managing the nation's fishery resources to provide a food source, recreational opportunities and livelihoods for the people of the United States;

Whereas, Congress, in passing the Magnuson-Stevens Act, found that "Commercial and recreational fishing constitutes a major source of employment and contributes significantly to the economy of the Nation."

Whereas, the Magnuson-Stevens Act created eight Regional Fishery Management Councils that are charged with managing, conserving, and utilizing fishery resources as well as protecting essential fisheries habitat, minimizing bycatch, and protecting listed species within the United States Exclusive Economic Zone;

Whereas, through the implementation of the Magnuson-Stevens Act and through the actions of the Regional Fishery Management Councils, the United States has become a global leader in the successful management of its fishery resources and associated ecosystems in a proactive sustainable manner;

Whereas, the Regional Fishery Management Councils and the National Marine Fisheries Service have made great strides in managing fisheries in an ecosystem-based manner;

Whereas, the Magnuson-Stevens Act requires that fisheries management actions be developed through a public process, in a transparent manner, and based on the best scientific information available;

Whereas, the Regional Fisheries Management Councils and the National Marine Fisheries Service manage fisheries stocks throughout their range and concerns have been raised that designations such as marine monuments may disrupt the ability of the Councils to continue to manage fisheries throughout their range and in an ecosystem-based manner;

Whereas, the designation process of marine national monuments under the Antiquities Act of

1906 does not explicitly require a robust public process or that decisions be based on a science-based environmental analyses, and does not require fishery management or conservation as an objective;

Whereas, the Regional Fishery Management Councils have a strong history of implementing spatial habitat and fisheries conservation measures (over 1000 individual spatial management measures) in a public, transparent, science-based manner through the Magnuson-Stevens Act;

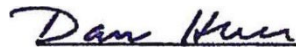
Whereas, concern has been raised that decisions to close areas of the U.S. EEZ, through statutory authorities such as through the Antiquities Act of 1906, may not take into account requirements to achieve optimum yield (OY) from the Nation's fishery resources, may negatively affect domestic fishing jobs, recreational opportunities and undermine efforts by the Regional Fishery Management Councils to develop and implement ecosystem-based management;

Therefore be it resolved, the CCC reiterates its support for the public, transparent, science-based process and management required by the Magnuson-Stevens Fishery Conservation and Management Act.

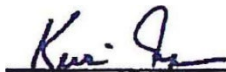
Therefore be it further resolved, the CCC recommends that if any designations are made in the marine environment under authorities such as the Antiquities Act of 1906 that fisheries management in the U.S. EEZ waters continue to be developed, analyzed and implemented through the public process of the Magnuson-Stevens Fishery Conservation and Management Act.



Carlos Farchette, Chair
Caribbean Fishery Management Council



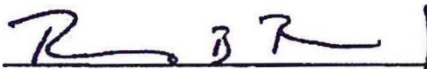
Dan Hull, Chair
North Pacific Fishery Management Council



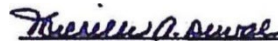
Kevin Anson, Chair
Gulf Fishery Management Council



Dorothy Lowman, Chair
Pacific Fishery Management Council



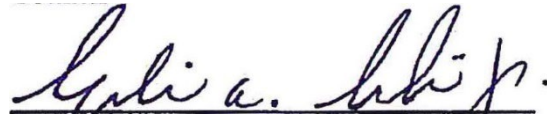
Richard Robins, Chair
Mid-Atlantic Fishery Management Council



Michelle Duval, Chair
South Atlantic Fishery Management Council



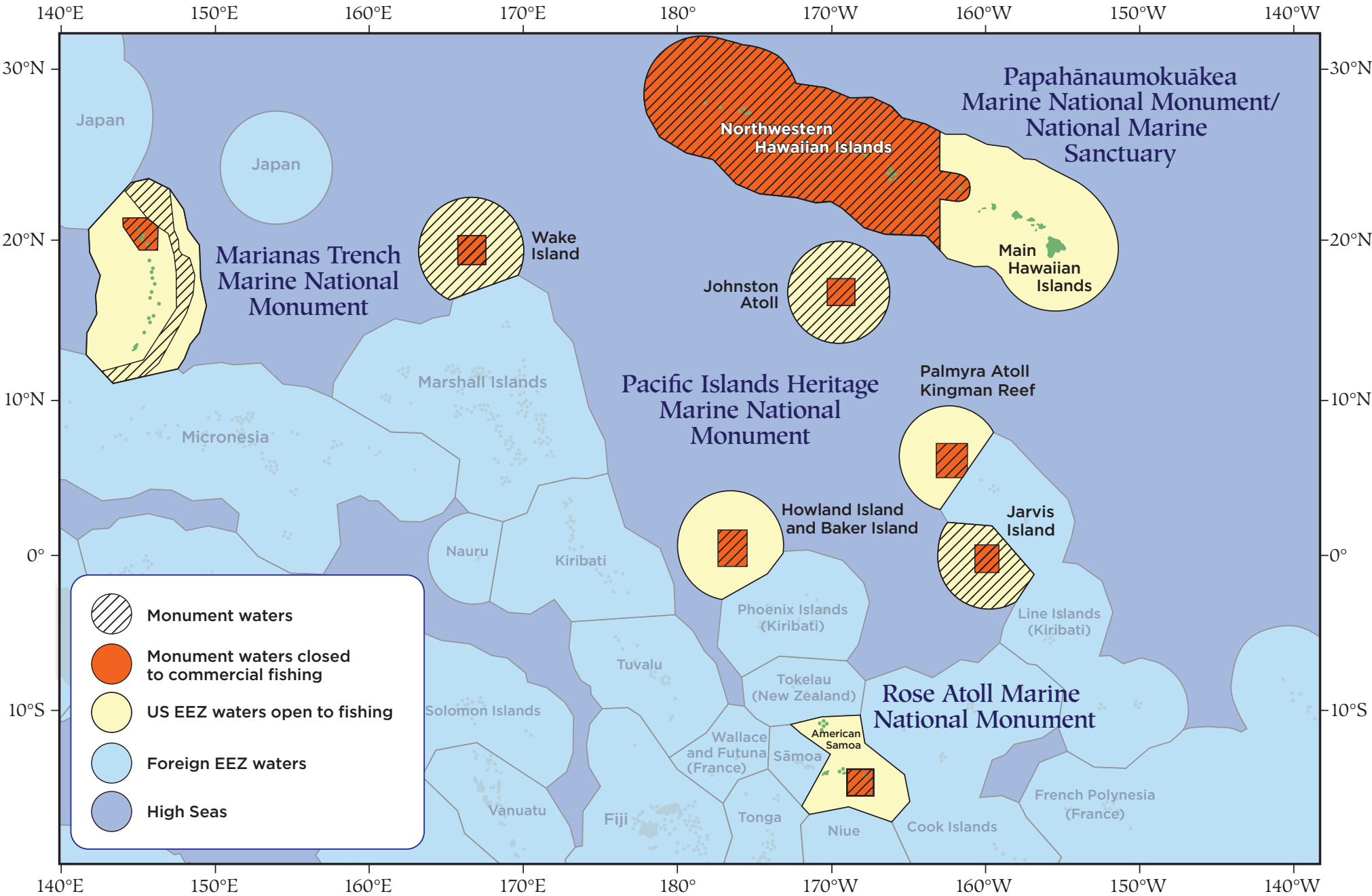
E.F. "Terry" Stockwell III, Chair
New England Fishery Management Council



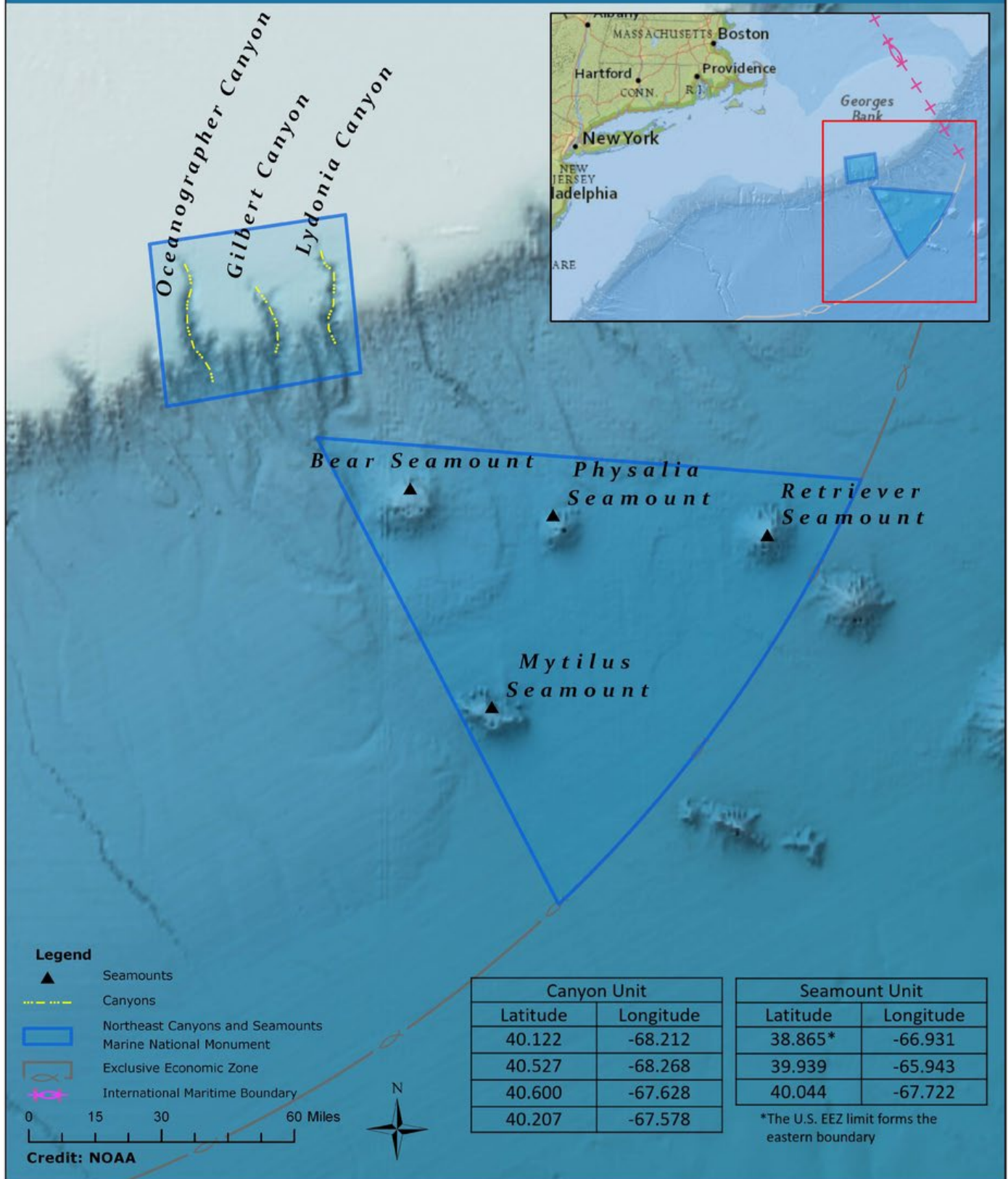
Edwin Ebisui Jr., Chair
Western Pacific Fishery Management Council



United States Exclusive Economic Zones of the US Western Pacific Region



Northeast Canyons and Seamounts Marine National Monument





New England Fishery Management Council

50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492
Rick Bellavance, *Chair* | Cate O'Keefe, PhD, *Executive Director*

July 1, 2025

Mr. Michael Pentony
GARFO Regional Administrator
NMFS/NOAA Fisheries
55 Great Republic Drive
Gloucester, MA 01930

RE: Comments on Coonamessett Farm Foundation Great South Channel Habitat Management Area Clam EFP modification

Dear Mike,

Please accept these comments on behalf of the New England Fishery Management Council regarding the potential adjustment of Exempted Fishing Permit (EFP) 23073 issued to Coonamessett Farm Foundation. This EFP authorizes compensation fishing with clam dredges in the Great South Channel Habitat Management Area (HMA), which was established when the Council's Omnibus Habitat Amendment 2 was implemented in April 2018. Following the Omnibus Amendment, the Council developed a clam dredge exemption action. Effective in June 2020, the exemption action created three exemption areas and two research areas within the HMA. Separately, the Council developed a set of [research objectives](#) for the HMA that identified the Rose and Crown and Davis Bank areas specifically as places where EFP-based projects could be authorized.

Considering the Council's previously designated research areas, and approved research priorities, the EFP project design, and the progress made to date on this research project, the Council is supportive of the shift in compensation fishing area so that this important habitat research can continue. We have no objection to authorizing fishing in both the Davis Bank and Rose and Crown areas during the remainder of the EFP period and agree that extending the EFP through March 2026 would allow additional opportunities for both compensation fishing and data collection.

Since the exemption and research areas were established in 2020, two EFP-based projects coordinated by Coonamessett Farm Foundation have used compensation fishing to fund collection and analysis of seafloor data within the HMA (EFP 19066 and this project, EFP 23073). The Council commented on EFP-based fishing generally in [October 2022](#), based on a review of the results of the EFP 19066 project and commented on this project specifically in [April 2024](#). Under the current EFP, partner vessels are authorized to fish in a portion of the Davis Bank area of the HMA through July 31, 2025. This surfclam harvest generates funds for fishery independent imaging and multibeam surveys and associated analyses. The proposed adjustment to the EFP outlined in the Federal Register notice would shift most of the remaining compensation trips from the Davis Bank area to the Rose and Crown area. Our understanding is that a small proportion of compensation fishing would continue in the Davis Bank area (1 trip per month for each of the two vessels). The table in the Federal Register notice states that the

project would continue through December 31, 2025, but we understand that you are considering extending the EFP through March 31, 2026 to allow additional time for both compensation fishing and research activities. Since the seasonal habitat mapping is conducted independently from the compensation fishing, an adjustment to the fishing area should not affect the core scientific deliverables from the project.

Based on communication with Coonamessett Farm Foundation staff and their fishing partners, we understand that surfclam fishing in the Davis Bank research area has been unproductive recently. Per the Federal Register notice, most potential compensation fishing trips (207 of 260) remain unharvested at present. The fishermen partnering on this project believe that fishing in the Rose and Crown area would produce much greater yields. Their assessment is based on experience gained fishing within a smaller section of the Rose and Crown area under EFP 19066. We understand that project scientists have been analyzing data as they go, and that future fishery-independent data collection efforts (both images and multibeam) and analysis can be scaled to match the amount of funds generated via future compensation fishing. This adaptive project structure will help ensure that at least a subset of data products will be provided even if the full complement of remaining trips under the EFP cannot be harvested in any area. Harvests from the Rose and Crown area would provide funds to enable continued data collection and analysis.

Sincerely,

A handwritten signature in blue ink, appearing to read "Cate O'Keefe".

Cate O'Keefe
Executive Director

Michael Pentony
GARFO Regional Administrator
NMFS/NOAA Fisheries
55 Great Republic Drive
Gloucester, MA 01930

July 3, 2025

Douglas Potts
Fishery Policy Analyst
NMFS/NOAA Fisheries
55 Great Republic Drive
Gloucester, MA 01930

Submitted via Email: nmfs.gar.efp@noaa.gov

Re: CFF Great South Channel HMA Clam EFP modification (RTID 0648-XE996)

Dear Doug,

Conservation Law Foundation (“CLF”) and Oceana appreciate the opportunity to comment on the proposed revision to the Exempted Fishing Permit (“EFP”) submitted by Coonamessett Farm Foundation (“CFF”).¹ Our organizations have weighed in repeatedly over the last decade on appropriate habitat protections in the region to meet the requirements of the Magnuson-Stevens Act for each Fishery Management Plan (“FMP”) to minimize adverse effects of fishing on Essential Fish Habitat (“EFH”). This current proposal represents a significant modification of the original flawed EFP² that we cautioned against. The proposal to allow highly destructive clam dredge compensation fishing in the Rose and Crown area of the Great South Channel (“GSC”) Habitat Management Area (“HMA”) should be flatly rejected. This request for access is far from an innocent modification of a past EFP. It represents a significant change with potentially significant environmental impacts that must be carefully evaluated and considered. This is especially important considering that clam dredging in the proposed action area has been thoroughly debated during the Omnibus Habitat Amendment 2 (“OHA2”)³ and the Clam Dredge Framework (“Framework”).⁴ Extensive efforts were dedicated, under both of these actions, to identify vulnerable marine ecosystems that needed protection from destructive fishing gear to foster the sustainability of managed species and the overall health of marine habitats. The product of these efforts was the GSC HMA. The Rose and Crown area, the crown jewel within this HMA, stands out for its complex and vulnerable habitats. Allowing compensation fishing here, especially the most destructive gear, will undermine protections and devastate this critical ecosystem. The modification must be rejected by NOAA.

¹ 90 Fed. Reg. 26276 (June 20, 2025).

² Conservation Law Foundation and Ocean comments to Original EFP 89 Fed. Reg. 18376 (March 13, 2024).

³ Final Rule, Omnibus Essential Fish Habitat Amendment 2, 83 Fed. Reg. 15240 (April 9, 2018).

⁴ Final Rule, Habitat Clam Dredge Exemption Framework, 85 Fed. Reg. 29870 (May 19, 2020).

NOAA should have ensured the original compensation area would suffice before approving the EFP.

In our previous letter, we emphasized the significant ecological risks associated with the compensation fishing model proposed in the CFF EFP. We highlighted that the number and scale of compensation trips could severely impact the complex and vulnerable habitats within the HMA. We also argued that the compensation trip funding model was not necessary and that alternative mechanisms, such as the Saltonstall-Kennedy program, should have been considered. Our concern was that the project approval process did not adequately ensure that the original compensation area would suffice, and that the project would cause ecological harm with no scientific value.

Moreover, we highlighted that the proposed project did not fully satisfy all the research objectives identified for the area, which undermined its overall value and justification. The project's limited scope, focusing on only two of the four objectives specified by the New England Fishery Management Council ("NEFMC"), was insufficient given high costs and the ecological impact of compensation fishing. We called for a thorough impact assessment to weigh scientific benefits against ecological risks and to explore alternatives to compensation fishing in the HMA. Additionally, we stressed the importance of robust monitoring, transparency, and public reporting to ensure accountability. Providing additional opportunities to drive the compensation fishing model in identified vulnerable habitats without first addressing these fundamental concerns disregards the importance of preserving the ecological balance and undermines the project and NOAA's credibility.

Approving this request would directly contradict the protective measures established under OHA2.

Access to the Rose and Crown area is not novel; it has been robustly debated and rejected by the NEFMC during the development of the OHA 2, and subsequently during the trailing Framework. The Framework specifically contemplated a clam dredge exemption area in Rose and Crown, which is identical to the area proposed in the current EFH application. In the Framework's analysis of clam dredging in Rose and Crown, it was determined that 75 km² of cobble and boulder-dominated habitat would be exposed to fishing,⁵ representing 17% of this habitat area within the HMA. The Rose and Crown area, with 39% of its 192 km² being cobble or boulder dominated,⁶ has a higher percentage of such habitats compared to the overall HMA.

⁵ *Clam Dredge Framework Adjustment*, Final Submission (July 22, 2019), prepared by the New England Fishery Council in consultation with the National Marine Fisheries Service and the Mid-Atlantic Fishery Management Council, Table 25 page 105.

⁶ *Id.* at 103.

Moreover, the Rose and Crown area is characterized by complex habitats, with 89% of the stations examined showing complex habitat features, higher than the HMAs overall 67%.⁷ The area also has stable sediments, with 76% observations indicating stability, making it more stable than the HMA overall.⁸ The analysis in the Framework concluded that the Rose and Crown exemption area “encompasses complex, cobble and boulder dominated habitats estimated to be stable under typical water flows, which are habitat types which are adversely affected by clam and mussel dredging. This indicates that clam and mussel dredging in the Alternative 3 exemption area would have negative effects on habitats within the HMA, reducing the benefits that these habitats provide to managed species.”⁹

NOAA has not adequately explained how allowing compensation fishing in this area would not undermine the objectives of OHA2, the contribution of Rose and Crown to the overall EFH conservation in the HMA or offered consideration of other measures to offset the adverse effects of clam dredging in this area. OHA2 was designed to protect vulnerable marine ecosystems from destructive fishing practices, and the Rose and Crown Area was specifically identified for its ecological importance. The Clam Dredge Framework further considered and ultimately rejected access to this area due to its critical habitats and potential for significant ecological damage. Allowing compensation in this area, particularly with the most destructive fishing gear, would directly contradict the protective measures established under OHA2, jeopardizing the integrity and sustainability of critical habitats. NOAA has not provided a clear and compelling rationale for how such activities align with OHA2’s conservation goals, comply with the Magnuson-Stevens Act, or whether this activity should be evaluated under the National Environmental Protection Act as an activity with potentially significant impacts on the environment.

Conclusion.

This EFP raised grave concerns as proposed in 2024 when it failed to fully satisfy all the research objectives identified by NEFMC which undermined its overall value and justification for dredging in a comparatively less valuable area of the HMA. Further, the use of compensation fishing over pursuit of direct funding raised concerns that the project's limited scope did not justify the ecological impacts of compensation fishing. We called for a thorough impact assessment to weigh scientific benefits against ecological risks, to explore alternative funding sources to compensation fishing in the HMA, and to ensure compensation fishing as originally proposed would fully fund the project. Regretfully, it does not appear that any of these considerations were factored into the issuance of the 2024 EFP, but those failures do not warrant approval of this modification request. Allowing compensation fishing in the Rose and Crown area would undermine the OHA2 objectives and the MSA requirements to minimize adverse effects on EFH. Until NOAA provides a clear and compelling rationale for how such activities

⁷ *Id.*

⁸ *Id.*

⁹ *Id.* at 104.



would align with the conservation goals of OHA2 and the EFH requirements of the MSA this EFP modification should be denied.

Sincerely,

Elizabeth “Libby” Etrie
Director, Ocean Policy
Conservation Law Foundation

Gareth Lawson
Senior Scientist
Conservation Law Foundation

Erica Fueller
Senior Counsel
Conservation Law Foundation

Gib Brogan
Campaign Director
Oceana

CC: New England Fishery Management Council



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

July 8, 2025

James Goveia
Acting Director of Planning and Program Development
Federal Transit Administration, Region 2
One Bowling Green, Room 429
New York, New York 10004

RE: Essential Fish Habitat Consultation, Hudson Tunnel Project, Hudson River, NJ and NY

Dear Mr. Goveia:

Reference is made to your May 27, 2025, letter requesting reinitiation of the essential fish habitat (EFH) consultation for the Hudson Tunnel Project, Hudson River, New Jersey and New York, due to modifications of the project. According to a February 28, 2025 email correspondence, the US Federal Transit Administration (FTA) Region 2 has assumed the lead agency role from the US Federal Railroad Administration (FRA) for the project.

As indicated in your letter, ongoing project planning efforts following the May 2021 issuance of the Project's Combined Final Environmental Impact Statement (FEIS)/Record of Decision (ROD) have identified the need for additional in-water work activities on the Manhattan side of the new rail tunnel, not covered under previous consultations for the project. Additional project activities are proposed to assist with ground improvement (i.e., grouting/ground freezing) and to facilitate safe operation of the boring tunnel machine and related activities. Specific activities include the temporary installation of:

- a 178-foot by 111-foot marine deck supported by eleven 36-inch diameter steel piles;
- two 195-foot by 40-foot chiller barges, each to be supported by six 36-inch spuds;
- a 150-foot by 30-foot trailer barge supported by four 36-inch spuds;
- 350 12-inch diameter steel casings; and
- a perimeter barrier (i.e., curtain for fish exclusion), should project activities not be completed between July 1 - January 20, 2026.

To minimize impacts to EFH and other aquatic resources, a number of best management practices (BMPs) will continue to be used for in-water work such as:

- Use of turbidity curtains around construction operations.
- Visual turbidity monitoring.
- Placement of pipe casings on a barge with a basin to contain sediment and runoff.
- Operational modifications to minimize turbidity and sedimentation during pipe casing installation and removal (e.g., reducing lift speed).
- Prohibiting unfiltered overflow from barges into the river.



- Spill kits and oil absorbent socks on vessels.
- Use of oil containment boom, if necessary.

Project disturbances for new activities include noise and turbidity within a work area of approximately 2-acres, approximately 0.92-acres of temporary shading from the proposed marine deck and barges, and 432 square feet of temporary benthic substrate disturbance due to pilings/casings. Project activities are anticipated to take place from Fall 2025 through Fall 2028 (30 to 36 months). Once the marine deck and casings are installed, they are anticipated to be in place for 24 to 27 months.

As indicated in your letter, we have been coordinating with you pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) since 2017, with our most recent correspondence provided on March 10, 2025. Through our consultations, conservation recommendations adopted into the project include a modified work schedule that avoids in-water work from January 21 through June 30, protective of migrating anadromous fish, overwintering striped bass, and winter flounder.

We have reviewed the information provided and agree with your conclusion that the adverse effects of this project on EFH will not be substantial. However, we do not agree that a perimeter barrier to form a fish exclusion zone (in the form of a curtain) is an appropriate or adequate substitute for the use of seasonal in-water work restrictions, nor is it a measure we have endorsed or recommended for other projects. Curtains have not been demonstrated to be effective or a substitute for avoiding impactful activities when sensitive life stages are present or during fish migration. Therefore, we recommend that project activities continue to adhere to the agreed upon work schedule that avoids in-water work from January 21 through June 30, protective of migrating anadromous fish, overwintering striped bass, and winter flounder.

Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA we recommend that you adopt the following EFH conservation recommendations to avoid, minimize or offset adverse impacts on EFH:

1. Continue to avoid in-water work from 1/21 to 6/30, protective of migrating anadromous fish, overwintering striped bass, and winter flounder. The use of a perimeter barrier to form a fish exclusion zone (in the form of a curtain) is not an acceptable substitute for compliance with this recommendation.

Section 305 (b)(4)(B) of the MSA requires that you provide us with a detailed written response to our EFH conservation recommendations, including the measures you have adopted to avoid, mitigate, or offset the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate or offset such effect pursuant to 50 CFR 600.920(k). Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920 (j) if new information becomes available, or if the project is revised in such a manner that affects the basis for the above EFH

conservation recommendations.

We appreciate the continued coordination on this project. If you have any questions or need additional information, please contact Jessie Murray at (732) 872-3116 or by e-mail at jessie.murray@noaa.gov.

Sincerely,



Louis A. Chiarella
Assistant Regional Administrator
for Habitat and Ecosystem Services

cc:

FTA – D. Moser, D. Burns
FRA - C. Hansen, C. Ward
GARFO PRD – E. Carson-Supino, C. Vaccaro
GARFO HESD – K. Greene
New York District ACOE – S. Ryba, R. Miranda, C. Minck
NYSDEC – S. Watts, J. Socrates, C. Bauer
FWS – S. Papa
EPA Region II – M. Finocchiaro
MAFMC – C. Moore
NEFMC – C. O’Keefe
ASMFC – R. Beal

From: Region2 MPRSA <Region2_MPRSA@epa.gov>

Sent: Monday, July 14, 2025 2:39 PM

To: Region2 MPRSA <Region2_MPRSA@epa.gov>

Subject: PUBLIC SCOPING EXTENDED-Dredged Material Management Options in the New York Bight

Dear Stakeholder:

In response to several requests, EPA is extending the public comment period for scoping of Region 2's National Environmental Policy Act review and assessment of ocean dredged material management options for dredged materials currently suitable for New York Bight until 11:59 PM on August 3, 2025.

Please provide your written comments via email to Region2_MPRSA@epa.gov no later than 11:59 PM on August 3, 2025.

For links to the NOI, factsheet, recordings of the June 24 and June 26 scoping meetings, and more information on Ocean Dredged Material Management in Region 2, please visit:

<https://www.epa.gov/marine-protection-permitting/region-2-ocean-dredged-material-management-new-york-bight-atlantic>

Thank you for your meaningful engagement and continued interest in the Port of New York and New Jersey and the health of our ocean environment. We look forward to hearing from you.

Water Division
U.S. EPA, Region 2



From: Region2 MPRSA

Sent: Wednesday, June 18, 2025 11:19 AM

Subject: Notice of Intent and Public Scoping: Dredged Material Management Options in the New York Bight

Dear Stakeholder:

We are writing to invite you to attend a virtual meeting to learn alkkbout and provide input on alternatives that the EPA is considering for continued ocean management of dredged materials

currently suitable for deposition in the New York Bight. The New York Bight is defined as the Atlantic Continental Shelf waters off Long Island, New York, and New Jersey.

In June 2023, the U.S. Army Corps of Engineers-New York District (Army Corps-NYD) assessed dredged material management needs and capacity over the next 20 years and demonstrated a continued need for an ocean alternative for managing suitable quality dredged materials to ensure the safe and efficient function of the Port of New York and New Jersey into the future. Army Corps-NYD requested that the EPA formally begin a process to evaluate possible alternatives and identify environmentally sound and economically feasible alternatives to continue appropriate management of ocean-suitable dredged material deposited in waters of the inner New York Bight.

The EPA is soliciting input from the public, non-government organizations, and industry, along with federal, state, and local governments, on the range of alternatives considered, specific environmental issues to be evaluated in the environmental assessment document, and the potential effects of alternatives for managing dredged material suitable for deposition on the seabed in the New York Bight. The EPA is sharing this Notice of Intent (NOI) to prepare a review and assessment consistent with the National Environmental Policy Act (NEPA) that considers New York Bight dredged material management options.

As a stakeholder in the NY/NJ Harbor region, the EPA invites you to participate in the public input process (scoping) for this important effort. We will conduct two virtual scoping meetings, on June 24 (1:00 - 3:00 PM) and June 26 (4:00 - 6:00 PM), and accept written comments until 11:59 PM on July 14th, 2025. Please send written comments to the email address provided below. Registration and additional information on the project and its progress can be accessed through the links provided in the NOI.

For links to the NOI and more information on Ocean Dredged Material Management in Region 2, please visit: <https://www.epa.gov/marine-protection-permitting/region-2-ocean-dredged-material-management-new-york-bight-atlantic>

If you have specific questions about this public input process and phase, please email Region2_MPRSA@epa.gov.

Thank you for your continued interest in the Port of New York and New Jersey and the health of our ocean environment. We look forward to hearing from you.

Water Division
U.S. EPA, Region 2





U.S. Department
of Transportation

**Federal Transit
Administration**

Region 2

One Bowling Green, Room 429
New York, New York 10004

July 16, 2025

Louis A. Chiarella
Assistant Regional Administrator for
Habitat and Ecosystem Services
NOAA Fisheries Service
Greater Atlantic Regional Fisheries
55 Great Republic Drive
Gloucester, MA 01930

**Reference: Essential Fish Habitat Consultation, Hudson Tunnel Project, Hudson River,
NJ and NY
Proposed Modifications to Construction Activities within the Hudson River
National Marine Fisheries Service (NMFS) Letter dated July 8, 2025**

Dear Louis A. Chiarella:

On May 27, 2025, the Federal Transit Administration (FTA) requested re-initiation of the essential fish habitat (EFH) consultation with the National Oceanic and Atmospheric Administration (NOAA) for the Hudson Tunnel Project (the Project) with respect to certain additional in-water work activities on the Manhattan side of the new rail tunnel not covered under previous consultations. FTA subsequently provided additional information on June 6, 2025, to aid NOAA's review of the effects of the Project on EFH. This information included site plans and cross sections, bathymetry and water lines, the number and dimension of casings and pipe piles, the proposed area of the Hudson River that would be shaded for more than 12 months, and a description of a proposed perimeter curtain.

FTA notes NOAA's concurrence with FTA that the adverse effects of this Project on EFH will not be substantial, subject to NOAA recommendations. Pursuant to Section 305(b)(4)(B) of the MSA, FTA affirms that FTA and the project sponsor, Gateway Development Commission (GDC) will continue to comply with the EFH conservation recommendations for use of best management practices (BMPs) during in-water work, as noted in the May 27, 2025, consultation.

Also pursuant to Section 305(b)(4)(B) of the MSA, FTA and the GDC affirm they will adopt and adhere to the following EFH conservation recommendations to avoid, minimize or offset adverse impacts on EFH during implementation of the Project:

1. Continue to avoid in-water work from 1/21 to 6/30, protective of migrating anadromous fish, overwintering striped bass, and winter flounder.

Louis A Chiarella

Page 2

FTA acknowledges NOAA's position that a perimeter barrier to form a fish exclusion zone (in the form of a turbidity curtain), even with the planned BMPs, is not an appropriate or adequate substitute for the use of seasonal in-water work restrictions, stated in NOAA's July 8, 2025, correspondence.

FTA and GDC acknowledge that a distinct and additional EFH consultation must be reinitiated with your office pursuant to 50 CFR 600.920 (j) if new information becomes available, or if the project is revised in such a manner that affects the basis for the above EFH. GDC has indicated that it may continue to explore and evaluate potential alternative measures to protect migrating anadromous fish, overwintering striped bass, and winter flounder. If proposed in the future, any such alternative measures would be presented in a subsequent FTA request to re-initiate the EFH consultation for the Project with your office.

If you have questions or require additional information regarding this request, please contact Daniel Moser at (212) 668-2326 or daniel.moser@dot.gov.

Sincerely,

James Goveia
Acting Director of Planning and Program Development

cc: D. Burns, FTA
D. Moser, FTA
C. Hansen, FRA
C. Ward, FRA
M. Keamy, FRA
M. Finocchiaro, EPA
J. Murray, NOAA
K. Greene, NOAA
E. Carson-Supino, NOAA
C. Vaccaro, NOAA
C. Moore, MAFMC
C. O'Keefe –NEFMC
R. Beal, ASMFC
S. Ryba, USACE
C. Minck, USACE
R. Miranda, USACE
S. Watts, NYSDEC
C. Nichols, NYSDEC
J. Socrates, NYSEC
C. Bauer, NYSDEC
B. Engle, GDC
R. Edwards, AMTRAK
J. Geitner, NJ TRANSIT



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

July 8, 2025

James Goveia
Acting Director of Planning and Program Development
Federal Transit Administration, Region 2
One Bowling Green, Room 429
New York, New York 10004

RE: Essential Fish Habitat Consultation, Hudson Tunnel Project, Hudson River, NJ and NY

Dear Mr. Goveia:

Reference is made to your May 27, 2025, letter requesting reinitiation of the essential fish habitat (EFH) consultation for the Hudson Tunnel Project, Hudson River, New Jersey and New York, due to modifications of the project. According to a February 28, 2025 email correspondence, the US Federal Transit Administration (FTA) Region 2 has assumed the lead agency role from the US Federal Railroad Administration (FRA) for the project.

As indicated in your letter, ongoing project planning efforts following the May 2021 issuance of the Project's Combined Final Environmental Impact Statement (FEIS)/Record of Decision (ROD) have identified the need for additional in-water work activities on the Manhattan side of the new rail tunnel, not covered under previous consultations for the project. Additional project activities are proposed to assist with ground improvement (i.e., grouting/ground freezing) and to facilitate safe operation of the boring tunnel machine and related activities. Specific activities include the temporary installation of:

- a 178-foot by 111-foot marine deck supported by eleven 36-inch diameter steel piles;
- two 195-foot by 40-foot chiller barges, each to be supported by six 36-inch spuds;
- a 150-foot by 30-foot trailer barge supported by four 36-inch spuds;
- 350 12-inch diameter steel casings; and
- a perimeter barrier (i.e., curtain for fish exclusion), should project activities not be completed between July 1 - January 20, 2026.

To minimize impacts to EFH and other aquatic resources, a number of best management practices (BMPs) will continue to be used for in-water work such as:

- Use of turbidity curtains around construction operations.
- Visual turbidity monitoring.
- Placement of pipe casings on a barge with a basin to contain sediment and runoff.
- Operational modifications to minimize turbidity and sedimentation during pipe casing installation and removal (e.g., reducing lift speed).
- Prohibiting unfiltered overflow from barges into the river.



- Spill kits and oil absorbent socks on vessels.
- Use of oil containment boom, if necessary.

Project disturbances for new activities include noise and turbidity within a work area of approximately 2-acres, approximately 0.92-acres of temporary shading from the proposed marine deck and barges, and 432 square feet of temporary benthic substrate disturbance due to pilings/casings. Project activities are anticipated to take place from Fall 2025 through Fall 2028 (30 to 36 months). Once the marine deck and casings are installed, they are anticipated to be in place for 24 to 27 months.

As indicated in your letter, we have been coordinating with you pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) since 2017, with our most recent correspondence provided on March 10, 2025. Through our consultations, conservation recommendations adopted into the project include a modified work schedule that avoids in-water work from January 21 through June 30, protective of migrating anadromous fish, overwintering striped bass, and winter flounder.

We have reviewed the information provided and agree with your conclusion that the adverse effects of this project on EFH will not be substantial. However, we do not agree that a perimeter barrier to form a fish exclusion zone (in the form of a curtain) is an appropriate or adequate substitute for the use of seasonal in-water work restrictions, nor is it a measure we have endorsed or recommended for other projects. Curtains have not been demonstrated to be effective or a substitute for avoiding impactful activities when sensitive life stages are present or during fish migration. Therefore, we recommend that project activities continue to adhere to the agreed upon work schedule that avoids in-water work from January 21 through June 30, protective of migrating anadromous fish, overwintering striped bass, and winter flounder.

Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA we recommend that you adopt the following EFH conservation recommendations to avoid, minimize or offset adverse impacts on EFH:

1. Continue to avoid in-water work from 1/21 to 6/30, protective of migrating anadromous fish, overwintering striped bass, and winter flounder. The use of a perimeter barrier to form a fish exclusion zone (in the form of a curtain) is not an acceptable substitute for compliance with this recommendation.

Section 305 (b)(4)(B) of the MSA requires that you provide us with a detailed written response to our EFH conservation recommendations, including the measures you have adopted to avoid, mitigate, or offset the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate or offset such effect pursuant to 50 CFR 600.920(k). Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920 (j) if new information becomes available, or if the project is revised in such a manner that affects the basis for the above EFH

conservation recommendations.

We appreciate the continued coordination on this project. If you have any questions or need additional information, please contact Jessie Murray at (732) 872-3116 or by e-mail at jessie.murray@noaa.gov.

Sincerely,



Louis A. Chiarella
Assistant Regional Administrator
for Habitat and Ecosystem Services

cc:

FTA – D. Moser, D. Burns
FRA - C. Hansen, C. Ward
GARFO PRD – E. Carson-Supino, C. Vaccaro
GARFO HESD – K. Greene
New York District ACOE – S. Ryba, R. Miranda, C. Minck
NYSDEC – S. Watts, J. Socrates, C. Bauer
FWS – S. Papa
EPA Region II – M. Finocchiaro
MAFMC – C. Moore
NEFMC – C. O’Keefe
ASMFC – R. Beal



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

July 24, 2025

Shannon Reinheimer
Environmental Scientist
U.S. Army Corps of Engineers
Norfolk District
803 Front St.
Norfolk, VA 23510

Re: York River Entrance Channel, Maintenance Dredging; Essential Fish Habitat Assessment

Dear Ms. Reinheimer:

We have reviewed the essential fish habitat (EFH) worksheet and the supplemental information you provided regarding the proposed maintenance dredging of the York River Entrance Channel (YREC) which extends approximately 23 miles from the -38 ft. contour at the mouth of the Chesapeake Bay to the piers at the Yorktown Naval Weapons Station (YNWS). The federal entrance channel primarily serves deep draft commercial vessel traffic heading upriver to Plains Marketing LP, the Town of West Point and Navy vessels bound for YNWS and Cheatham Annex.

Project Description

As stated in the EFH assessment the channel was last dredged in 2003 and has an anticipated maintenance cycle of approximately ten years. Maintenance dredging is proposed to begin in 2027/2028 dependent on funding and will restore the 750 ft. wide channel to an authorized depth of -37 ft. mean lower low water (MLLW) plus 6 ft. of allowable overdepth for a maximum depth of -43 ft. MLLW. Approximately 2 million cubic yards (cy) of material will be removed from the channel by either hydraulic suction cutterhead, hydraulic hopper dredge and/or mechanical dredge. The type of dredge has yet to be determined and may include using a combination of equipment plants to maximize efficiency and cost. Material will be tested for overboard disposal and acceptable material transported to Norfolk Ocean Disposal Site (NODS), located approximately 17 nautical miles east of the mouth of the Chesapeake Bay. The York River entrance channel area is designated as essential fish habitat (EFH) for nine federally-managed species (York River and Chesapeake Bay) and a habitat area of particular concern (HAPC) for sandbar shark (*Carcharhinus plumbeus*), while the NODS is designated as EFH for 24 federally-managed species. The length of the project area is also designated an anadromous fish use area by the Virginia Department of Wildlife Resources

Magnuson Stevens Fishery Conservation and Management Act (MSA)

We concur with your determination that proposed maintenance dredging of the York River Entrance Channel will adversely affect EFH including temporary increases in total suspended



solids (TSS), turbidity plumes, underwater noise and the removal (dredge) and burial (overboard disposal) of the existing benthos, including EFH prey species. We have substantial concerns about the extent of channel deepening beyond the Congressionally authorized depth of -37 ft and the direct, indirect, individual and synergist effects the additional dredging will have on EFH and federally-managed species. We recognize there will be variability in the post-dredge bottom contours based upon the type of dredging equipment used and that some amount of overdepth dredging is necessary to ensure the authorized depths are achieved throughout the entirety of the channel. However, as noted in the Final Detailed Project Report and Environmental Assessment for the York River Entrance Channel (USACE Norfolk District, July 1992 last rev. May 1993), the project is defined as being "...dredging of the channel to 37 feet, with 1 foot of required and 1 foot of allowable overdredging." This combined two feet of allowable dredging beyond the authorized depths is typical for maintenance dredging of federal navigation channels within the North Atlantic Division. The Norfolk District is proposing to dredge an additional six feet beyond the authorized channel depths, increasing the duration of the dredging and its associated adverse effects to EFH. It is unclear from the information provided if this de facto deepening will result in changes to the channel dimensions and needs to be addressed in a revised EFH Assessment

Therefore, we are providing the following EFH conservation recommendations to avoid, minimize or otherwise offset these adverse effects pursuant to Section 305(b)(4)(A) of the MSA:

EFH Conservation Recommendations:

- Conduct a condition assessment prior to 2027/2028 dredge to better estimate volumes;
- Identify NODS cells to be used and develop a disposal placement plan for dredged material at NODS to distribute material as evenly as possible and reduce sediment accumulation/mounding.
- Conduct Marine Protection Research and Sanctuaries Act (MPRSA) Section 103 evaluation of sediments, as you have proposed.
- Conduct all dredging upriver of the Goodwin Island Thorofare and Allen's Island outside the Virginia Department of Wildlife Resources anadromous fish time of year restriction between February 15 and June 30 of any year.
- Employ best management practices for operation of dredge equipment, (Appendix A, pgs. 8-9) as you have proposed.
- Limit allowable over-depth dredging to a maximum of 2 feet (1 foot of required and 1 foot of allowable overdredging) for a total of -39 ft MLLW as described in the 1993 Detailed Project Report and Environmental Assessment for this project.
- Investigate the beneficial reuse of dredged material (fine silty-sand) when environmentally preferable and practicable.

Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to our EFH conservation recommendations, including a description of measures you have adopted for avoiding, mitigating, or offsetting the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, you must explain your reasons for not following the recommendations. This includes providing the scientific justification for any

disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects pursuant to 50 CFR 600.920(k). In addition, if new information becomes available or the project is revised in such a manner that affects the basis for the above EFH conservation recommendations the EFH consultation must be reinitiated pursuant to 50 CFR 600.9200). Any changes to EFH designations, the identification of new EFH or HAPCs also trigger the need to reinitiate consultation.

Endangered and Threatened Species- Endangered Species Act

Federally listed species may be present in the project area. The US Army Corps of Engineers is responsible for determining whether the proposed action may affect listed species. Please be aware that we have recently provided on our [website guidance and tools](#) to assist action agencies with their description of the action and analysis of effects to support their determination. You can also find information about the temporal and spatial distribution of species and their different life stages on our interactive [ESA Section 7 Mapper](#). If it is determined that the proposed action may affect a listed species, determination of effects, along with justification and a request for concurrence to the attention of the Section 7 Coordinator, nmfs.gar.esa.section7@noaa.gov. After receiving a complete, accurate comprehensive request for consultation, in accordance with the guidance and instructions on our website, we would then be able to conduct a consultation under Section 7 of the ESA. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued. If you have any questions regarding these comments, please contact Brian Hopper, NOAA Protected Resources Division (brian.d.hopper@noaa.gov, 410-573-4592).

We look forward to your response to our EFH conservation recommendation and continued coordination with you on this project. If you have any questions, please do not hesitate to contact Mr. David L. O'Brien in our Gloucester Point, VA field office at 804-684-7828 (david.l.obrien@noaa.gov).

Sincerely,



Louis A. Chiarella
Assistant Regional Administrator
for Habitat and Ecosystem Services

cc: Robert Pruhs, NAO Corps
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From: Elizabeth Methratta - NOAA Federal <elizabeth.methratta@noaa.gov>

Sent: Friday, July 25, 2025 2:34 PM

Subject: Regional Standards for Offshore Wind Project Level Monitoring

Attached is the document entitled, *Regional Standards for Offshore Wind Project Level Monitoring*. We welcome feedback on any aspect of the document. In particular we are interested in knowing the Council's thoughts on the following questions that were mentioned in our presentation at the June meeting:

- 1) Do the monitoring standards address the right questions?; and
- 2) Will the monitoring standards collect information that will meet the Council's needs when evaluating changes in marine resources and fishing operations in relation to offshore wind energy projects?

If possible, we are seeking feedback by **Fall 2025**. Many thanks for all of your help with this. As always, please feel free to reach out with any questions.

Best,
Lisa

--

Elizabeth T. Methratta, Ph.D.

Fishery Biologist, Northeast Fisheries Science Center

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NOAA FISHERIES

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

NOAA Fisheries

Northeast Fisheries Science Center

July 2025

I. EXECUTIVE SUMMARY

Utility-scale offshore wind development is occurring in the Northeast U.S. Continental Shelf ecosystem (sensu Sherman 1991). Project-level environmental monitoring is required by the Bureau of Ocean Energy Management to evaluate the effects “of proposed activities on physical, biological, and socioeconomic resources, as well as to evaluate the seafloor and sub-seafloor conditions that could be affected by the construction, installation, and operation of meteorological towers, buoys, cables, wind turbines, and supporting structures” (BOEM 2023). In order to understand regional-scale effects of wind development on National Oceanic and Atmospheric Administration (NOAA) Trust Resources, the Bureau of Ocean Energy Management (BOEM) and the NOAA Fisheries jointly identified the need for standard approaches for offshore wind project-level monitoring (Hare et al. 2022). Standard approaches conducted across individual wind projects within and across lease areas will enable the comparison of data across projects and facilitate the integration of data from multiple projects within the region into ecosystem and socio-economic analyses and models. It is anticipated that an adaptive approach that uses the knowledge gained from monitoring to adapt future offshore wind monitoring will be needed for the Northeast U.S. Continental Shelf ecosystem. This document presents the recommended regional monitoring standards to evaluate the effects of fixed-foundation offshore wind development on protected species, fisheries species, oceanography, and socio-economic conditions. Here, “region” is defined as the Mid-Atlantic Bight and Southern New England portions of the Northeast U.S. Continental Shelf ecosystem. These standards are meant to guide the planning and implementation of monitoring programs led by offshore wind developers. These recommendations incorporate the best scientific information available to achieve standardization of methods. Developers should follow these standards when implementing their monitoring programs.

Protected Species - Protected species can be exposed to various Impact Producing Factors (IPFs)¹ throughout all phases of offshore wind development. Potential impacts to these species are of particular concern, as each species / population is granted additional protections under the Endangered Species Act (ESA) and/or Marine Mammal Protection Act (MMPA). The addition of multiple IPFs from offshore wind development activities on species that are already vulnerable can affect both the health of individual protected species, but also the overall health of these populations (Kraus et al. 2019). The initial priority monitoring topics vary slightly between marine mammals, sea turtles, and protected fish, but are mainly equivalent to that of fisheries species (noise effects, artificial reef effects, electromagnetic fields (EMF) effects, cumulative effects on movement and behavior) with the addition of monitoring the effects of vessel strike and entanglement. This monitoring approach should be adaptive, and may be subject to change as additional offshore wind and wildlife research and monitoring is conducted and new lessons are learned.

Fisheries Species - Fisheries species experience multiple IPFs and these have been summarized by several regional synthesis efforts (e.g., Hogan et al. 2023). For fisheries species monitoring, five initial priority topics are identified: noise effects; effects from altered hydrodynamics; artificial reef effects; electromagnetic fields (EMF) effects; cumulative effects on movement and behavior. Monitoring of fisheries species should take an adaptive approach to refining methods and adding additional questions over time in an interactive manner.

¹ IPFs are defined by the Bureau of Ocean Energy Management (BOEM) as, the factors generated by wind activities that “directly or indirectly affect physical, biological, economic, or cultural resources” (BOEM 2019, 2020). <https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Impact-Producing-Factors-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-South-Atlantic.pdf>

Physical and Biological Oceanographic Habitats - These habitats experience multiple IPFs and the potential effects should be included in project-level monitoring programs. Monitoring the response of physical oceanographic variables (e.g., currents, turbulence, water temperature, salinity, dissolved oxygen, nutrients, water column stratification) and biological oceanographic variables (e.g., phytoplankton, zooplankton, and ichthyoplankton) are critical to understanding changes in water column habitat and food resources for protected species and fisheries species.

Socio-economic Conditions - Monitoring of socio-economic conditions includes considerations of the effects of offshore wind energy development on individuals and communities involved in commercial and recreational (for-hire and private angler) fisheries at various scales. Effects include changes in, economic, social, and cultural elements, such as but not limited to changes to fishing behavior, business operations, demographics, employment, human and social capital, costs and revenues, and attitudes and perceptions. The framework developed considers three IPFs: the presence of structures, traffic, and port utilization. For each IPF the guidelines outline elements that should be monitored to understand direct and indirect effects of offshore wind development on the socio-economic conditions. Guidelines are also provided for the use and development of existing and new indicators and methods needed to monitor both direct and indirect effects.

II. LIST OF ACRONYMS

ACT - Atlantic Cooperative Telemetry network

ASMFC - Atlantic States Marine Fisheries Commission

ATN - Animal Telemetry Network

BOEM - Bureau of Ocean Energy Management

CI - Confidence Interval

COP - Construction and Operations Plan

CFR - Code of Federal Regulations

cm - Centimeter

CPUE - Catch Per Unit Effort

dB - Decibel

DD - Decimal Degrees

DE - Detection Efficiency

DR - Detection Range

EFP - Exempted Fishing Permit

EMF - Electromagnetic Field

ESA - Endangered Species Act

FAIR - Findable, Accessible, Interoperable, Reusable

FOV - Field of View

g - Grams

GARFO - Greater Atlantic Regional Fisheries Office

G-Fisher - Gulf Fishery Independent Survey of Habitat and Ecosystem Resources program

HRG - High Resolution Geophysical

IPF - Impact Producing Factor

kHz - Kilohertz

LOA - Letter of Acknowledgement

MAFMC - Mid-Atlantic Fishery Management Council

MATOS - Mid-Atlantic Acoustic Telemetry Observation System

mm - Millimeter

NCEI - National Center for Environmental Information

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

NEFMC - New England Fishery Management Council
NEFSC - Northeast Fisheries Science Center
NMFS - National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration
OWD - Offshore Wind Development
OWED - Offshore Wind Energy Development
PAM - Passive Acoustic Monitoring
PSAT - Pop-up Satellite Archival Tagging
QA/QC - Quality Assurance/Quality Control
REI - Receiver Efficiency Index
RWSC - Regional Wildlife Science Collaborative
ROV - Remotely Operated Vehicle
S-BRUV - Stereo Baited Remote Underwater Video
SEFSC - Southeast Fisheries Science Center
SERO - Southeast Regional Office
SOP - Standard Operating Procedure
WEA - Wind Energy Area
WHAM - Woods Hole Assessment Model

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V. GLOSSARY OF TERMS

Baseline - The period of time prior to development activities including pre-construction High Resolution Geophysical (HRG) surveys.

Construction - The development phase that involves bottom disturbing activities including the installation of cables, foundations, and other infrastructure associated with the offshore wind project.

Lease Area - The specific area of ocean leased by a specific offshore wind developer.

NOAA Trust Resources - NOAA trust resources are living marine resources. They include commercial and recreational fishery resources (fish, shellfish, and their habitats), migratory fish species (like salmon and eels), endangered and threatened marine species (like whales, sea turtles, and their habitats), and other critical habitats (like marshes, mangroves, seagrass beds, and coral reefs), and resources associated with National Marine Sanctuaries and National Estuarine Research Reserves.

Operation - The development phase during which the offshore wind project is operating, generating electricity, and delivering electricity to the onshore electrical grid.

Pre-Construction - The development phase during which offshore wind developers are assessing their lease area and determining where offshore wind infrastructure will be installed within the area leased. This includes pre-construction High Resolution Geophysical (HRG) surveys.

Project - A specific wind energy development within the area leased to an offshore wind developer. More than one wind project or wind energy development may be developed within an individual lease area.

Region - The geographic focus of the monitoring standards is referred to as the region that includes Mid-Atlantic Bight and Southern New England portions of the Northeast U.S. Continental Shelf ecosystem <https://www.st.nmfs.noaa.gov/copepod/time-series/us-50101/html/origfig01.html>

Wind Energy Area - An area designated for offshore wind leasing by the Bureau of Ocean Energy Management. A wind energy area may be composed of one or more areas that are leased to one or more offshore wind developers.

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VI. PREFACE

A. INTRODUCTION

Offshore wind energy development is increasing in the Northeast U.S. Continental Shelf ecosystem (Figure P-1). In the Mid-Atlantic Bight and Southern New England biophysical regions of the Northeast U.S. Continental Shelf, the development of offshore wind involves the installation of fixed-foundation turbines, subbottom cables, scour protections, and concrete mattresses onto the sea bottom. This contrasts with the floating wind structures and dynamic cables that may be installed in the Gulf of Maine. Fixed-foundation wind structures interact with the marine ecosystem through several Impact Producing Factors (IPFs) that have the potential to affect the ecological, human, and fisheries management dimensions of the marine ecosystem (Hogan et al. 2023; Methratta et al. 2020). IPFs are defined by the Bureau of Ocean Energy Management (BOEM) as the factors generated by wind activities that “directly or indirectly affect physical, biological, economic, or cultural resources” (BOEM 2019, 2020).

This document presents the monitoring standards for protected species, fisheries species, and socio-economic conditions, although it is important to recognize that these NOAA Trust Resources are interrelated. The need for standardized monitoring of fixed-foundation wind projects in the Northeast U.S. Continental Shelf ecosystem is immediate because these developments are currently being installed. Thus the monitoring standards presented here are specific to fixed-foundation offshore wind projects.

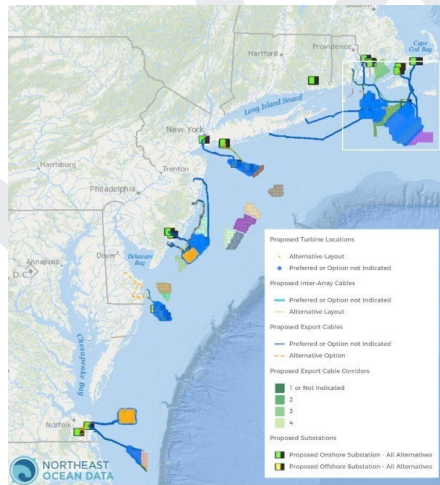


Figure P-1. Wind energy areas and cable routes in the Mid-Atlantic Bight (Cape Cod, MA to Cape Hatteras, NC) that will utilize fixed foundation turbine foundations. Construction in these WEAs either has occurred, is occurring, or will occur in the future. Map based on information provided by the Northeast Ocean Data portal (2025).

Standardized monitoring will allow data collected within the Northeast U.S. Continental Shelf ecosystem to be comparable and enable the evaluation of offshore wind effects at scales larger than wind energy development projects that are meaningful to species, habitats, fishing communities, and the assessment of cumulative effects of development (ROSA 2021; Methratta et al. 2023; ORE Catapult 2024). This is because marine species, fisheries, and fishing communities occur over much broader geographic spatial scales than an individual wind project. Recognizing the need for monitoring standards, NOAA Fisheries and BOEM identified the following objectives in the Survey Mitigation Strategy (Hare et al. 2022):

“Develop and apply regional standards and requirements to wind energy development, project-specific

monitoring, and data accessibility (Objective 2.1); Develop and communicate regional standardized project-specific monitoring protocols, including process for independent scientific peer review, to address NOAA Fisheries survey needs (Action 2.1.1.); and Develop and communicate regional standards for data accessibility related to wind energy development projects (Action 2.1.2).” Advancing offshore wind ecosystem science will increase our understanding of how offshore wind is affecting populations and the ecosystem; inform avoidance, minimization, and mitigation measures; underpin cumulative effects analyses; and inform the siting of future lease areas.

B. PURPOSE OF THIS DOCUMENT

The purpose of this document is to define standards for fixed-foundation offshore wind project-level monitoring in the Northeast U.S. Continental Shelf ecosystem. The monitoring standards presented herein are aligned with the scientific objectives of the regional NOAA Fisheries Science Plan for Offshore Wind Development (in prep.). The monitoring standards focus on an initial set of high priority questions that were identified over the last several years through the development of the Science Plan and through conversations with partners throughout the region. The list of questions addressed is not exhaustive, and an adaptive approach to refining methods and adding additional questions iteratively over time is expected. The monitoring standards presented here also build on the many lessons learned described in the seminal works previously published on the topics of offshore wind development interactions with scientific surveys (Hare et al. 2022), monitoring guidelines and frameworks for offshore wind developments (BOEM 2023; ROSA 2021, 2022; Cresci et al. 2024; ORE Catapult 2024; Regional Synthesis Workgroup 2023, Stokesbury et al. 2022; Isaksson et al. 2023; RWSC 2023), previous monitoring examples and lessons learned from OWDs in the U.S. and in Europe (Stokesbury et al. 2023; Bailey et al. 2014; Degraer et al. 2012; 2013, 2015; 2016; 2017; 2018; 2019; 2020; 2022; 2023; Lindeboom et al. 2015; Carey et al. 2020); recent syntheses of OWD impact producing factors effects on the marine ecosystem (Hogan et al. 2023); cumulative effects (Gusatu et al. 2021; Wilstead et al. 2016; 2018a, b); offshore wind indicators (Secor et al. 2024; Methratta 2024; Willis-Norton 2024); and experimental design (Methratta 2020; 2021; 2025; Kerr et al. 2019; Van Hoey et al. 2019; Peterson et al. 2001; Underwood 1994).

C. PRIMARY TOPIC AREAS FOR PROJECT-LEVEL MONITORING STANDARDS

These monitoring standards are organized into two main parts. Part I defines recommended regional standards for monitoring the response of marine species and oceanographic habitat to offshore wind development. Part II defines regional standards for monitoring socio-economic responses to offshore wind development.

PART I: MONITORING THE RESPONSE OF MARINE SPECIES AND HABITAT TO OFFSHORE WIND DEVELOPMENT

Species Groups and Response Variables Addressed by the Monitoring Standards

- **Marine Mammals** - This includes species of Odontocetes, Mysticetes, and Pinnipeds.
- **Sea Turtles** - All five sea turtle species in the region are addressed including: loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), Kemp’s Ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*), although hawksbill are rare to the region.

- **Protected Fish Species** - For the purposes of this document, protected fish include all species that are listed as Endangered or Threatened or are proposed for listing under the ESA. There are currently five species listed as Endangered or Threatened under the ESA and none proposed (NOAA Fisheries), but this list is subject to change.
- **Fisheries Species** - The standards presented here pertain to the 42 commercial and recreational fisheries species managed by the New England and Mid-Atlantic Fishery Management Councils in the Northeast U.S. Continental Shelf ecosystem (NOAA Fisheries 2024). This includes a diverse array of benthic, demersal, pelagic, and highly migratory species, as well as shellfish.
- **Oceanographic Variables** - Physical and biological oceanographic variables, e.g., water current speed, velocity, and direction; temperature, salinity, and dissolved oxygen; phytoplankton, zooplankton, and ichthyoplankton are the focus of the section that examines changes in hydrodynamics; Oceanographic variables are also measured as covariables in all proposed monitoring standards.
- **Benthic Habitat** - GARFO is currently developing recommendations for benthic habitat monitoring to support Essential Fish Habitat (EFH) consultations. While these recommendations are under development, please refer to *Recommendations for Mapping Fish Habitat* described in NOAA Fisheries 2021.

Impact Producing Factors Addressed by the Monitoring Standards

1. **Noise** - Noise is produced during all phases of offshore wind development. Underwater noise is composed of sound pressure and particle motion. Noise can also cause vibration in bottom substrates. Sound pressure is a change in pressure above ambient conditions caused by a wave propagated by the action that moves in all directions from the source. Particle motion occurs when the propagation of a sound wave together with the oscillation of water particles transmits energy to neighboring particles. The particles oscillate along the line of transmission together with the sound pressure wave. Pre-construction High Resolution Geophysical (HRG) surveys, construction noise (pile-driving, dredging, and ship-traffic), operation (turbine rotation), and decommissioning (vibratory pile removal) all cause increases in sound pressure, particle motion, and substrate vibration, and this topic examines how these noise sources affect marine species.
2. **Hydrodynamics** - The movement of water past turbine foundations affects local patterns of water velocity, turbulence, and mixing of water. The movement of wind past the turbine blades creates a wind wake on the leeward side of the structure. This modification of the atmosphere affects broad scale oceanographic processes. These wind wake effects include increased mixing and reduced stratification, which can affect broad scale patterns in the transport and distribution of fish larvae and zooplankton. This topic addresses how changes in local scale (turbine-level) and broad scale (wind-wakes) hydrodynamics affect the movement and distribution of nutrients, temperature, salinity, primary, and secondary production, as well as larvae and zooplankton.
3. **Cumulative Effects on Movement and Behavior** - Changes in the movement and behavior of animals around wind farms can occur in response to many different stimuli associated with offshore wind development. This topic addresses how wind development cumulatively alters patterns of movement and behavior for marine species.
4. **Vessel Strikes and Entanglement** - Vessel traffic is anticipated to increase during all phases of development which increases the potential for animals to be struck by vessels. The addition of

hard structures to the marine environment are new surfaces for fishing gear to foul. This trailing gear, along with incidental capture in traditional gear used for fisheries monitoring and research, has the potential to result in entanglement. This topic addresses patterns of vessel strikes and entanglement in fishing gear and ghost fishing gear.

5. **Artificial Reef Effects** - Artificial structures (including turbine foundations, scour protections, exposed cables, and concrete mattresses) in the ocean become colonized by epifauna which attract a community of finfish, invertebrates, marine mammals, and sea turtles. This topic addresses artificial reef effects on marine species and surrounding habitat. This topic includes monitoring contaminants in sediments and fish tissue derived from corrosion protection materials.
6. **Electromagnetic Fields (EMFs)** - As electricity generated within the wind project moves through the inter-array cables and the sea-land export cable, electromagnetic fields (EMFs) are emitted from the cable. This emission of EMFs into the ecosystem has the potential to interact with marine organisms particularly those that have electroreceptive or magnetoreceptive organs. This topic addresses how EMFs affect the movement and behavior of marine species.

PART II: MONITORING THE RESPONSE OF SOCIO-ECONOMIC CONDITIONS TO OFFSHORE WIND DEVELOPMENT

Communities Included in the Monitoring Standards

- Commercial Fishing Communities
- Recreational Fishing Communities

Impact Producing Factors Addressed by these Monitoring Standards

1. **Presence of Structures** - The Structure Presence IPF considers effects associated with the physical presence of onshore (e.g., substations) or offshore structures (e.g., turbines), installation and maintenance activities and disturbances associated with installing and maintaining cables, turbines and substations, as well as unanticipated release or spills into receiving waters such as fuel, hazardous materials, suspended sediment, trash, or debris.
2. **Traffic** - Offshore wind development changes the amount and distribution of vessel traffic. This includes vessel congestion and collisions across all phases, including traffic for geological and geophysical surveys and gear interactions during pre-construction periods.
3. **Port Utilization** - Changes in port activity, upgrades, and/or maintenance that occurs due to offshore wind development. This can include activities related to port expansion and construction from increased economic activity and maintenance dredging or dredging to deepen channels for larger vessels.

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Table P-1. Impact producing factors and response groups addressed by the monitoring standards.

		Response Group								
		Physical Oceanogr. Variables	Phyto- & Zooplankton	Ichthyo-plankton	Protected Mammals	Protected Sea Turtles	Protected Fish	Fisheries Species	Benthic Habitat	Socio-Economic
Impact Producing Factors	Vessel Strike and Entanglement				X	X	X			
	Noise				X	X	X	X		
	Cumulative Effects on Movement and Behavior				X	X	X	X		
	Altered Hydrodynamics	X	X	X						
	Electromagnetic Fields						X	X		
	Artificial Reef Effects						X	X	X	
	Presence of Structure									X
	Traffic									X
	Port Utilization									X

D. HOW TO USE THIS DOCUMENT

These standards are meant to guide the planning and implementation of monitoring programs led by offshore wind developers. Offshore wind developers and/or their contractors developing monitoring plans should review this document and identify the monitoring questions they plan to address at their specific offshore wind project(s). The selected questions and associated recommendations for addressing those questions should be incorporated into their monitoring plan(s). A single wind developer is not expected to address all questions at their individual offshore wind project. Recognizing that wind development is a new industry in the Northeast U.S. Continental Shelf ecosystem, it is anticipated that an adaptive approach will be needed in which knowledge gained from monitoring will be used to adapt future offshore wind monitoring. Further, additional questions to be addressed at offshore wind projects will be added over time as knowledge is gained from monitoring. A comprehensive review of offshore wind development interaction with marine species, habitat, and socio-economic conditions should be conducted after the first three years of data collection.

E. ORGANIZATION OF SECTIONS

The monitoring standards are organized by a set of fundamental principles of monitoring and research in order to collect data that are useful, informative, accessible, and applicable to the needs of stakeholders.

Organization of Part I: the Marine Species and Habitat Sections

1. Define clear hypotheses and/or questions – State a concise, well-refined research question or hypothesis that defines the purpose, goal, and context of the monitoring activities.

2. Select relevant focal species or indicators that may be influenced by impact producing factors – Biological monitoring refers to the collection of data on the abundance, distribution, and vital rates of focal species coincident with environmental covariates and IPFs that may influence species. There are several criteria to consider in the selection of focal species or functional groups to be monitored at a wind project. The criteria for focal species selection will be refined over time as knowledge is gained through formal vulnerability analysis and through the analysis and interpretation of monitoring data. The species recommended for monitoring were selected using the criteria listed below.

Criteria for Focal Species Selection:

- Species with a fishery that overlaps the footprint of the lease in which the wind project is located;
- Species with high proportion of population biomass occurring within the NMFS scientific survey strata that overlap the footprint of the lease in which the project is located;
- Species with a high reliance on habitat(s) where the wind project is located;
- Species that have known spawning or feeding grounds that overlap the footprint of the lease in which the wind project is located;
- Species or life stages that have higher vulnerability (exposure and sensitivity) to offshore wind-associated stressors; and/or
- Species that are amenable to the monitoring approach (e.g., for tagging and telemetry studies, species of appropriate size, readily accessible, can be safely handled) to the relevant tagging method).
- Additional criteria may be added over time knowledge on effects and interactions is gained.

Additional considerations for marine mammals, sea turtles, and protected fish species

- Species that are listed as Endangered, Threatened, or proposed to be listed under the ESA and those protected under the MMPA;
- Species that are amenable (e.g., of appropriate size, readily accessible, can be safely handled) to the relevant tagging method, or are likely to be detected with passive acoustic or visual monitoring; and/or
- Species that have a major migratory pathway that overlaps the footprint of the lease in which the wind project or cable route is located.

3. Collect sufficient baseline information – For the selected species, existing data from long-term sampling programs should be summarized and evaluated to inform baseline data collection. Baseline data collection should occur for a minimum of three years prior to construction activities. This provides an opportunity to observe interannual variability and existing trend directionality. Data collection should occur during the season(s) that the focal species is expected to be present in the project area. For protected species, data collection should occur year round, though the season(s) that the focal species are expected to be present in the project area can be prioritized. Existing data from long-term sampling programs should be summarized and evaluated to inform baseline data collection.

4. Conduct monitoring and research at spatial and temporal scales that are relevant to the question/hypothesis being addressed – The spatial and temporal scale of monitoring and research should be appropriate for the question / hypothesis being addressed. Consistency among projects in the spatial and temporal scales used to address a given question will facilitate the integration of data sets across projects.

5. Apply standardized methods and approaches across all individual fixed-foundation wind projects within the Northeast U.S. Continental Shelf – Standardized methodologies applied consistently across wind projects within the Northeast U.S. Continental Shelf ecosystem where fixed-foundation wind development is occurring will enable the evaluation of region scale and ecosystem scale effects. Standardization should apply to sampling platform and modality within a given habitat type, sampling design, data elements collected, data storage, and the sharing and dissemination of data products. Note also that there are standard approaches for acquiring

permits and authorizations needed to conduct monitoring. For many protected species, capture and handling guidelines exist and should be followed.

6. Determine sample size – Power analysis should be conducted using existing data sets for the system when possible and appropriate. Statistical power is the probability of detecting a significant effect when it occurs, i.e., the likelihood that a statistical test correctly rejects the null hypothesis (Cohen et al. 1988). Achieving a desired level of statistical power depends upon the sample size used, the expected effect size, and the level of statistical significance. For a given effect size, when variability is greater, a larger sample size is needed to detect a significant difference. To determine the number of samples needed to achieve the desired level of power, a power analysis should be conducted using existing data sets for the system. The power analysis should use a method appropriate for the study design and associated statistical tests planned. Separate power analyses should be conducted for each response variable (e.g., abundance, size, etc.).

7. Apply valid analytical methods to evaluate change – Ensure statistical methods selected are appropriate for the data collected and the questions being addressed. Environmental variables including depth, temperature, salinity, or other variables relevant to the study species should be included as covariates in analyses. Other covariates may include year, season, sex, and size. In addition to statistical significance, the mean, standard deviation, 95% confidence intervals, and sample size effect size for each response variable and associated confidence intervals for each effect size should be reported (Methratta 2025).

8. Establish and carry out a plan for data storage, access, information sharing, and public data accessibility – Data, meta-data, and relevant code should be made publicly available and follow the FAIR (Findable, Accessible, Interoperable, Reusable) principles for data stewardship and management (Wilkinson et al. 2016). Developers should coordinate with NOAA Fisheries to identify suitable virtual data repositories and formats.

9. Define performance indices and establish a schedule for evaluating monitoring plan performance – Performance indices should characterize the ability of the monitoring plan to detect a change in the biological responses measured within acceptable levels of precision. This can be evaluated with statistical indices such as confidence intervals. Acceptable levels of precision should be established.

10. Review the performance of the monitoring program using meaningful metrics and adapt approach to improve performance as needed – If portions of the monitoring plan are found to be lacking in performance (i.e., unable to provide sufficiently precise estimates of effects), then the following elements should be considered for adaptation:

- Sample Size: Sample size is dependent on the amount of variability in the system. For a given effect size, when variability is greater, a larger sample size is needed to detect a significant difference.
- Sampling Gear/Modality
- Sampling Design
- Spatial Layout of Instrumentation

11. Interactions with Other Offshore Wind Data Collections

11.1 Connection to Data Collected for Survey Mitigation

Whenever possible, monitoring methods should generate data streams that are equivalent to those collected by the long-term scientific surveys conducted by NEFSC outside of wind energy areas. Sampling for abundance and/or biology should thus match the methods for collection of the focal species set forth in the NEFSC Survey Mitigation Plans (NEFSC 2024). By implementing the same sampling methodology, the information can also serve as a datastream for survey mitigation needs. In cases where exact sampling methods are impossible to match to NEFSC survey methods (i.e., due to the presence of wind structures in the sampling area), other methods may be deemed equivalent if NEFSC scientists deem them to be precise, accurate, reliable, and useful for assessment purposes.

11.2 Connection to Data Collected for Monitoring Ecological Effects

Multiple data collection efforts will occur within an offshore wind project. These include project-level monitoring for effects on protected species, habitat, fisheries species, and socio-economic conditions; and the collection of data for survey mitigation purposes. Identifying related data collections may create opportunities for utilizing data for multiple purposes. For example, collecting biological data for a given fisheries species during a monitoring program to study artificial reef effects may be integrated with survey mitigation data in order to inform the assessment of that species' population.

Organization of Part II: Socio-Economic Monitoring Section

There is currently no established framework or guidelines for monitoring changes in socio-economic conditions in response to offshore wind development. Therefore, the socio-economics section begins with defining a tiered framework for monitoring commercial and recreational fisheries socio-economic conditions. The framework considers three IPFs: the presence and installation of structures, port utilization, and traffic. For each IPF, the elements that should be monitored to understand direct and indirect effects of offshore wind development on the socio-economic system are defined. Part 2 for the socio-economic monitoring section is structured as the following:

1. Purpose – Fisheries socio-economic monitoring collects data to quantify change over time in socio-economic responses to offshore wind developments. It includes tracking changes in economic, social, and cultural elements in individuals, fleets, and communities involved in commercial and recreational fisheries.

2. Core components of a monitoring plan – Includes identifying:

- Clear hypotheses and/or questions using the conceptual models as a guide,
- Communities most affected,
- Differences between individual, fleet, and community effects, and
- Spatial and temporal scales to be used among projects.

Monitoring should be done using adaptive approaches and with a plan for data storage and accessibility.

3. Impact producing factors affecting fisheries socio-economic conditions – Defines the IPFs that affect fisheries socio-economic conditions and introduces the tiered framework for

monitoring commercial and recreational fisheries socio-economic responses to offshore wind energy projects.

4. Conceptualization of the effects of selected IPFs on fisheries socio-economic conditions –

Select relevant methods and metrics to assess the direct (Tier 1) and indirect (Tier 2) effects of each IPF being monitored. All Tier 1 elements should be included in the monitoring plan. Tier 2 elements identified to be monitored should be assessed throughout all phases of the development process.

5. Monitoring guidance – Recommendations to help ensure accuracy and comparability in future analyses.

F. CONTRIBUTORS TO THIS EFFORT

Table P-2. List of contributors.

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REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

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REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

**PART I: PROJECT-LEVEL MONITORING STANDARDS TO EVALUATE OFFSHORE WIND
DEVELOPMENT EFFECTS ON MARINE SPECIES AND HABITATS**

Draft

SECTION 1

Noise - Monitoring the Effects of Offshore Wind Development Noise on Fisheries Species and Protected Species

PURPOSE: The purpose of this monitoring standard is to define standard methods for addressing specific questions about how noise (sound pressure, particle motion, and substrate vibration) caused by offshore wind development affect the distribution, abundance, behavior (including acoustic behaviors, movement, masking, and spawning behaviors), condition, injury, and mortality. Both fisheries species and protected species are addressed in this section. The term “protected species” in this section refers to marine mammals, sea turtles, and protected fish species unless otherwise specified. Fixed foundation offshore wind developments are the focus of these standards with additional standards for floating offshore wind to be addressed in a future document. Following the *Fundamental Principles of Monitoring and Research* presented in the Preface (Section VI), this document describes recommended best practices for addressing this priority research topic.

TAXA ADDRESSED BY THIS MONITORING STANDARD

- Marine Mammals
- Sea Turtles
- Protected Fish Species
- Fisheries Species

1. Define clear hypotheses and/or questions

The monitoring priorities defined by the draft NEFSC Regional Offshore Wind Science Plan (in prep.) guided the development of specific questions to be addressed using these monitoring.

Table 1. Specific questions to be addressed by this monitoring standard – Noise
1. Baseline Soundscape - What is the characterization of the soundscape prior to construction and pre-construction survey activities?
2. Pre-Construction Survey Noise Effects - What are the noise levels associated with pre-construction activities, including HRG surveys, compared to baseline and along a distance gradient, and how does this noise affect the distribution, abundance, condition, injury, and mortality rate of fisheries species and/or protected species?
3. Construction Noise Effects - What are the noise levels associated with construction activities (foundation installation, cable laying, etc.) compared to baseline and along a distance gradient, and how does this noise affect the distribution, abundance, behavior, condition, injury, and mortality of fisheries species and/or protected species?
4. Operational Noise Effects - What are the noise levels associated with operations (e.g., turbine noise and vessel noise) compared to baseline, seasonally, and along a distance gradient, and how does this noise affect the distribution, abundance, behavior, condition, injury, and mortality rate of fisheries species and/or protected species?
5. Decommissioning Noise Effects: What are the noise levels associated with decommissioning (e.g., foundation removal and vessel noise) compared to baseline, seasonally, and along a distance gradient,

and how does this noise affect the distribution, abundance, behavior, condition, injury, and mortality rate of fisheries species and/or protected species?

2. Select relevant focal species or indicators that are expected to be vulnerable to sound pressure, particle motion, and substrate vibration

2.1 Fisheries Species Recommended for Monitoring

Focal species recommended for these monitoring activities include: Atlantic surfclam (*Spisula solidissima*), sea scallop (*Placopecten magellanicus*), longfin squid (*Doryteuthis pealeii*), black sea bass (*Centropristis striata*), and summer flounder (*Paralichthys dentatus*), if they meet one or more of the criteria listed in the Preface section entitled, *Criteria Focal Species Selection*.

2.2 Protected Fish Species Recommended for Monitoring

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) and Giant Manta Ray (*Mobula birostris*) are recommended for protected fish species monitoring. The list of focal protected fish species may be updated in the future as more research is conducted and more information becomes available. Particular emphasis should be given on protected fish species identified to be highly vulnerable to OWD through formal vulnerability assessments or targeted offshore wind and wildlife research efforts.

2.3 Protected Marine Mammals and Sea Turtles Recommended for Monitoring

The primary recommended focal species is the North Atlantic right whale (*Eubalaena glacialis*) given its reduced abundance and known habitat use overlap with existing lease areas. Additional high priority species would include other more abundant endangered large baleen whales in the region, including fin (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), sperm whales (*Physeter macrocephalus*), humpback whales (*Megaptera novaeangliae*), and minke whales (*Balaenoptera acutorostrata*). Primary sea turtle species of concern include the endangered leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*) sea turtles.

3. Collect sufficient baseline information

Baseline data collection should occur for a minimum of 3 years. This provides an opportunity to observe interannual variability and directionality of any existing trends. Data collection should occur during all four seasons.

4. Conduct monitoring and research at spatial and temporal scales that are relevant to the question/hypothesis being addressed

4.1 Temporal Scale

Noise will be emitted from offshore wind energy projects during all phases of development. As such, soundscape, fishery, and protected species monitoring should occur for at least 3 years before construction activities, during pre-construction activities (e.g., HRG surveys), throughout construction (pile installation, cable laying), and throughout the operational phase (turbine noise and vessel noise) (Van Parijs et al. 2021). Monitoring should occur during all four seasons for all years of monitoring. Noise from HRG surveys will be emitted during pre-construction activities. Therefore, the baseline soundscape

should be evaluated prior to the onset of pre-construction activities, and the soundscape and response of fish species and protected species should be monitored during pre-construction activities. In addition, noise from construction activities, notably vessel traffic and pile driving, will be emitted during the construction period. Following baseline data collection, monitoring should continue to occur for the entire period of construction. Noise is also emitted during the operational phase; therefore, monitoring should continue during the operational phase.

4.2 Spatial Scale

Noise emissions from pre-construction activities and construction activities can extend beyond the boundaries of the wind project for 10s of km and will attenuate with distance from the source. Studies should be conducted at the project level but should conduct measurements for the entire expected range of noise emissions from the source which extend beyond the boundaries of the wind project to the wind energy area scale, and should prioritize known areas of importance for species of interest. It is recommended that a gradient design be used that extends to the furthest distance noise is expected to reach based on existing information. The spatial scale of the monitoring method should also align with the scientific question or application of interest (see Van Parijs et al. 2021 Supplemental Information for suggested Passive Acoustic Monitoring (PAM) designs and RWSC PAM resources (RWSC 2024)). Given the potential spatial extent of noise and species movement, coordination among developers with adjacent leases within a WEA is recommended to optimize hydrophone and receiver placements, maximize efficiency, and synergize the collection of information, e.g., movement of a tagged individual from one lease area into another.

5. Apply standardized methods and approaches across all individual wind projects within a region

5.1 Sampling Gear and Instrumentation

5.1.1 Collection of Fish for Tagging

Species to be tagged should be collected following the methods in the NEFSC Survey Mitigation Plans that address the focal species (e.g., hook and line, baited trap video, etc.) whenever possible (NEFSC 2024a). Efforts should be taken to minimize harm during capture and handling, and maximize the survival of tagged animals (Matley et al. 2024).

Protected Species Additional Consideration: The directed capture and handling of protected fish species can only occur if capture and handling have been authorized by an ESA permit and must follow existing best practices, such as *A protocol for use of shortnose, Atlantic, Gulf, and green sturgeons* (Kahn and Mohead 2010). Tagging of protected species should be coordinated with partner institutions that are authorized to tag marine mammals or turtles under the MMPA and ESA, or to apply for their own research permit working with experienced principal investigators who are qualified to tag. Acute injuries and mortalities that occur during all activities associated with this monitoring standard should be documented.

5.1.2 Measurements of soundscape and noise generated by offshore wind development activities: Passive Acoustic Monitoring (PAM)

There are numerous types of PAM systems that are each best suited to specific research questions. Continuous, archival PAM using fixed-station or bottom-mounted sensors is recommended prior to construction of offshore wind energy as well as during all phases of development to assess the baseline soundscape and monitor noise level during development (Van Parijs et al. 2021; 2023). Alternatively, mobile platforms and real-time systems, especially when used in tandem with archival, bottom-mounted sensors are useful for understanding the distribution of fisheries and marine mammal species and potential effects of construction noise or other anthropogenic activities (Caiger et al. 2020; Van Hoeck et al. 2023; Van Parijs et al. 2021). The PAM system selected must be able to sample at the same frequencies expected by the target species. Additionally, fisheries species are known to respond to particle motion, rather than sound pressure, as such particle motion sensors could also be considered for use alongside PAM.

Analysis of passive acoustic data for vocal species presence and soundscape metric summaries should apply the use of automatic detectors and PAM software that has been evaluated for performance and has been reviewed by a group of experts. If automated detectors or software is not available, then analysis should be conducted through manual visual processing by an acoustic expert familiar with the species' call type of interest. Recommended open source software for analysis of soundscape metrics include PyPAM, MANTA (Miksis-Olds et al. 2021), and PAMGUIDE (Merchant et al. 2015), as they all calculate decade metrics allowing standardized comparisons across projects (Van Parijs et al. 2021).

5.1.3 Measurements of fish movement and behavior in response to noise: Tagging and telemetry

Acoustic, satellite, and/or pop-up satellite archival tagging (PSAT) and telemetry may be used to track movement patterns of focal species (References: RWSC 2024a, b; Bowers et al. in prep.; Hussey et al. 2015; Shaw et al. 2021; Gervelis and Kneebone 2022). Deployed tags may also have pressure, temperature, acceleration, salinity, or other sensors for the simultaneous collection of environmental and behavioral data. Acoustic telemetry receivers may also be integrated with existing or new multi-disciplinary data collection platforms (e.g., PAM stations, data buoys, gliders, survey vessels) to maximize concurrent animal and environmental data streams.

5.1.4 Measurements of protected species movement and behavior in response to noise: Tagging, telemetry, PAM, aerial surveys, ship based surveys

Observations of protected species should be collected before, during, and after pile driving in order to assess potential responses in terms of both movement and behavior. This should be done in a manner that ideally would provide sufficient sample size to draw statistically robust conclusions, however with some methods and taxa, such as tagging of cetaceans, this may be difficult to achieve. A combination of methods should be used to overcome limitations of each method. These approaches may also overlap with other existing efforts such as survey mitigation or other research efforts. Methods for approaches such as tagging and aerial and shipboard surveys are outlined in the Draft Survey Mitigation Plans (NEFSC 2024b) and elsewhere within this document, including in the protected species movement, behavior, and site fidelity monitoring section.

5.1.5 Measurements of shellfish species in response to noise

Sampling methods used to evaluate the effects of noise on Atlantic surfclam (*Spisula solidissima*) and sea scallop (*Placopecten magellanicus*) should be consistent with their respective survey mitigation plans (NEFSC 2024a).

5.2 Sampling Platform for Collection of Species to be Tagged

Vessels and sampling gear that is small and sufficiently feasible to maneuver within an offshore wind farm should be used for sampling. A vessel capable of launching or deploying the sampling gear and instrumentation is recommended.

5.3 Sampling Design

5.3.1 PAM

Soundscape: An array of bottom-mounted, archival PAM receivers should be deployed within and adjacent to the wind energy area for continuous soundscape monitoring (Van Parijs et al. 2021). A number of receivers sufficient to provide coverage across the footprint of the entire wind project should be deployed.

Fish Acoustic Behavior: As most fish calls are below 1 kHz, a minimum sampling rate of 2 kHz should be used to monitor fish calls, though a sampling rate of at least 48 kHz is recommended for soundscape monitoring. To monitor changes in fish acoustic behavior, placement of bottom-mounted PAM receivers should be determined using the best available information about fish hotspots or putative spawning sites in the region. For most effective monitoring of fish acoustics, it is recommended to use a combination of bottom-mounted and mobile platforms (Van Hoeck et al. 2023). Bottom-mounted receivers provide thorough temporal coverage, while mobile platforms provide broad spatial coverage of the wind energy area. Additionally, PAM receivers can be co-located with acoustic telemetry receivers to expand sampling modalities and improve interpretation. Recommended array designs, including those for detecting marine mammals, are available in the supplemental materials of Van Parijs et al. (2021). Entities deploying PAM should also coordinate with the Regional Wildlife Science Collaborative, who maintains PAM monitoring best practices for offshore wind energy development and supports coordination of monitoring efforts throughout the East Coast.

Marine Mammal Acoustic Behavior: The sampling design and associated PAM sampling rates necessary to monitor marine mammals depends on the species group of interest. To monitor for baleen whales, a sampling rate of at least 2kHz should be used. To monitor some odontocetes species, including sperm whales, a sampling rate of at least 48 kHz is required. To capture other high frequency producing species including dolphins or harbor porpoises, the use of the click detector, such as an FPOD, is required. Additionally sampling design recommendations are detailed in Van Parijs et al. (2021), the forthcoming MITRE report entitled “Draft Technical Guidance for Offshore Wind: Passive Acoustic Monitoring and Infrared Imaging”, and the DOE report entitled “Evaluating Tools and Technologies for Monitoring Baleen Whales During Offshore Wind Foundation Installation”.

Monitoring Sound from Specific Offshore Wind Noise Generating Activities: PAM receivers should be deployed along a spatial gradient relative to the noise source being monitored (e.g., pre-construction HRG survey noise, pile driving noise, etc.). PAM receivers can be co-located with acoustic telemetry receivers to expand sampling modalities and improve interpretation.

5.3.2 Tagging and Telemetry

An array of receivers should also be placed along a spatial gradient relative to the noise source being monitored (e.g., pre-construction HRG survey noise, pile driving noise, etc.). A number of receivers sufficient to monitor near-field and far-field movements and behaviors relative to the noise source is recommended. Receiver data should be downloaded on a routine basis, at minimum every 6-12 months. Receivers should be maintained throughout baseline data collection and for the duration of the noise source being monitored, e.g., duration of pre-construction survey noise, the duration of pile driving, etc.

Periodic maintenance, battery replacement, or receiver replacements should occur as needed. For acoustic, satellite transmitter or PSAT studies, fish should be collected, tagged and released within the project area if at all possible; if this is not possible, collection, tagging, and release of individuals should occur adjacent to lease areas where there is a likelihood they will pass through the wind project. This will increase the likelihood of getting detections at the outset of the investigation. Please see Section 5.2 for additional considerations regarding protected species tagging.

Locations of fixed acoustic telemetry receiver moorings should be shared with the fishing industry, USCG, RWSC, and other marine users to avoid gear conflicts through Notice to Mariners and other communication mechanisms. Acoustic telemetry receiver and PAM locations should all be shared with the RWSC which maintains a database and map of research asset locations for the purpose of regional project coordination and research planning.

5.4 Range Testing of Acoustic Telemetry Arrays

Range testing of each deployed array should be conducted prior to the initiation of the study. An underlying assumption of acoustic telemetry is that fish within 500 m to 1000 m (1 km) are detected by the receivers, but that can vary with transmitter size (Babin et al. 2019) and environmental parameters (Secor et al. 2020) such as: water column depth, season, pycnocline strength, and other factors. Ground truthing that the receivers will pick up fish moving by at varying depths, speeds, and frequency is important (Kessel et al. 2014).

5.5 Shellfish Physical Injury and Mortality

Monitoring the effects of noise on Atlantic surf clam and sea scallop should be consistent with the methods in the respective survey mitigation plans for these species (NEFSC 2024a). A before-after-gradient design is recommended with increasing distances from the source of noise including HRG surveys and pile driving noise. Measurements should include abundance, density, size, injury and mortality of individuals.

5.6 Data Elements

Units of reporting should match those in NEFSC sampling protocols where applicable.

5.6.1 Noise levels

- Sound pressure (dB re 1 μ Pa)
- Particle motion (estimated) (Nedelec et al. 2021)
- Substrate vibration (mm s⁻²) (Nedelec et al. 2021)

5.6.2 Biological indices measured for tagged individuals

- Species ID
- Biological indices measured by NEFSC survey protocols
- Abundance and relevant measure of sampling effort depending on modality; CPUE
- Biomass (g)
- Condition
- Size distribution (cm)
- Physical injury
- Mortality
- Size/Length distribution per species tagged (cm)

5.6.3 Environmental Covariates

- Temperature (°C)
- Depth (m)
- Salinity (ppt)

5.6.4 PAM

To ensure standardized approaches for PAM, the recommendations provided in Van Parijs et al. (2021) should be followed including reporting the following minimum specifications:

- Bandwidth and frequency response (i.e., 10 to 2000 kHz)
- System sensitivity (i.e., -207 dB re 1 V/mPa @ 1 kHz) and dynamic range (dB)
- System self-noise (i.e., the equivalent bandwidth noise pressure level)
- Gain (dB)
- Directional response (i.e., omnidirectional or angular dependent)
- Sample rate (kHz)
- Sample resolution (i.e., 12 Bits)
- Recording schedule (i.e., recording duration/interval)
- Automatic detector performance metrics

5.6.5 PAM Data products:

- Decade or daily hybrid millidecade sound levels in 1 min bins for soundscape summary
- Time stamp, geographic coordinates, and confidence (possible or confirmed detection) for all species specific call observations

5.6.6 Tag Data and Biological Data

- Acoustic detections
- Geographic coordinates (lat, long, DD)
- Length (cm)
- Weight (g)
- Sex
- Condition
- Injury/Mortality
- Indication that the individual was tagged previously

6. Determine sample size and statistical power for each response variable of interest

Sample size selection will depend on the focal species. For more sedentary fish species, larger sample sizes ($n = 30-40$ individuals) may be achievable. For highly migratory species or protected species, only smaller sample sizes ($n = 10-20$) may be achievable. Attempts should be made to tag the largest sample size practicable, but not exceed 40 individuals. Any assumptions made in determining the sample size should be tested and clearly stated in reporting of monitoring outcomes. For protected species, sample size must remain within the number allowed by the investigator's permit.

7. Apply valid analytical methods to evaluate change

7.1 Response Variables to be Measured

- Movement patterns exhibited in the vicinity of the footprint of the array

- Movement patterns exhibited during pre-construction surveys, pile-driving, operation, decommissioning
- Patterns of movement toward or away from pile driving; site fidelity, residency, behavior inferred from movement patterns
- Date of return to area following wind-related noise activities (if any)
- Behavior (if possible) exhibited during pre-construction surveys, pile-driving, operation, and decommissioning

7.2 Statistical Methods

Statistical methods that are appropriate for the data collected and the questions being addressed should be employed. Several papers provide guidance on statistical methods for analyzing telemetry data (e.g., Joo et al. 2019; Whoriskey et al. 2019; Jonsen et al. 2022). For satellite transmitter and PSAT studies, care must be given to generating plausible animal tracks, acknowledging the varying levels of geolocation and movement path uncertainties (Jonsen et al. 2022). Methods for estimating most probable tracks and associated spatiotemporal uncertainty should be documented and reported. Generalized Linear Models (GLMs), Generalized Additive Models (GAMs), Generalized Linear Mixed Models, and Generalized Additive Mixed Models (GAMMs) may be used depending on the assumptions made and whether relationships between response variables are observed to be linear or nonlinear (Livermore et al. 2023). Environmental variables including depth, temperature, salinity, or other variables relevant to the study species should be included as covariates in analyses. Other covariates may include year, season, sex, and size. Statistical outcomes appropriate for the analytical methods or models employed should be reported alongside estimates of the magnitude of change and its biological relevance (e.g., Wood 2025; Methratta 2025).

8. Establish and carry out a plan for data storage, access, and information sharing

Data sharing and accessibility should follow the FAIR principles for data stewardship and management (Wilkinson et al. 2016).

8.1 PAM Data

PAM generates large volumes of data that require specific data management practices to ensure proper data storage. Data storage can be maintained on external hard drives or in cloud-based storage options. A detailed summary of recommendations for PAM data archiving and reporting is available in Van Parijs et al. (2021). Briefly, the raw audio recordings from PAM should be made publicly accessible through established data repositories, such as NOAA's National Center for Environmental Information (NCEI) Passive Acoustic Data Archive, and species detections should be reported through the NOAA Fisheries Passive Acoustic Monitoring Reporting System. All archived or reported data should include the associated metadata associated with the instrument and recordings, as well as the associated data products and their metadata. Additional guidance on PAM data management can be found in the RWSC's Data Management & Storage Best Practices for Long-term and Archival Passive Acoustic Monitoring (PAM) Data (RWSE 2022).

8.2 Tagging and Telemetry Data

8.2.1 Acoustic Telemetry

Acoustic-telemetry data should be submitted to the appropriate regional acoustic telemetry network (e.g., ACT Network) following any applicable data embargo period. We recommend the selection of the public data access level to best leverage the use of this data. Ideally, data submissions should occur whenever data collection and processing has been completed following retrieval of acoustic receivers. Where possible, near real-time data uploads are encouraged to support more timely regional monitoring of offshore wind impacts on trust resources.

As stated previously, all data submissions must be accompanied by comprehensive metadata that includes details on study design, acoustic transmitters deployed (e.g., tag type, tag parameterization, species tagged, tagging dates), and receiver specifications and locations. Metadata format should follow recognized standards to facilitate data interoperability and ensure that all necessary metadata is retained (MATOS 2025). Acoustic telemetry data should also be archived in raw form (Bowers et al. in prep), preferably using the templates provided by ACT MATOS (Appendix I; ACT MATOS 2021).

8.2.2 Satellite Telemetry

Satellite-telemetry data should be submitted to a publicly accessible repository following any applicable data embargo period. Recommended repositories include the ATN DAC, OBIS-SEAMAP, or Movebank. Ideally, data submissions should occur whenever data collection and processing has been completed following tag retirement, which may include:

1. When a tag stops transmitting and it can reasonably be assumed that the tag is no longer attached to the animal
2. When an archival tag uplinks data at the end of its programmed deployment (e.g., after detachment and surfacing)

Where possible, near real-time data uploads are encouraged to support more timely regional monitoring of offshore wind impacts on trust resources.

As stated previously, all data submissions must be accompanied by comprehensive metadata that includes details on study design, satellite tag deployed (e.g., tag type, deployment dates), tag parameterization (e.g., sampling intervals, duty cycles), and sensor details (e.g., salinity, CTD). Metadata format should follow recognized standards specified by the selected repository (ATN DAC, OBIS-SEAMAP, or Movebank) to facilitate data interoperability.

8.3 Data Embargo Period

Data products such as summary data tables, the results of data analyses, and the interpretation of results that address the monitoring questions should be provided to NOAA Fisheries as soon as they are prepared by the principal investigator. Ideally, raw data would be made available to NOAA Fisheries as early as possible solely to assist in management decisions. NOAA will limit data use to management purposes and will otherwise adhere to a 24 month embargo limitation with regards to publication in scientific journals.

9. Define performance indices and establish a schedule for evaluating monitoring plan performance

- All PAM data should go through consistent QA/QC checks by acoustic experts to ensure proper instrument function
- Number and percentage of lost receivers
- Tagging mortality (Martinez-Ramirez et al. 2024)
- Receiver Efficiency Index (REI) (Ellis et al. 2019; Kendall et al. 2021) - the proportion of transmitter activity from an array that occurs at a particular receiver location
- Detection Range (DR) - the maximum distance over which an acoustic transmitter can be detected by a receiver (Brownscombe et al. 2019; Winter et al. 2021)
- Detection Efficiency (DE) - the number of detections in a set period as a proportion of the total number possible (Brownscombe et al. 2019; Winter et al. 2021)
- Sample Size of tagged fish
- Confidence intervals (CIs) around response variables

10. Review the performance of the monitoring program using meaningful metrics and adapt approach to improve performance as needed

The performance of the monitoring program should be evaluated every 2 years using the performance indices identified in section 9. Receivers with low efficiency (DE and REI) should be considered for relocation. Response variables that have high levels of uncertainty should be evaluated to determine if an increase in sample size (number of tagged individuals) or other adaptations to the sampling design could increase certainty.

11. Interconnections with other OWD data collections

11.1 Connection to Data Collected for Survey Mitigation

Whenever possible, monitoring methods should generate data streams that are equivalent to those collected by the long-term scientific surveys conducted by NEFSC outside of wind energy areas. Methods used to collect fish for tagging should thus match the methods for collection of the focal species in the NEFSC Survey Mitigation Plans (NEFSC 2024a). Similarly, monitoring of Atlantic surf clam and Atlantic sea scallop should be consistent with methods in their respective survey mitigation plans (NEFSC 2024a). By implementing the same sampling methodology, the information can also serve as a data stream for survey mitigation needs. In cases where exact sampling methods are impossible to match to NEFSC survey methods (i.e., due to the presence of wind structures in the sampling area), other methods may be deemed equivalent if NEFSC scientists deem them to be precise, accurate, reliable, and useful for assessment purposes.

11.2 Connection to Data Collected for Monitoring Ecological Effects

Tagging and telemetry methods are also recommended for monitoring protected fish species as well as monitoring the responses of fisheries species to electromagnetic fields (EMFs) and their movement in and around wind projects (Sections 4 and 7). This method could also provide supplemental information for understanding the artificial reef effect if receiver arrays are placed with regard to structures (Section 6).

12. Permits and Authorizations

Monitoring plan developers should engage with the NMFS and state agencies to secure the permits and authorizations necessary to conduct monitoring. Early coordination is critical, particularly to ensure compliance with the ESA and MMPA if interactions with such species could occur. Additional consultation with the U.S. Department of State may be necessary if foreign vessels are involved with project monitoring plan/study activities.

12.1 State Permit Requirements

Each state may require individual permits to conduct study activities. Consultation with each state with project components and/or monitoring studies directly in or adjacent to its waters is necessary to determine specific state permit requirements.

12.2 Federal Permit Requirements

All project monitoring plan/study activities operating in federal waters (more than three miles from shore) must comply with existing fishing regulations (50 CFR 648 or 697) or be exempted from specific regulations. There are two options to document plan activities, depending on the type of vessel being used to conduct the work (see NMFS summary of scientific research and exempted fishing permits for more information):

- Activities conducted aboard scientific research vessels: A vessel that is chartered and controlled by a state/Federal government agency, university, or research institution that operates under a scientific research plan is exempt from federal fishing regulations. A commercial/recreational fishing vessel can serve as a scientific research vessel provided it is operating consistent with a fisheries project monitoring plan and under the direction of a state/federal agency, university, or scientific institution. While not required, a letter of acknowledgement (LOA) formally documents project monitoring plan/study activities and can minimize delay from any enforcement inquiries.
- Activities conducted aboard commercial/recreational fishing vessels: If not operating as a scientific research vessel as described above, a commercial/recreational vessel may need exemptions from existing fishing regulations (size/possession limits, gear requirements, etc.) to conduct project monitoring plan/study activities. Such vessels must request an exempted fishing permit (EFP) from NMFS.
- Contact the Greater Atlantic Regional Fisheries Office (GARFO) Sustainable Fisheries Division (978-281-9344) for additional information on the issuance of LOAs and EFPs. Project monitoring study activities may affect threatened or endangered species of fish and marine mammals, depending on where and how survey activities are conducted. Efforts should be made to avoid or minimize interactions with these species and to avoid or minimize effects on their habitat. Unless interactions are already covered as part of conventional fishing activities when operating under an EFP (NMFS guidance is under development and should be published soon on the Greater Atlantic Region's wind energy development page), you may need special permits or consultations from NMFS. Such permits may take several months or a year to be issued. Survey/monitoring plan coordinators should consult with NMFS well before study operations are expected to begin.
- For marine mammal questions, contact NOAA's Office of Protected Resources (301-427-8400).

- For questions regarding ESA Scientific Research and Enhancement Permits of Atlantic salmon, contact the USFWS at (207 827-5938 ext. 13).
- For questions regarding ESA Scientific Research and Enhancement Permits of other endangered fish including sturgeon, contact the Permits and Conservation Division of the Office of Protected Resources at (301-427-8401).

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SECTION 2

Hydrodynamic and Oceanographic Monitoring

PURPOSE: The purpose of this monitoring standard is to define standard methods for addressing specific questions about how physical and biological oceanographic processes change in response to offshore wind development. Changes to physical and biological oceanography have the potential to alter the abundance and distribution of foraging resources for marine mammals and other planktivorous species, which could therefore affect their distribution, abundance, behavior, and fitness. Following the *Fundamental Principles of Monitoring and Research* presented in the Preface (Section VI), this document describes recommended best practices for addressing this priority research topic. Research approaches for one IPF in certain instances may be applicable to other IPFs.

RESPONSE VARIABLES ADDRESSED BY THIS MONITORING STANDARD

- Physical Oceanographic Variables
- Phytoplankton
- Zooplankton
- Ichthyoplankton
- Small Pelagic Fish

1. Define clear hypotheses and/or questions

The monitoring priorities defined by the NEFSC Regional Offshore Wind Science Plan (in prep.) guided the development of specific questions to be addressed using these monitoring standards. Near-field = turbine scale processes (0-1000 m); Far-field = wind wake scale processes (1000 m -100 km).

Table 2. Specific questions to be addressed by this monitoring standard – Hydrodynamics and Oceanography

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|--|
| 1. Do wind wakes drive the formation of upwelling and downwelling dipoles, and if so, what are the characteristics of the dipoles, how do they affect plankton distribution, and how do they vary over spatial and temporal scales? |
| 2. How do tidal and frontal dynamics, specifically current speed and direction, change at local and broad scales, from before construction and over time after construction? |
| 3. How does stratification, specifically mixed layer depth, profiles of density, temperature, salinity, and nutrient distribution change at local and broad scales? |
| 4. How does the distribution, abundance, biomass, species composition, and productivity of zooplankton, phytoplankton, ichthyoplankton, and small pelagic fish abundance change from before construction and over time after construction, both at local scales and at broad scales? |
| 5. What is the effect of open-loop cooling systems associated with HVDC converter station operation on physical oceanographic variables and the distribution and abundance of ichthyoplankton (including eggs and larvae)? |

2. Select relevant focal species or indicators that are expected to be vulnerable to the IPFs being monitored

The primary species of concern with regards to potential hydrodynamic effects is the North Atlantic right whale (*Eubalaena glacialis*) through impacts on its food resources. Additional focal species include the endangered fin whale (*Balaenoptera physalus*) and leatherback turtle (*Dermochelys coriacea*). Both of these species rely to some extent on zooplankton distribution and are more prevalent than right whales, allowing more robust sample sizes. For ichthyoplankton, eggs and/or larvae of Atlantic surfclam (*Spisula solidissima*), sea scallop (*Placopecten magellanicus*), longfin squid (*Doryteuthis pealeii*), black sea bass (*Centropristis striata*), summer flounder (*Paralichthys dentatus*), and Atlantic cod (*Gadus morhua*) are of particular interest. Small pelagic fish are considered as an aggregate indicator.

3. Collect sufficient baseline information

Baseline data collection should occur during winter, spring, summer, and fall for a minimum of 3 years. This provides an opportunity to observe inter-annual and seasonal variability and existing trend directionality.

4. Conduct monitoring and research at spatial and temporal scales that are relevant to the question/hypothesis being addressed

4.1 Temporal Scale

Prior to Operational Activities – To establish the baseline oceanographic patterns, 3 years of data should be collected before any project-specific survey or construction activities commence. Sampling must occur in each season (winter, spring, summer, fall) each year.

Operational: During the operational phase of an offshore wind project when the project is generating power, monitoring should be conducted every year for at least the first three years following completion of turbine installation to assess both near and far-field effects. After the initial 3+ years, wind wake monitoring should be undertaken at 5 year increments until all lease areas within the expected maximum bounds of wind wakes (~100 km), given prevailing wind directions, are constructed and operational. This will enable an assessment of regional effects when wind wakes from multiple projects combined. For each year sampled, sampling must occur in each of the four seasons.

Decommissioning: Conduct monitoring for three years after decommissioning with sampling conducted during all four seasons to monitor changes due to the removal of structures.

Offshore Converter Substation Sampling – Data should be collected three years prior to construction, during each year of operation, and during each year of decommissioning. For each of these phases of development, sampling should occur quarterly (i.e., during all four seasons). If focal species are suspected to be spawning in the area, weekly sampling during the season of spawning (i.e., during peak egg and larvae presence) is recommended.

4.2 Spatial Scale

Near-Field (turbine-scale) wake sampling should occur within a 1000 m radius of each turbine sampled. Sampling should assess the vertical distribution of physical and biological variables at each station. A subset of foundations should be monitored that represent different aspects of the lease area. The

subset of foundations should be chosen such that this subset would allow for an assessment of hydrodynamic wake effects from all foundations.

Far-field (wind wake scale) sampling should occur within 30 km leeward of the edge of lease areas in order to capture the strongest potential wind deficits, the decay of potential wind wake effects further from turbines, and gradients of potential effects. Coordination should occur among lease areas such that proper spatial coverage is achieved regionally and effort is not duplicated. Observations in the lee of one wind development may serve as an observation point for multiple lease areas.

Offshore Converter Substation Sampling – Sampling of physical oceanographic variables and ichthyoplankton should be conducted at varying tidal cycles and across four seasons at distances of <500 m from the cooling water intake system and at discrete depths within the water column, including the depth of the water intake and outflow, to evaluate the spatial and temporal structure of the heated water discharge plume, as well as the abundance and distribution of larval fish species present at the wind project.

5. Sampling Gear and Instrumentation

Overview. Standardized methods and approaches should be conducted across individual wind projects within a region. Regional coordination via NOAA and the Regional Wildlife Science Collaborative (RWSC) is recommended in order to ensure approaches are standardized to the extent possible, resulting in datasets that can be combined to assess effects on a regional scale. Given the variability in regional conditions, different sampling methodologies may be appropriate depending on the area/region being sampled. Sampling modalities should include a mix of fixed, mobile, and remote sampling. Fixed moored stations should measure physical and biological components to understand changes over years, seasons, and synoptic weather events, and to compare against baseline data. Potential fixed stations could include surface buoys, profiling instruments (e.g., Wirewalker), and bottom-moored upward facing instruments (e.g., ADCPs and echosounders).

Fixed sampling should be paired with mobile sampling for context and to assess lagrangian vs. eularian changes. These may include autonomous underwater vehicles (AUVs), uncrewed surface vehicles (USVs), or gliders. Some biological mobile sampling (e.g., zooplankton nets) would be important to ground truth data collected by autonomous methods. Remote sensing should be used to provide a broader context of primary production, temperature changes, and current movement.

Whenever possible, physical and biological measurements should be taken on the same temporal scales and from the same sampling platform, both to reduce the need for additional stations, and gain insights as to how the physical environment may affect biological processes. Coordination between lease areas is also highly encouraged since broad scale effects may affect the larger region, and multiple offshore wind developments may jointly affect areas in the lee of one lease area.

Dipoles. Formation of dipoles caused by broad scale wind wakes have been modeled (e.g., Christiansen 2022) and observed empirically in the North Sea (Floeter et al. 2022). Floeter et al. (2022) towed a remotely operated undulating vehicle to measure the physical components of the water column and document upwelling and downwelling regions. This sort of sampling, whether towed by a ship or done autonomously would be suitable for documenting the potential formation of dipoles. This would be supplemented by sampling at fixed stations to assess the frequency of dipole formation and assess potential changes relative to natural variability. Sampling would primarily investigate physical changes in the water column, although coordinated biological sampling is also recommended to understand the effects on higher trophic levels.

Frontal dynamics. Oceanographic fronts are often broadly quantified via satellite remote sensing (e.g., Ullman and Cornillon 1999), while a finer understanding of frontal dynamics can be achieved with in situ sampling. Potential effects on frontal locations and strength should be assessed via satellite oceanography, however, in the winter temperature signatures of frontal regions are more difficult to discern. Satellite oceanography should be paired with in situ measurements of currents paired with upward facing echosounders to note how biological layers are affected by frontal dynamics.

Stratification. Stratification changes should be assessed by profiling moored instruments in strategic locations in and adjacent to the offshore wind lease area, such as a Wirewalker or similar instrument that collects Conductivity, Temperature, and Depth (CTD) information. As with assessment of other oceanographic effects, sampling locations should be spaced relative to turbine locations, with multiple stations near representative turbines spread in different directions, and spaced at increasing distances progressing from the turbine structures. Not each turbine needs to be sampled. Instead, 3 representative turbines should be selected within a lease area to represent varying oceanographic environments within the wind lease area (if applicable). Additional stations should occur outside of the lease area, as described in assessing wind wakes.

Zooplankton dynamics. Seasonally stratified net-based sampling using NOAA EcoMon protocols (Jossi and Marak 1983; Ejsymont and Sherman 2000; Richardson et al. 2010; Kane 2014) should be undertaken in and adjacent to the lease area. Sampling should be done at varying distances from turbine structures to determine if there are spatial gradients in either species or abundance. The resulting data should yield abundance by taxa and species (where reasonably possible) for each net tow and should assess possible changes over space, season, and year. Additional sampling, such as via echosounding and video/camera platforms, should assess taxa distribution within the water column how this may change relative to sampling location and turbine locations.

Phytoplankton dynamics. Phytoplankton should be sampled at multiple spatial scales, from satellite data imagery, to vertical casts with fluorescence, and at moored stations with an Imaging FlowCytobot (IFCB) or similar imaging instrument. Satellite data time series should serve to monitor broad changes in the distribution or magnitude of chlorophyll, and also assess potential phytoplankton size class changes. Vertical casts using a fluorometer should be combined with net and CTD casts. Moored vertically profiling stations should collect imaging data of phytoplankton to note potential changes at depth, and over seasons and years. The resulting image database should then be compared with existing and complimentary IFCB datasets such as those from the Long Term Ecological Monitoring study using an IFCB (see WHOI 2025a, b) and Martha's Vineyard Coastal Observatory (2025).

Ichthyoplankton. Ichthyoplankton should be sampled and enumerated with the methods described above for zooplankton via net sampling. Species of particular interest include: Atlantic surfclam (*Spisula solidissima*), sea scallop (*Placopecten magellanicus*), longfin squid (*Doryteuthis pealeii*), black sea bass (*Centropristis striata*), summer flounder (*Paralichthys dentatus*), and Atlantic cod (*Gadus morhua*).

Small Pelagic Fish. Small pelagic fish relative abundance can be evaluated with active acoustics instrumentation. This method samples the relative abundance of mobile finfish throughout the water column at high resolution. This can be deployed via a traditional research vessel (Jech et al. 2023) or an uncrewed surface vehicle (USV) (Hanegard et al. 2024).

5.1 Sampling Platform

Sampling platforms include vessel-based net sampling, floating and bottom-mounted moored profiling instruments, autonomous sampling via gliders and/or AUVs, and satellite remote sensing.

5.2 Sampling Design

Given that effects on oceanography will primarily be driven by physics, we suggest coordination among lease areas if the hydrographic and current environments are similar (e.g., same sized monopiles, similar bathymetry and current environments). Therefore developers may cultivate representative samples in similar environments (i.e., depths, monopile size, distance from bathymetric and oceanographic features such as fronts) across lease areas. The number of monitoring sites may differ per lease area depending on the local environment and placement of the lease.

Near-field (turbine-scale) sampling – This should occur at progressing distances (25, 50, 100, 200, 300, 500, 750, 1000 m) from the turbine and in four directions sufficient to sample varying spatial effects throughout the tidal ellipse and tidal cycle.

Far-field (wind wake scale) sampling – We suggest coordination among lease areas since potential changes are unlikely to be confined to the lease area, and control sites may be needed in or adjacent to another lease area. Also, monitoring should address both wind wakes directly stemming from one particular lease area, and wind wakes formed from multiple nearby developments.

Sampling should be spaced sufficiently such that observations can be achieved simultaneously within a wind wake and outside of one, and also simultaneously at multiple distances from the lease area. Fixed sampling stations should occur at regular intervals with increasing spacing progressing from the turbines, and we suggest that they are supplemented by mobile platforms. In regions with shoals separated by a tidal front (e.g., Nantucket Shoals) nearby, at least one station should occur shallower than the 20 m isobath if within 30 km from the edge of the lease area. Nearby land such as Nantucket Island may also interfere with spacing of observation stations. Ideal spacing of sampling observations would occur at 1, 3, 5, 7, 10, 15, 20, and 30 km from the edge of the lease area (Christiansen et al. 2022; Floeter et al. 2022).

Sampling Ichthyoplankton and Physical Oceanographic Variables at Offshore Converter Substations – Sampling is recommended at progressive distances (25, 50, 100, 200, 300, 500 m) from the inflow and outflow and in four directions sufficient throughout the tidal ellipse and tidal cycle. Methods for sampling zooplankton and stratification should be employed as noted above.

5.3 Data Elements

Identify the following.

- Vertical and horizontal water column physical structure, and biological patterns of distribution, abundance, and concentration in and adjacent to the wake area
- Changes in mixing, stratification, pycnocline, current strength and direction (e.g., tidal currents, eddies), temperature, nutrients
- Phytoplankton and zooplankton abundance, density, and distribution within the water column
- Data from control sites to quantify potential changes due to foundation/turbine presence
- Measurements of length, width, and depth of the hydrodynamic effects (wakes) around project foundations
- Assessment of the potential formation of upwelling & downwelling dipoles from wind wakes (see Floeter et al. 2022)
- Current speed and direction to assess changes in tidal & frontal dynamics
- Mixed layer depth, profiles of density, temperature, salinity, and nutrient distribution to assess the magnitude of potential changes to stratification

- Distribution and abundance of the copepod species, particularly *Calanus finmarchicus*, *Centropages typicus*, and *pseudocalanus spp.* (see Ecomon protocols - Jossi and Marak 1983; Ejsymont and Sherman 2000; Richardson et al. 2010; Kane 2014)
- Distribution and abundance of ichthyoplankton biomass, and species composition (see Ecomon protocols - (Jossi and Marak 1983; Ejsymont and Sherman 2000; Richardson et al. 2010; Kane 2014)
- Distribution and abundance of phytoplankton biomass, productivity, and species composition
- Distribution and total abundance of small pelagic fish species

6. Apply valid statistical methods for determining sample size and statistical power for each response variable of interest

A power analysis should be conducted using existing data sets for the system. The power analysis should use a method appropriate for the study design and associated statistical tests planned.

7. Apply valid analytical methods to evaluate change

Statistical methods that are appropriate for the data collected and the questions being addressed should be employed. For example, Generalized Linear Models (GLMs), Generalized Additive Models (GAMs), Generalized Linear Mixed Models, and Generalized Additive Mixed Models (GAMMs) may be used depending on the assumptions made and whether relationships between response variables are observed to be linear or nonlinear. Environmental variables including depth, temperature, salinity, and current speed and direction should be included as covariates or main effects in analyses. Other main effects or covariates may include distance from structure, year, and season. Multivariate methods may be used to evaluate changes in community composition. Statistical outcomes appropriate for the analytical methods or models employed should be reported alongside estimates of the magnitude of change and its biological relevance (e.g., Wood 2025; Methratta 2025).

8. Establish and carry out a plan for data storage, access, information sharing, and public data availability

Data, meta-data, and relevant code should be made publicly available and follow the FAIR (Findable, Accessible, Interoperable, Reusable) principles for data stewardship and management (Wilkinson et al. 2016). Developers should coordinate with NOAA Fisheries to identify suitable virtual data repositories and formats.

9. Define performance indices and establish a schedule for evaluating monitoring plan performance

Performance indices for abundance estimates and biological measures including those listed below should be evaluated annually. If performance is deemed to be low, then plans to adapt the monitoring program should be made.

Performance Indices

- 95% confidence intervals around the means of biological indices
- Effect size and associated confidence intervals (Methratta 2025)
- Image quality

- Rarefaction Curves (sampling effort vs. species richness)

10. Review the performance of the monitoring program using meaningful metrics and adapt approach to improve performance as needed

Performance indices should characterize the ability of the monitoring plan to detect a change in the biological responses measured within acceptable levels of precision. The performance of the monitoring program should be evaluated every year using the performance indices identified in section 9. Response variables that have high levels of uncertainty should be evaluated to determine if an increase in sample size or other adaptations to the sampling design could increase certainty.

11. Interconnections with other OWD data collections

11.1 Connection to Data Collected for Survey Mitigation

Whenever possible, monitoring methods should generate data streams that are equivalent to those collected by the long-term scientific surveys conducted by NEFSC outside of wind energy. Biological sampling should thus match the methods for collection of the focal species in the NEFSC Survey Mitigation Plans (NEFSC 2024). By implementing the same sampling methodology, the information can also serve as a data stream for survey mitigation needs.

11.2 Connection to Data Collected for Monitoring Effects

Developers should engage with the NMFS, other relevant Federal and State agencies to secure the permits and authorizations necessary to conduct monitoring. Early coordination is critical, particularly to ensure compliance with the ESA and MMPA. Additional consultation with the U.S. Department of State may be necessary if foreign vessels are involved with project monitoring plan/study activities.

12. Permits and Authorizations

12.1 State Permit Requirements

Each state may require individual permits to conduct study activities. Consultation with each state with project components and/or monitoring studies directly in or adjacent to its waters is recommended to determine specific state permit requirements.

12.2 Federal Permit Requirements

All project monitoring plan/study activities operating in federal waters (more than three miles from shore) must comply with existing fishing regulations (50 CFR 648 or 697) or be exempted from specific regulations. There are two options to document plan activities, depending on the type of vessel being used to conduct the work (see NMFS summary of scientific research and exempted fishing permits for more information):

- Activities conducted aboard scientific research vessels: A vessel that is chartered and controlled by a state/Federal government agency, university, or research institution that operates under a scientific research plan is exempt from federal fishing regulations. A commercial/recreational fishing vessel can serve as a scientific research vessel provided it is

operating consistent with a fisheries project monitoring plan and under the direction of a state/federal agency, university, or scientific institution. While not required, a Letter of Acknowledgement (LOA) formally documents project monitoring plan/study activities and can minimize delay from any enforcement inquiries.

- Activities conducted aboard commercial/recreational fishing vessels: If not operating as a scientific research vessel as described above, a commercial/recreational vessel may need exemptions from existing fishing regulations (size/possession limits, gear requirements, etc.) to conduct project monitoring plan/study activities. Such vessels must request an exempted fishing permit (EFP) from NMFS.
- Contact the GARFO Sustainable Fisheries Division (978-281-9344) for additional information on the issuance of LOAs and EFPs. Project monitoring study activities may affect threatened or endangered species of fish and marine mammals, depending on where and how survey activities are conducted. Efforts should be made to avoid or minimize interactions with these species and to avoid or minimize effects to their habitat. Unless interactions are already covered as part of conventional fishing activities when operating under an EFP (NMFS guidance is under development and should be published soon on the Greater Atlantic Region's wind energy development page), you may need special permits or consultations from NMFS. Such permits may take several months or a year to be issued. Survey/monitoring plan coordinators should consult with NMFS well before study operations are expected to begin.
- For marine mammal questions, contact NOAA's Office of Protected Resources (301-427-8400).
- For questions regarding ESA Scientific Research and Enhancement Permits of Atlantic salmon, contact the USFWS at (207 827-5938 ext. 13).
- For questions regarding ESA Scientific Research and Enhancement Permits of other endangered fish including sturgeon, contact the Permits and Conservation Division of the Office of Protected Resources at (301-427-8401).

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SECTION 3

Cumulative Effects Monitoring of Movement, Behavior, and Distribution: Marine Mammals and Sea Turtles

PURPOSE: The purpose of this monitoring standard is to define standard methods for addressing specific questions about the movements, behavior, and distribution of protected marine mammals and sea turtles exposed to all phases of offshore wind development. This includes changes in distribution patterns due to the cumulative effects of pre-construction activity, construction activity, operation, and decommissioning. Fixed foundation offshore wind developments are the focus of these standards with additional standards for floating offshore wind to be addressed in a future document. Following the *Fundamental Principles of Monitoring and Research* presented in the Preface, this document describes recommended best practices for addressing this priority research topic.

TAXA ADDRESSED BY THIS MONITORING STANDARD

- Marine Mammals
- Sea Turtles

1. Define clear hypotheses and/or questions

The monitoring priorities defined by the NEFSC Regional Offshore Wind Science Plan (in prep.) guided the development of specific questions to be addressed using these monitoring standards.

Table 3. Specific questions to be addressed by this monitoring standard – Cumulative Effects on Marine Mammals and Sea Turtles
1. How much time do individuals of the focal species spend in the wind project over a month, season, and year, and how does this change during and after offshore wind construction?
2. Do individuals of the focal species leave the wind project during offshore wind development, and if so, do they return to the WEA, and what is the frequency of return and the duration of time spent in the WEA?
3. Within a wind project, how much time do individuals of the focal species spend in the footprint of the turbines, cables, and scour protection zones over a month, season, and year, and how does this change during and after offshore wind construction?
4. When do individuals of the focal species migrate through the wind project area prior to construction and how does this change during and after offshore wind construction?

2. Select relevant focal species or indicators that are expected to be vulnerable to the IPFs being monitored

Criteria for focal species selection for monitoring are defined in the Preface (section VI) of this document.

The criteria for focal species selection will be refined over time as knowledge is gained through the analysis and interpretation of monitoring data. The focal species is likely to differ depending on the location of the WEA.

2.1 Protected Marine Mammal and Sea Turtle Species Recommended for Monitoring

Primary candidates for focal species include the North Atlantic right whale (*Eubalaena glacialis*) given its reduced abundance and known use of existing wind energy areas, whether foraging, traveling to and from calving areas, or calving. Additional high priority species would include other more abundant endangered large baleen whales in the region, including fin (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), and sperm whales (*Physeter macrocephalus*).

All five sea turtle species in the region - loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), Kemp's Ridley (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) - may be considered for primary focal species designation depending on the location of the wind project, although hawksbill are rare to the region. All species are protected under the Endangered Species Act, and green and loggerhead critical habitat may overlap with some potential lease areas.

Additional species for consideration protected under the marine mammal protection act could include gray seals (*Halichoerus grypus*) and harbor seals (*Phoca vitulina*), common bottlenose dolphin (*Tursiops truncatus*), harbor porpoise (*Phocoena phocoena*), and short-beaked common dolphin (*Delphinus delphis*). These species are likely to interact with the area directly surrounding the turbine foundation as an artificial reef ecosystem develops.

3. Collect sufficient baseline information

Baseline data collection should minimally occur for at least 3 years but optimally for 10 years (White et al. 2022). Three years would minimally provide an opportunity to observe interannual variability and directionality of any existing trends. Ten years would enable high statistical power in detecting population trends (White et al. 2022). Data collection should occur during the season(s) that the focal species is expected to be present in the project area.

4. Conduct monitoring and research at spatial and temporal scales that are relevant to the question/hypothesis being addressed

4.1 Temporal Scale

Following baseline data collection, monitoring should continue to occur for the lifetime of the project including pre-construction surveys, construction, operation, and decommissioning.

Aerial surveys. Aerial surveys should be conducted twice a month to understand potential changes in distribution and abundance.

Vessel surveys. The number of vessel surveys is contingent on the employment of other survey techniques. The area should be surveyed sufficiently to understand the regional abundance and distribution focal species. If paired with aerial surveys, annual or seasonal surveys may be appropriate during times when sea state and weather are generally suitable for shipboard surveys.

Passive Acoustic Monitoring. Monitoring should occur consistently throughout the time period when possible.

Tagging. The number of tags deployed and how those tags are programmed will depend on the hypothesis/question being addressed and the behavior of the focal species. There are clear trade-offs in tag longevity, data resolution, and continuity of the transmitted data (Cioffie et al. 2023). We recommend partnering with institutions that are permitted to tag marine mammals and/or sea turtles under the MMPA and/or ESA and have the requisite experience and qualifications.

4.2 Spatial Scale

The questions addressed by this monitoring standard (Table 3) are wind energy area scale questions. Addressing questions at this spatial scale of resolution will necessitate cooperation among developers with adjacent leases within a WEA. Many protected marine mammal and sea turtle species, including some of the recommended focal species, are migratory and have broad distributions. With that in mind, some questions addressed by this monitoring standard extend to the regional scale. To address questions at this spatial scale of resolution, cooperation among developers along the Atlantic coast is strongly recommended, as is coordination with regional NOAA surveys (e.g., Atlantic Marine Assessment for Protected Species, or AMAPPS). At minimum, the spatial scale for the methods described here should cover the target lease areas, but would be best if it extended regionally beyond the lease area, or aligned closely with other survey efforts to effectively extend coverage regionally.

5. Apply standardized methods and approaches across all individual wind projects within a region

Monitoring protected marine mammal and sea turtle movement, behavior, and distribution in and adjacent to wind projects is best conducted using a suite of approaches, as each individual approach has both strengths and weaknesses. Distribution and broadscale movements are best monitored through a combination of visual and acoustic observation, while behavior and fine scale movement (e.g., behavior and movements around a wind turbine) is best monitored by tagging. However, for tagging to be employed as a successful monitoring approach, it must be undertaken by experienced practitioners with requisite permits and sufficient sample sizes, consistently collected over a number of years. In order to assess the effect of particular stressors (i.e., pile driving, blasting, etc.) on individuals, any tagging studies must be well designed such that they can provide robust inference to effectively measure behavioral changes of individuals attributable to acute stressors.

5.1 Aerial Survey Methodology

All data collection should be conducted in such a manner that it can be seamlessly merged with other existing aerial surveys in the region, especially those from the NOAA's AMAPPS program and the existing surveys of the MA/RI WEA conducted by the New England Aquarium, but also the right whale surveys conducted directly by the NEFSC and those currently run by Azura in the Mid-Atlantic. This will allow for regional species abundance estimation and an assessment of whether distribution differs within and outside of WEAs. Guidance on conducting appropriate vessel-based surveys is below, however, for additional details, please see the Marine Mammal & Sea Turtle Aerial Survey Mitigation Plan (Survey Mitigation Plan(s) (NEFSC 2024). If done properly, aerial survey monitoring surveys may double as survey mitigation surveys.

5.1.1 Sampling Platform

Conduct aerial surveys using a plane that has been demonstrated as a successful platform for marine mammal and sea turtle aerial observing. This would aid in calibrating observed data to other survey efforts to best assess potential changes in distribution and abundance. The plane must be able to carry both human observers and a digital camera system. New survey approaches such as uncrewed vehicles may be explored for monitoring and used for monitoring once the technology has been established and vetted.

5.1.2 Sampling Design

The survey design should be pre-specified systematic approximately parallel line transects, with a random start within a geographic stratum. The track lines are orientated approximately perpendicular to the coastline and across the depth contours to account for typical spatial gradients in the species density.

Line transect sampling methods are used to collect and analyze the data. Surveys would need to fly at approximately 1500 ft to allow for sufficient clearance above the turbine blades. Along with 2 pilots, 2 teams of 3 scientists should be in the plane. To implement the 2-independent team methodology, each team has 2 scientists simultaneously visually searching waters in front of and to the side of the plane with the naked eye. Each team also has 1 data recorder that records only data from 1 team. The 2 teams are physically and auditorily isolated from each other. The 2 teams are necessary to estimate perception bias (the probability of missing an animal group that is available to be seen but was missed due to factors such as environmental conditions or human error). Combined with ancillary dive profile data, this allows for incorporation of availability bias in the resulting abundance estimates, and recording of weather and sea state conditions enables assessment of sighting likelihood.

5.2 Vessel-based Survey Methodology

Vessel-based marine mammal and sea turtle surveys may be used in lieu of aerial surveys to detect distribution of protected species within a lease area. An additional benefit of ship-based surveys is their ability to collect ancillary oceanographic and ecological data that may help explain observed patterns of species distribution. All data collection should be conducted in such a manner that it can be seamlessly merged with other vessel-based observing surveys, especially those from the NOAA's AMAPPS program, to allow for regional species abundance estimation and an assessment of whether distribution differs within and outside of WEAs. Guidance on conducting appropriate vessel-based surveys is below, however, for additional details, see the Marine Mammal & Sea Turtle Vessel-Based Abundance Survey Mitigation Plan (Survey Mitigation Plan(s) (NEFSC 2024). If done properly, vessel-based monitoring surveys may double as survey mitigation surveys.

5.2.1 Sampling Platform

The proper sampling platform is a vessel that is capable of operating safely within wind projects, and has the ability to employ multiple teams of scientists observing marine mammals and sea turtles at different locations and heights on this ship, where ships with higher observing platforms will have better sighting capabilities.

5.2.2 Sighting Gear and Instrumentation

Teams of scientists employ deck-mounted high-powered binoculars (25x150 powered) and laptops with specialized software to record characteristics of species sightings, the observing team of scientists, and environmental and sighting conditions.

5.2.3 Sampling Design, Gear, and Instrumentation

These surveys should use a line transect approach with two teams of four scientists with two teams located on a flying bridge, and a second on a bridge deck. Each team has 2 scientists visually searching with deck-mounted high-powered binoculars (25x150 powered), 1 data recorder, and 1 scientist on rest. Scientists rotate positions every 30 minutes from 0600 to 1800 on good weather days (winds less than 25 knots and visibility greater than 2 nautical miles [nm]).

Employing two independent teams in this manner allows for the estimation of perception bias (the probability of missing an animal group that is available to be seen but was missed due to environmental conditions, distance from the ship, or human error). Combined with ancillary dive profile data, this allows for incorporation of availability bias in the resulting abundance estimates, and recording of weather and sea state conditions enables assessment of sighting likelihood.

An underlying assumption of the line transect methodology is that the regions surveyed are random representations of the habitats that the marine mammals and sea turtles inhabit. Surveys are needed inside and outside of the development areas to determine if the developments directly or indirectly change the distribution and abundance patterns within the development areas. Therefore, vessel-based surveys should either extend outside of lease area boundaries, or closely coordinate with other regional surveys such that an assessment can be made of whether distribution offshore wind development is affecting species distribution.

5.2.4 Ancillary Data Collection

One of the benefits of a vessel-based survey as compared to an aerial survey is that additional ancillary data can be collected on the oceanography, on other species and trophic levels, and via towed passive acoustic arrays. On NOAA abundance surveys, in addition to the above visual line transect data for marine mammals and sea turtles, there are 3 other teams of scientists collecting data. There is 1 team of 2 scientists (1 person on effort during daylight hours, the other at rest) that focuses on collecting strip transect data on seabirds that are used to estimate relative abundance and spatiotemporal habitat-density maps of seabirds (Winship et al. 2018).

There is another team of 2-3 scientists (at least 1 is on effort during daylight hours) that monitor the spatiotemporal vocalizations of cetaceans and other species using a towed hydrophone array. There is a third team of 1-3 scientists that collect data on the physical and biological characteristics of the water column. This team collects active acoustic data on the backscatter patterns of planktonic and fish species during the day and night times. They also collect physical characteristics of the water column using flow-through ship-mounted monitoring systems and over-the-side deployed monitoring devices like a conductivity, temperature, and depth (CTD) monitoring device. In addition, this team samples the water column for the spatiotemporal distribution of planktonic life using bongo nets, other sampling nets, and visual plankton recorders, and the distribution of fish populations using mid-water trawls and other similar sampling devices.

5.3 Passive Acoustic Monitoring Methodology

Details of Passive Acoustic Monitoring (PAM) sampling and instrumentation can be found in the Noise section (Section 1) of this guidance, with additional information available in the Survey Mitigation Plan(s) (NEFSC 2024) and in Van Parijs et al. (2021).

5.4 Tagging Methodology

For tagging to be employed as a successful monitoring approach, it must be undertaken by experienced practitioners with requisite permits and sufficient sample sizes, consistently collected over a number of years. In order to assess the effect of particular stressors (i.e., pile driving, blasting, etc.) on individuals, any tagging studies must be well designed such that they can provide robust inference to effectively measure behavioral changes of individuals attributable to acute stressors. While some guidance is provided below, we strongly recommend consulting with the NEFSC and tagging experts in the research community before embarking on any tagging studies.

5.4.1 Sampling Gear and Instrumentation

Acoustic, satellite, and/or pop-up satellite archival tagging (PSAT) and telemetry of focal species may be employed (References: RWSC 2024a, b; Bowers et al. in prep.; Hussey et al. 2015; Shaw et al. 2021; Gervelis and Kneebone 2022). The correct type of tag will differ by species considering their behavior, morphology, and population status (Andrews et al. 2019). Deployed tags may have pressure, temperature, acceleration, salinity, or other sensors for the simultaneous collection of environmental and behavioral data. Acoustic telemetry receivers may also be integrated with existing or new multi-disciplinary data collection platforms (e.g., PAM stations, data buoys, gliders, survey vessels) to maximize concurrent animal and environmental data streams.

5.4.2 Sampling Design

In an ideal situation, tags would be placed on randomly selected individuals. As this is impracticable, it is best to approximate random sampling in realistic conditions by finding time-area strata where initial tagging bias is minimal, where the focal species density is high enough to facilitate tagging, and where the size or age class is representative of animals in the region. Sample sizes are likely to vary each year in response to tagging conditions, but we recommend that at least 10 or more tags are deployed per year per species for several years. Without a sufficient sample size and multi-year time series robust conclusions cannot be drawn on movement, behavior, and distribution patterns.

5.4.3 Sampling Platform

Sampling platforms and methods may differ significantly depending on the species one is attempting to tag, but likely would involve working from a small boat if tagged offshore, often launched from a larger vessel. Tagging may require capture, such as turtles in a dip net, hoop net, or rarely a stationary net. Other tagging can be done via a pole, drones, or dart.

5.5 Data Elements

Units of reporting should match those in NEFSC sampling protocols outlined in survey mitigation documents (NEFSC 2024) where applicable. Coordination with NEFSC aerial and vessel survey teams is recommended to ensure proper data collection.

5.5.1 Aerial Survey

At a minimum, surveys should collect the following data elements:

- Observing effort metrics (observers, teams, observing configuration, ship speed, course heading, platform, transect number, survey and leg design/type, dates, times, etc.)
- Sighting conditions (weather, sea state, swell angle, glare, visibility, etc.)
- Observer recording the sighting

- Species observed, certainty, group size, behavior, swim direction
- Distance and angle of sightings from the plane's path

5.5.2 Vessel Survey

- Observing effort metrics (observers, teams, observing configuration, platform, dates, times, course heading, flight height, transect number, etc.)
- Sighting conditions (weather, sea state, visibility, cloud ceiling height, etc.)
- Observer recording the sighting
- Species observed, certainty, group size, behavior, swim direction
- Distance and angle of sightings from the plane's path

5.5.3 PAM

See the Noise section (Section 1) of these monitoring guidelines.

5.5.4 Tagging

As situations will differ by species and the type of tag deployed, please consult NOAA and research community experts for specific data elements to collect. Some potential data elements include:

- Species tagged
- Date, time, and location of species tagged
- Locations collected from tag data and associated data to assess accuracy of reported locations
- Dive patterns, orientation, and depths of the tagged animal (if applicable)
- Environmental conditions of the surrounding water (if applicable)
- Photos, video, or acoustic recordings from the tag (if applicable)
- All data recorded or transmitted by the deployed tag

6. Apply valid statistical methods for determining sample size and statistical power for each response variable of interest

6.1 Aerial surveys

Survey design should assess sample size and conduct a power analysis to ensure an ability to detect changes within the survey area. Lease area may need to be combined and coordinated with other regional surveys to ensure sufficient sample size and statistical power.

6.2 Vessel-based surveys

Survey design should assess sample size and conduct a power analysis to ensure an ability to detect changes within the survey area. Lease area may need to be combined and coordinated with other regional surveys to ensure sufficient sample size and statistical power.

6.3 PAM

See the Noise section (Section 1) of these monitoring guidelines.

6.4 Tagging

Attempts should be made to tag the largest sample size practicable. For protected species, sample size must remain within the number allowed by the investigator's permit.

7. Apply valid analytical methods to evaluate change

7.1 Response Variables to be assessed

- Day of the year (Julian date) that the focal species enters to the wind project prior to construction, and how this changes after offshore wind construction
- Duration of time the focal species spends in the wind project over a month, season, and year; How does this change before vs. after construction and annually for the lifetime of the project?
- Date that focal species leaves the wind project; How does this change before vs. after construction and annually for the lifetime of the project?
- Frequency of return and the duration of time spent in the wind project following return?; How does this change before vs. after construction and annually for the lifetime of the project?
- Movement range and distribution within and near the wind project; How does this change before vs. after construction and annually for the lifetime of the project?

7.2 Statistical Methods

Aerial and Vessel Surveys. Aerial and vessel survey data should be provided to the NEFSC for statistical analysis

PAM. See the Noise section (Section 1) of these monitoring guidelines.

Tagging. Statistical methods that are appropriate for the data collected and the questions being addressed should be employed. Several papers provide guidance on statistical methods for analyzing telemetry data (e.g., Joo et al. 2019; Whoriskey et al. 2019; Jonsen et al. 2022). For satellite transmitter and PSAT studies, care must be given to generating plausible animal tracks, acknowledging the varying levels of geolocation and movement path uncertainties (Jonsen et al. 2022). Methods for estimating most probable tracks and associated spatiotemporal uncertainty should be documented and reported. Generalized Linear Models (GLMs), Generalized Additive Models (GAMs), Generalized Linear Mixed Models, and Generalized Additive Mixed Models (GAMMs) may be used depending on the assumptions made and whether relationships between response variables are observed to be linear or nonlinear (Livermore et al. 2023). Environmental variables including depth, temperature, salinity, photoperiod, or other variables relevant to the study species should be included as covariates in analyses. Other covariates may include year, season, sex, and size. Statistical outcomes appropriate for the analytical methods or models employed should be reported alongside estimates of the magnitude of change and its biological relevance (e.g., Wood 2025; Methratta 2025).

8. Establish and carry out a plan for data storage, access, information sharing, and public data accessibility

Data sharing and accessibility should follow the FAIR (Findable, Accessible, Interoperable, Reusable) principles for data stewardship and management (Wilkinson et al. 2016).

8.1 Aerial & Vessel Surveys

Data storage and access should be coordinated through NOAA and the Regional Wildlife Science Collaborative (RWSC) to ensure proper information sharing and public data accessibility (RWSC 2024c). Plans for storage of regional aerial and vessel surveys are currently in development. This coordination will also allow merging of multiple datasets to leverage surveys on a regional scale.

8.2 PAM Data

PAM generates large volumes of data that require specific data management practices to ensure proper data storage. Data storage can be maintained on external hard drives or in cloud-based storage options. A detailed summary of recommendations for PAM data archiving and reporting is available in Van Parijs et al. (2021). Briefly, the raw audio recordings from PAM should be made publicly accessible through established data repositories, such as NOAA's National Center for Environmental Information (NCEI) Passive Acoustic Data Archive, and species detections should be reported through the NOAA Fisheries Passive Acoustic Monitoring Reporting System. All archived or reported data should include the associated metadata associated with the instrument and recordings, as well as the associated data products and their metadata. Additional guidance on PAM data management can be found in the [RWSC's Data Management & Storage Best Practices for Long-term and Archival Passive Acoustic Monitoring \(PAM\) Data \(RWSC 2022\)](#).

8.3 Tagging and Telemetry Data

8.3.1 Acoustic Telemetry

Acoustic-telemetry data should be submitted to the appropriate regional acoustic telemetry network (e.g., ACT Network) following any applicable data embargo period. We recommend the selection of the public data access level to best leverage the use of this data. Ideally, data submissions should occur whenever data collection and processing has been completed following retrieval of acoustic receivers. Where possible, near real-time data uploads are encouraged to support more timely regional monitoring of offshore wind impacts on trust resources.

As stated previously, all data submissions must be accompanied by comprehensive metadata that includes details on study design, acoustic transmitters deployed (e.g., tag type, tag parameterization, species tagged, tagging dates), and receiver specifications and locations. Metadata format should follow recognized standards to facilitate data interoperability and ensure that all necessary metadata is retained (MATOS 2025). Acoustic telemetry data should also be archived in raw form (Bowers et al. in prep), preferably using the templates provided by ACT MATOS (Appendix 1; ACT MATOS 2021).

8.3.2 Satellite Telemetry

Satellite-telemetry data should be submitted to a publicly accessible repository following any applicable data embargo period. Recommended repositories include the ATN DAC, OBIS-SEAMAP, or Movebank. Ideally, data submissions should occur whenever data collection and processing has been completed following tag retirement, which may include:

- a. When a tag stops transmitting and it can reasonably be assumed that the tag is no longer attached to the animal
- b. When an archival tag uplinks data at the end of its programmed deployment (e.g., after detachment and surfacing)

Where possible, near real-time data uploads are encouraged to support more timely regional monitoring of offshore wind impacts on trust resources.

As stated previously, all data submissions must be accompanied by comprehensive metadata that includes details on study design, satellite tag deployed (e.g., tag type, deployment dates), tag parameterization (e.g., sampling intervals, duty cycles), and sensor details (e.g., salinity, CTD). Metadata

format should follow recognized standards specified by the selected repository (ATN DAC, OBIS-SEAMAP, or Movebank) to facilitate data interoperability.

8.3.3 Data Embargo Period

Data products such as summary data tables, the results of data analyses, and the interpretation of results that address the monitoring questions should be provided to NOAA Fisheries as soon as they are prepared by the principal investigator. Ideally, raw data would be made available to NOAA Fisheries as early as possible solely to assist in management decisions. NOAA will limit data use to management purposes and will otherwise adhere to a 24 month embargo limitation with regards to publication in scientific journals.

9. Define performance indices and establish a schedule for evaluating monitoring plan performance

Performance indices should characterize the ability of the monitoring plan to detect a change in the biological responses measured within acceptable levels of precision. Each year, the following performance indices should be recorded and reported to NOAA Fisheries.

Aerial and Vessel Surveys

- Number and dates of surveys performed
- Number of species observed
- Effort metrics of transects run
- Detection metrics to be used in Distance Sampling
- Annual report detailing the above information and those listed in the Data Elements section above (Section 5.5)

PAM & Tagging

- All PAM data should go through consistent QA/QC checks by acoustic experts to ensure proper instrument function
- Number and percentage of lost receivers
- Tag-induced mortality (Martinez-Ramirez et al. 2024)
- Receiver Efficiency Index (REI) (Ellis et al. 2019; Kendall et al. 2021) - the proportion of transmitter activity from an array that occurs at a particular receiver location
- Detection Range (DR) - the maximum distance over which an acoustic transmitter can be detected by a receiver (Brownscombe et al. 2019; Winter et al. 2021)
- Detection Efficiency (DE) - the number of detections in a set period as a proportion of the total number possible (Brownscombe et al. 2019; Winter et al. 2021)
- Sample Size of tagged fish
- Confidence intervals (CIs) around response variables

10. Review the performance of the monitoring program using meaningful metrics and adapt approach to improve performance as needed

The performance of the monitoring program should be evaluated annually using the performance indices identified in sections 5 and 9. Response variables that have high levels of uncertainty should be evaluated to determine if an increase in sample size (number of tagged individuals) or other adaptations to the sampling design could increase certainty.

11. Interconnections with other OWD data collections

11.1 Connection to Data Collected for Survey Mitigation

Whenever possible, monitoring methods should generate data streams that are equivalent to those collected by the long-term scientific surveys conducted by the NEFSC outside of wind energy areas. Methods used to collect data should thus match the methods for collection of the focal species in the NEFSC Survey Mitigation Plans (NEFSC 2024). By implementing the same sampling methodology, the information can also serve as a datastream for survey mitigation needs. In cases where exact sampling methods are impossible to match to NEFSC survey methods (i.e., due to the presence of wind structures in the sampling area), other methods may be considered equivalent if NEFSC scientists deem them to be precise, accurate, reliable, and useful for assessment purposes.

11.2 Connection to Data Collected for Monitoring Ecological Effects

Movement, behavior, and distribution data can be assessed relative to potentially changing oceanographic and ecological factors, some of which would be assessed through monitoring the influence of presence of structures (Section 2.2). Tagging and telemetry methods are also recommended for monitoring responses to noise and electro-magnetic fields (EMFs).

12. Permits and Authorizations

Monitoring plan developers should engage with the NMFS and state agencies (where applicable) to secure the permits and authorizations necessary to conduct monitoring. Early coordination is critical, particularly to ensure compliance with the ESA and MMPA if interactions with such species are planned or could occur. Additional consultation with the U.S. Department of State may be necessary if foreign vessels are involved with project monitoring plan/study activities.

12.1 State Permit Requirements

Each state may require individual permits to conduct study activities. Consultation with each state where project components and/or monitoring studies will directly/adjacently occur is recommended to determine specific state permit requirements.

12.2 Federal Permit Requirements

All project monitoring plan/study activities operating in federal waters (more than three miles from shore) must comply with existing fishing regulations (50 CFR 648 or 697) or be exempted from specific regulations. There are two options to document plan activities, depending on the type of vessel being used to conduct the work (see NMFS summary of scientific research and exempted fishing permits for more information):

- Activities conducted aboard scientific research vessels: A vessel that is chartered and controlled by a state/Federal government agency, university, or research institution that operates under a scientific research plan is exempt from federal fishing regulations. A commercial/recreational fishing vessel can serve as a scientific research vessel provided it is operating consistent with a fisheries project monitoring plan and under the direction of a state/federal agency, university, or scientific institution. While not required, a letter of

acknowledgement (LOA) formally documents project monitoring plan/study activities and can minimize delay from any enforcement inquiries.

- Activities conducted aboard commercial/recreational fishing vessels: If not operating as a scientific research vessel as described above, a commercial/recreational vessel may need exemptions from existing fishing regulations (size/possession limits, gear requirements, etc.) to conduct project monitoring plan/study activities. Such vessels must request an exempted fishing permit (EFP) from NMFS.
- Contact the GARFO Sustainable Fisheries Division (978-281-9344) for additional information on the issuance of LOAs and EFPs. Project monitoring study activities may affect threatened or endangered species of fish and marine mammals, depending on where and how survey activities are conducted. Efforts should be made to avoid or minimize interactions with these species and to avoid or minimize effects to their habitat. Unless interactions are already covered as part of conventional fishing activities when operating under an EFP (NMFS guidance is under development and should be published soon on the Greater Atlantic Region's wind energy development page), you may need special permits or consultations from NMFS. Such permits may take several months or a year to be issued. Survey/monitoring plan coordinators should consult with NMFS well before study operations are expected to begin.
- For marine mammal questions, contact NOAA's Office of Protected Resources (301-427-8400).
- For questions regarding ESA Scientific Research and Enhancement Permits of Atlantic salmon, contact the USFWS at (207 827-5938 ext. 13).
- For questions regarding ESA Scientific Research and Enhancement Permits of other endangered fish including sturgeon, contact the Permits and Conservation Division of the Office of Protected Resources at (301-427-8401).

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SECTION 4

Cumulative Effects Monitoring of Movement and Behavior: Fisheries Species and Protected Fish Species

PURPOSE: The purpose of this monitoring standard is to define standard methods for addressing specific questions about the movements of fish species exposed to all phases of offshore wind development. This includes changes in movement patterns due to the cumulative effects of pre-construction activity, construction activity, operation, and decommissioning. This information will be used to infer responses in fish behavior, residency, migration, and site fidelity to offshore wind. Fisheries species and protected species are addressed here. For protected fish species, the documentation of acute injury and mortality during all monitoring activities is required in order to support species conservation efforts. Fixed foundation offshore wind developments are the focus of these standards with additional standards for floating offshore wind to be addressed in a future document. Following the *Fundamental Principles of Monitoring and Research* presented in the Preface (Section VI), this document describes recommended best practices for addressing this priority research topic.

TAXA ADDRESSED BY THIS MONITORING STANDARD

- Fisheries Species
- Protected Fish Species

1. Define clear hypotheses and/or questions

The monitoring priorities defined by the NEFSC Regional Offshore Wind Science Plan (in prep.) guided the development of specific questions to be addressed using these monitoring standards.

Table 4. Specific questions to be addressed by this monitoring standard – Cumulative Effects on Fisheries Species and Protected Fish Species

1. How much time do individuals of the focal species spend in the wind project over a month, season, and year, and how does this change during and after offshore wind construction?
2. What is the duration of time that the species spends in the wind project? Do individuals of the focal species leave the wind project, and if so, do they return and what is the frequency of return?
3. Within a wind project, how much time do individuals of the focal species spend associated with wind structures (e.g., turbines, cables, and scour protection zones) over a month, season, and year, and how does this change during and after offshore wind construction?
4. When do individuals of the focal species migrate through the area prior to construction and how does this change during and after offshore wind construction?

2. Select relevant focal species or indicators that are expected to be vulnerable to the IPFs being monitored

2.1 Fisheries Species Recommended for Monitoring

Focal species recommended for these monitoring activities include: black sea bass (*Centropristis striata*), summer flounder (*Paralichthys dentatus*), Atlantic cod (*Gadus morhua*), bluefin tuna (*Thunnus thynnus*),

and sea scallop (*Placopecten magellanicus*), if these species meet one or more of the criteria listed in the Preface section entitled, *Criteria for Focal Species Selection*.

2.2. Protected Fish Species Recommended for Monitoring

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and Giant Manta Ray (*Mobula birostris*) are recommended for protected fish species monitoring. The list of focal protected fish species may be updated in the future as more research is conducted and more information becomes available. Particular emphasis should be given on protected fish species identified to be highly vulnerable to OWD through formal vulnerability assessments or targeted offshore wind and wildlife research efforts.

3. Collect sufficient baseline information

All Fish Species: Baseline data collection should ideally occur for a minimum of three years. This provides an opportunity to observe interannual variability and directionality of any existing trends. Data collection should occur during the season(s) that the focal species is expected to be present in the project area.

Protected Fish Species Additional Considerations: Note that there is a lack of baseline data on many protected fish species and their life stages in areas where offshore wind development is set to occur in the Northeast Shelf region (RWSC 2024). Data collection of protected fish species should occur year round, though the season(s) that the focal species are expected to be present in the project area can be prioritized.

4. Conduct monitoring and research at spatial and temporal scales that are relevant to the question/hypothesis being addressed

4.1 Temporal Scale

Following baseline data collection, monitoring should continue to occur for the lifetime of the project including pre-construction surveys, construction, operation, and decommissioning.

4.2 Spatial Scale

All Fish Species: Monitoring should occur across the entire wind project. Given the potential spatial extent of fish movement and the processes that drive those patterns, coordination among developers with adjacent leases within a WEA is recommended to optimize receiver placements, maximize efficiency, and synergize the collection of information, e.g., movement of a tagged individual from one wind project into another.

Protected Fish Species Additional Considerations: Many protected fish species, including some of the recommended focal protected fish species, are migratory and have broad distributions. With that in mind, some questions addressed by this monitoring standard extend to the regional scale. To address questions at this spatial scale of resolution, cooperation among developers along the Atlantic coast is strongly recommended.

5. Apply standardized methods and approaches across all individual wind projects within a region

5.1 Sampling Gear and Instrumentation

5.1.1 Collection of Fish for Tagging

Focal species should be collected following the methods in the NEFSC Survey Mitigation Plans that address the focal species (e.g., hook and line, baited trap video, etc.) whenever possible. Efforts should be taken to minimize harm during capture and handling, and maximize the survival of tagged animals (Matley et al. 2024).

5.1.2 Tagging and Telemetry Methods

Acoustic, satellite, and/or pop-up satellite archival tagging (PSAT) and telemetry may be used to track movement patterns of focal species (References: RWSC 2024a, b; Bowers et al. in prep.; Hussey et al. 2015; Shaw et al. 2021; Gervelis and Kneebone 2022). Deployed tags may also have pressure, temperature, acceleration, salinity, or other sensors for the simultaneous collection of environmental and behavioral data. Acoustic telemetry receivers may also be integrated with existing or new multi-disciplinary data collection platforms (e.g., PAM stations, data buoys, gliders, survey vessels) to maximize concurrent animal and environmental data streams.

Locations of fixed acoustic telemetry receiver moorings should be shared with the fishing industry, USCG, RWSC, and other marine users to avoid gear conflicts through Notice to Mariners and other communication mechanisms. Fish to be tagged should be collected from inside the wind project that is being monitored.

5.2 Sampling Platform

Vessels and sampling gear that are small and sufficiently feasible to maneuver within an offshore wind farm should be used for sampling. A vessel capable of launching or deploying the sampling gear and instrumentation is required.

Protected Fish Species Additional Considerations: The directed capture and handling of protected fish species can only occur if capture and handling have been authorized by an ESA permit and must follow existing best practices, such as *A protocol for use of shortnose, Atlantic, Gulf, and green sturgeons* (Kahn and Mohead 2010). Capture of animals for tagging should be completed through existing fisheries sampling techniques, and may be adjusted as technology develops. The preferred sampling technique will differ from species to species and will be dependent on the location of sampling. Proper documentation of injuries and deaths of protected fish species during all activities associated with this monitoring standard is required.

5.3 Sampling Design

An array of receivers should also be placed throughout the wind energy area to monitor presence/absence within the array. A number of receivers sufficient to provide coverage across the footprint of the entire wind project. For questions that have the potential to be addressed in adjacent wind projects, coordination among wind projects is advised. Receiver data should be downloaded on a routine basis, at minimum every 6-12 months. Receivers around the perimeter and within the wind project should be maintained throughout baseline data collection and for the lifetime of the project, with periodic maintenance, battery replacement, or receiver replacements as needed. For acoustic,

satellite transmitter or PSAT studies, fish should be collected, tagged and released within the wind project if at all possible; if this is not possible, collection, tagging, and release of individuals should occur adjacent to wind projects where there is a likelihood they will pass through the wind project. This will increase the likelihood of getting detections at the outset of the investigation.

5.4 Range Testing

Range testing of each deployed array should be conducted prior to the initiation of the study. An underlying assumption of acoustic telemetry is that fish within 500 m to 1000 m (1 km) are detected by the receivers, but that can vary with water column depth, season, pycnocline strength, and other factors. Ground truthing that the receivers will pick up fish moving by at varying depths, speeds, and frequency is important.

5.5 Data Elements

Units of reporting should match those in NEFSC sampling protocols where applicable.

5.5.2 Biological indices measured for individuals collected for tagging

- Species ID
- Biological indices measured by NEFSC survey protocols
- Abundance and relevant measure of sampling effort depending on modality; CPUE
- Biomass (g)
- Condition
- Size distribution (cm)
- Physical injury
- Mortality
- Size/Length distribution per species tagged (cm)

5.5.3 Environmental Covariates

- Temperature (°C)
- Depth (m)
- Salinity (ppt)

6. Determine sample size and statistical power for each response variable of interest

All Fish Species: Sample size selection will depend on the focal species. For more sedentary species, larger sample sizes ($n = 30-40$ individuals) may be achievable. For highly migratory species or protected fish species only smaller sample sizes ($n = 10-20$) may be achievable. Attempts should be made to tag the largest sample size practicable, but not exceed 40 individuals. Any assumptions made in determining the sample size should be tested and clearly stated in reporting of monitoring outcomes. For protected fish species, sample size must not exceed the total number allowed by the principal investigator's permit. All tagged individuals should be measured for length, sex, weight, and other standard biological metrics, and also inspected visually for previous tags.

Protected Fish Species Additional Consideration: The directed capture and handling of protected fish species can only occur if capture and handling have been authorized by an ESA permit and must follow existing best practices, such as *A protocol for use of shortnose, Atlantic, Gulf, and green sturgeons* (Kahn

and Mohead 2010). Acute injuries and mortalities of protected fish that occur during all activities associated with this monitoring standard should be documented.

7. Apply valid analytical methods to evaluate change

7.1 Response Variables to be Assessed

- Day of the year (Julian date) that the focal species enters to wind project prior to construction, and how this changes after offshore wind construction
- Duration of time the focal species spends in the wind project over a month, season, and year; How does this change before vs. after construction and annually for the lifetime of the project
- Date that focal species leaves the wind project; Change in departure time before vs. after construction and annually
- Frequency of return and the duration of time spent in the wind project following return; Change in return date and duration of time spent in the wind project before vs. after construction and annually
- Movement range within and near the wind project; How does this change before vs. after construction and annually for the lifetime of the project?

Protected Fish Species - Additional Variables to be Assessed

- Activities that occurred simultaneously with noticeable acute injury or mortality of protected fish species during pre-construction, construction, operation, and decommissioning and any actions associated with monitoring.
- Number of individuals observed to be affected.

7.2 Statistical Methods

Statistical methods that are appropriate for the data collected and the questions being addressed should be employed. Several papers provide guidance on statistical methods for analyzing telemetry data (e.g., Joo et al. 2019; Whoriskey et al. 2019; Jonsen et al. 2022). For satellite transmitter and PSAT studies, care must be given to generating plausible animal tracks, acknowledging the varying levels of geolocation and movement path uncertainties (Jonsen et al. 2022). Methods for estimating most probable tracks and associated spatiotemporal uncertainty should be documented and reported. Generalized Linear Models (GLMs), Generalized Additive Models (GAMs), Generalized Linear Mixed Models, and Generalized Additive Mixed Models (GAMMs) may be used depending on the assumptions made and whether relationships between response variables are observed to be linear or nonlinear (Livermore et al. 2023). Environmental variables including depth, temperature, salinity, photoperiod, or other variables relevant to the study species should be included as covariates in analyses. Other covariates may include year, season, sex, and size. Statistical outcomes appropriate for the analytical methods or models employed should be reported alongside estimates of the magnitude of change and its biological relevance (e.g., Wood 2025; Methratta 2025).

8. Establish and carry out a plan for data storage, access, information sharing, and public data accessibility

Data sharing and accessibility should follow the FAIR (Findable, Accessible, Interoperable, Reusable) principles for data stewardship and management (Wilkinson et al. 2016).

8.1 Acoustic Telemetry

Acoustic-telemetry data should be submitted to the appropriate regional acoustic telemetry network (e.g., ACT Network) following any applicable data embargo period. We recommend the selection of the public data access level to best leverage the use of this data. Ideally, data submissions should occur whenever data collection and processing has been completed following retrieval of acoustic receivers. Where possible, near real-time data uploads are encouraged to support more timely regional monitoring of offshore wind impacts on trust resources.

As stated previously, all data submissions must be accompanied by comprehensive metadata that includes details on study design, acoustic transmitters deployed (e.g., tag type, tag parameterization, species tagged, tagging dates), and receiver specifications and locations. Metadata format should follow recognized standards to facilitate data interoperability and ensure that all necessary metadata is retained (MATOS 2025). Acoustic telemetry data should also be archived in raw form (Bowers et al. in prep), preferably using the templates provided by ACT MATOS (Appendix 1; ACT MATOS 2021).

8.2 Satellite Telemetry

Satellite-telemetry data should be submitted to a publicly accessible repository following any applicable data embargo period. Recommended repositories include the ATN DAC, OBIS-SEAMAP, or Movebank. Ideally, data submissions should occur whenever data collection and processing has been completed following tag retirement, which may include:

1. When a tag stops transmitting and it can reasonably be assumed that the tag is no longer attached to the animal
2. When an archival tag uplinks data at the end of its programmed deployment (e.g., after detachment and surfacing)

Where possible, near real-time data uploads are encouraged to support more timely regional monitoring of offshore wind impacts on trust resources.

As stated previously, all data submissions must be accompanied by comprehensive metadata that includes details on study design, satellite tag deployed (e.g., tag type, deployment dates), tag parameterization (e.g., sampling intervals, duty cycles), and sensor details (e.g., salinity, CTD). Metadata format should follow recognized standards specified by the selected repository (ATN DAC, OBIS-SEAMAP, or Movebank) to facilitate data interoperability.

Protected Fish Species - Additional Considerations

All documented acute injuries and mortalities of protected fish species should be shared with the relevant Regional Office (GARFO or Southeast Regional Office (SERO)) as well as the Office of Protected Resources (OPR).

8.3 Data Embargo Period

Data products such as summary data tables, the results of data analyses, and the interpretation of results that address the monitoring questions should be provided to NOAA Fisheries as soon as they are prepared by the principal investigator. Ideally, raw data would be made available to NOAA Fisheries as early as possible solely to assist in management decisions. NOAA will limit data use to management purposes and will otherwise adhere to a 24 month embargo limitation with regards to publication in scientific journals.

9. Define performance indices and establish a schedule for evaluating monitoring plan performance

Performance indices should characterize the ability of the monitoring plan to detect a change in the biological responses measured within acceptable levels of precision. Each year, the following performance indices should be recorded and reported to NOAA Fisheries.

- Number and percentage of lost receivers
- Tag-induced mortality (Martinez-Ramirez et al. 2024)
- Receiver Efficiency Index (REI) (Ellis et al. 2019; Kendall et al. 2021) - the proportion of transmitter activity from an array that occurs at a particular receiver location
- Detection Range (DR) - the maximum distance over which an acoustic transmitter can be detected by a receiver (Brownscombe et al. 2019; Winter et al. 2021)
- Detection Efficiency (DE) - the number of detections in a set period as a proportion of the total number possible (Brownscombe et al. 2019; Winter et al. 2021)
- Sample Size of tagged fish
- Confidence intervals (CIs) around response variables

10. Review the performance of the monitoring program using meaningful metrics and adapt the approach to improve performance as needed

Performance should be evaluated annually using the performance indices identified above. Receivers with low efficiency (DE and REI) should be considered for relocation. Response variables that have high levels of uncertainty should be evaluated to determine if an increase in sample size (number of tagged individuals) or other adaptations to the sampling design could increase certainty.

11. Interconnections with other OWD data collections

11.1 Connection to Data Collected for Survey Mitigation

Whenever possible, monitoring methods should generate data streams that are equivalent to those collected by the long-term scientific surveys conducted by NEFSC outside of wind energy areas. Methods used to collect fish for tagging should thus match the methods for collection of the focal species in the NEFSC Survey Mitigation Plans (NEFSC 2024). By implementing the same sampling methodology, the information can also serve as a datastream for survey mitigation needs. In cases where exact sampling methods are impossible to match to NEFSC survey methods (i.e., due to the presence of wind structures in the sampling area), other methods may be deemed equivalent if NEFSC scientists deem them to be precise, accurate, reliable, and useful for assessment purposes.

11.2 Connection to Data Collected for Monitoring Ecological Effects

Tagging and telemetry methods are also recommended for monitoring responses to noise and electromagnetic fields (EMFs). Data collected to address this topic can be used to inform species/stock size for black sea bass which are assessed with the Woods Hole Assessment Model (WHAM) (Stock and Miller 2021). Protected species data can also be used to inform any ESA provisions (NOAA Fisheries), such as reclassifying species or developing protective regulations.

12. Permits and Authorizations

Monitoring plan developers should engage with the NMFS and state agencies to secure the permits and authorizations necessary to conduct monitoring. Early coordination is critical, particularly to ensure compliance with the ESA if interactions with such species could occur. Additional consultation with the U.S. Department of State may be necessary if foreign vessels are involved with project monitoring plan/study activities.

12.1 State Permit Requirements

Each state may require individual permits to conduct study activities. Consultation with each state with project components and/or monitoring studies directly in or adjacent to its waters is recommended to determine specific state permit requirements.

12.2 Federal Permit Requirements

All project monitoring plan/study activities operating in federal waters (more than three miles from shore) must comply with existing fishing regulations (50 CFR 648 or 697) or be exempted from specific regulations. There are two options to document plan activities, depending on the type of vessel being used to conduct the work (see NMFS summary of scientific research and exempted fishing permits for more information):

- Activities conducted aboard scientific research vessels: A vessel that is chartered and controlled by a state/Federal government agency, university, or research institution that operates under a scientific research plan is exempt from federal fishing regulations. A commercial/recreational fishing vessel can serve as a scientific research vessel provided it is operating consistent with a fisheries project monitoring plan and under the direction of a state/federal agency, university, or scientific institution. While not required, a letter of acknowledgement (LOA) formally documents project monitoring plan/study activities and can minimize delay from any enforcement inquiries.
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- Contact the GARFO Sustainable Fisheries Division (978-281-9344) for additional information on the issuance of LOAs and EFPs. Project monitoring study activities may affect threatened or endangered species of fish and marine mammals, depending on where and how survey activities are conducted. Efforts should be made to avoid or minimize interactions with these species and to avoid or minimize effects on their habitat. Unless interactions are already covered as part of conventional fishing activities when operating under an EFP (NMFS guidance is under development and should be published soon on the Greater Atlantic Region's wind energy development page), you may need special permits or consultations from NMFS. Such permits may take several months or a year to be issued. Survey/monitoring plan coordinators should consult with NMFS well before study operations are expected to begin.
- For marine mammal questions, contact NOAA's Office of Protected Resources (301-427-8400).

- For questions regarding ESA Scientific Research and Enhancement Permits of Atlantic salmon, contact the USFWS at (207 827-5938 ext. 13).
- For questions regarding ESA Scientific Research and Enhancement Permits of other endangered fish including sturgeon, contact the Permits and Conservation Division of the Office of Protected Resources at (301-427-8401).

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SECTION 5

Vessel Strike and Entanglement Monitoring: Protected Species

PURPOSE: The purpose of this monitoring standard is to define standard methods for addressing vessel strike and entanglement of protected species (mammals, turtles, and protected fish) associated with offshore wind development. Entanglement in this case includes incidental capture during fisheries monitoring or interactions with abandoned fishing gear that accumulates around hard structures introduced by offshore wind development. Vessel strikes and entanglement not only have the potential to significantly affect both the health and mortality of individual marine mammals, sea turtles, and protected fish, but also the overall abundance and health of protected species populations (Pettis and Hamilton 2023; Fox et al. 2020; Fuentes et al. 2021; Duncan et al. 2017). Following the *Fundamental Principles of Monitoring and Research* presented in the Preface (Section VI), this document describes recommended best practices for addressing this priority research topic.

TAXA ADDRESSED BY THIS MONITORING STANDARD

- Marine Mammals
- Sea Turtles
- Protected Fish

1. Define clear hypotheses and/or questions

The monitoring priorities defined by the NEFSC Regional Offshore Wind Science Plan (in prep.) guided the development of specific questions to be addressed using these monitoring standards.

Table 5. Specific questions to be addressed by this monitoring standard – Vessel Strike and Entanglement

1. How many individuals for each protected species population are known to be struck, or potentially struck, annually per project by vessels associated with offshore wind development? This question recognizes that vessel strikes can be recorded, but that a completely accurate count by species may not be possible given the nature of vessel strikes.
2. How many protected species individuals are known to be entangled by ghost gear/derelict fishing gear/marine debris that accumulates around foundations, scour protection, cable protection systems, and associated structures annually per project?
3. How many individuals for each protected species population are incidentally captured during offshore wind project-level monitoring of fisheries species?

2. Select relevant focal species or indicators that are expected to be vulnerable to the IPFs being monitored.

Estimates of anthropogenic serious injury and mortality are required for all marine mammal stocks that occur in US waters by the Marine Mammal Protection Act (MMPA). Permits issued under the MMPA and/or consultations under the ESA may require project-level reporting of vessel strike and entanglement events for all protected species in addition to other project-specific reporting (e.g., NMFS OPR 2024).

3. Collect sufficient baseline information

General monitoring of vessel strike and entanglement is conducted independently of offshore wind development, therefore baseline data is currently being collected by NOAA and others (Henry et al. 2023). NOAA also monitors vessel traffic nationally through AIS and VMS. Additionally, NOAA monitors species distributions with many partners, and together, this helps monitor and assess vessel strike risk through time which acts as a baseline. No specific additional baseline monitoring is required by developers prior to offshore wind development activities given that monitoring is already being conducted. However, vessel strike monitoring should occur whenever offshore wind vessels are active, and entanglement monitoring should begin once structures are in place, or when studies with incidental capture risk (e.g., fisheries studies) occur.

4. Conduct monitoring and research at spatial and temporal scales that are relevant to the question/hypothesis being addressed

4.1 Temporal Scale

Prior to development activities – Entanglement and vessel strike assessments in the region will take place by NOAA and other parties prior to, and independent of, any construction or surveying activities. No additional monitoring is required during this time.

Pre-Construction Surveys: Vessel strike and incidental capture monitoring should occur during this phase. Note that since there are no project structures at this phase, accumulation of marine debris/derelict fishing gear is not an entanglement factor.

Construction: Vessel strike and entanglement monitoring should occur during this phase.

Operation: During the operational phase, vessel strike monitoring should occur during all vessel use. Entanglement monitoring around foundations and associated structures should be conducted throughout the life of the project. Initial monitoring should include 25% of turbine and cable associated structures every 6 months, with a rotating schedule to ensure all structures are checked over a two year period. The frequency of monitoring should be adaptable relative to the amount of marine debris accumulation, either more frequently or less so. Entanglement monitoring of turbine structures should be conducted for four years as an exploratory period, after which the level of monitoring can be assessed relative to the amount of debris accumulation. Monitoring of fisheries incidental capture of protected species should be monitored continuously as part of standard operation of conducting fisheries monitoring surveys.

Decommissioning: Vessel strike monitoring should occur during all vessel use. The level of entanglement monitoring during and after decommissioning is dependent on the amount of structure that remains and the process used for decommissioning. The level of incidental capture in monitoring studies is similarly dependent on the studies conducted.

4.2 Spatial Scale

Vessel strike monitoring should occur wherever vessels associated with the project operate.

The turbines inspected in an annual monitoring cycle should be spatially varied across the lease area to assess whether certain areas are more likely to accumulate marine debris than others. This should aid the efficiency of later monitoring should the schedule need to be adapted. Monitoring for entanglement should also occur wherever monitoring operations utilizing fishing gear take place.

5. Apply standardized methods and approaches across all individual wind projects within a region

5.1 Sampling Approaches

Vessel Strikes

Monitoring approaches for vessel strikes are typically included as conditions of Construction and Operation Plan (COP) approval and proposed by the applicant or BOEM (e.g., BOEM 2021). Additional requirements may be prescribed by NMFS Office of Protected Resources (OPR) mitigation in its Incidental Take Authorizations (ITAs) (e.g., NMFS OPR 2021), or the Incidental Take Statement in a NMFS Biological Opinion.

Collectively, vessel strike minimization measures fall into the following general categories: speed reductions, monitoring for animals in the vessel's path, separation distances between vessels and animals, actions to be taken when an animal is sighted, and increased situational awareness. The complete list of measures are typically included in the BOEM Conditions of COP Approval and ITA for each project, and further articulated in a developer submitted Vessel Strike Avoidance Plan.

Monitoring and trained lookouts are required for all project vessels operating in the action area during all phases of the project. The following are suggested guidelines for vessel strike monitoring during offshore wind development activities.

- All vessel crew members and trained lookouts (PSOs, dedicated visual observers) must receive training on the identification of marine mammals, sea turtles, and listed fish, all vessel strike avoidance mitigation requirements (e.g., speed restrictions, separation distances), methods for monitoring for protected species, and communication and reporting protocols.
- All transiting vessels operating at any speed must have a trained lookout on duty at all times to monitor for marine mammals within a 180 degrees (°) direction of the forward path of the vessel (90° port to 90° starboard) located at an appropriate vantage point for ensuring vessels are maintaining required separation distances. The dedicated visual observer must not have any other duties while the vessel is transiting.
- Alternative monitoring technology, such as night vision and thermal cameras, will be available to the trained lookout to ensure effective monitoring at night and in any other low visibility conditions.
- At the onset of transits and while underway, all vessel operators and trained lookouts must check for notifications about protected species and vessel speed management measures. These media may include, but are not limited to: NOAA weather radio, U.S. Coast Guard NAVTEX and Channel 16 broadcasts, Notices to Mariners, the Whale Alert app, or WhaleMap website. Information about active SMAs and DMAs/Slow Zones can be accessed at: <https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-vessel-strikes-north-atlantic-right-whale>.
- Whenever multiple Project vessels are operating, any visual detections of protected species will be communicated in near real time to PSOs, vessel captains, or both associated with other Project vessels for situational awareness.
- It can be very difficult to determine when a protected fish is struck by a moving vessel. If the captain/operator or other passengers have any indication that something was hit, the boat must

pause when it is safe to do so and inspect the area for any signs of impact or injury to protected fish species.

- Monitoring approaches should be revisited annually to assess whether the best approaches are being used as technology changes and improved methodology is developed.

Entanglement

As this sort of monitoring is currently uncommon, the methods for inspecting foundations, scour protection, and cable mattresses may advance over time and developers are encouraged to adapt to the most effective surveying approaches. Methods employed to monitor other resources may also benefit entanglement monitoring. For example, ROV video for monitoring epifauna for artificial reef monitoring may double as an entanglement monitoring platform. Some options for surveying offshore wind infrastructure include ROVs, divers, cameras, remote sensing equipment, or other means to determine the locations of marine debris.

Incidental Capture

Incidental capture monitoring should comply with NEFSC Observer protocols (NOAA Fisheries 2021b, c). All net catch should be monitored and protected species capture counts should be reported by species. Additional information on gear type, gear configuration, time, and location. Specifics can be found in the NEFSC Observer Operations Manual.

5.2 Sampling Design

See description under temporal and spatial scales

5.3 Data Elements

Reporting should follow the requirements listed in the Biological Opinions and Incidental Take Authorizations applicable to the respective projects. Such data elements include, but are not limited to, the data elements listed below.

Vessel Strikes. Record general parameters of the vessel strike incident (specific database field guidance is in development at NOAA; please confer with NOAA prior to finalizing data fields to be recorded):

- Record number
- Date, time, and location
- Vessel, vessel operator, vessel characteristics (e.g., propeller size, gross tonnage, length)
- Vessel strike avoidance technology onboard, if any
- Vessel operation at time of strike (e.g., speed, heading, avoidance action taken, part of ship that struck the animal)
- Vessel strike event reporter affiliation, and contact information
- Vessel strike event witness affiliation, and contact information
- Species, or description of characteristics if ID is unknown
- Characteristics of the animal (e.g., size, color, sex)
- Approximate size, description of injury, if discernable, and disposition of the animal
- Characteristics of the animal prior to vessel strike (e.g., behavior, distance when first sighted, swim direction)
- Photos and/or video of the incident and struck animal

- Description of the event, including weather, sea state, visibility, wind, and other environmental conditions
- National Stranding database ID for animal involved in event, if known

Entanglement. Provide annual reports that include the following.

- Survey date(s)
- Documentation of survey conducted
- Contact information of the operator
- Location and pile identification number (if applicable)
- Photographic and/or video documentation of the survey and debris encountered
- Any animals sighted, species ID or description of characteristics if ID is unknown
- Condition of the animal(s)
- Number of entanglements per unit of survey effort
- Disposition of any located debris (i.e., removed or left in place)

Incidental Capture. Data elements recorded should follow Northeast Fishery Observer Program protocols (NOAA Fisheries 2021a, b, c). The data should document the incidental capture species and condition, time, date, and location of the event, characteristics of the gear in which the animal was caught, in addition to other aspects outlined in the observer protocols.

6. Determine sample size and statistical power for each response variable of interest

There is currently no information with which to conduct a power analysis. After 3 years of initial data collection, the monitoring data should be examined to assess the proper monitoring frequency and spatial distribution, at which point a power analysis should be attempted to refine the study design if there is sufficient data to do so.

7. Apply valid analytical methods to evaluate change

Monitoring data related to vessel strikes and entanglements should be reported to NMFS, and NMFS will examine data in a larger context to estimate vessel strike and entanglement rates. This includes observations and survey effort with dates, coordinates, species information, etc.

8. Establish and carry out a plan for data storage, access, information sharing, and public data availability

Data, meta-data, and relevant code should be made publicly available and follow the FAIR (Findable, Accessible, Interoperable, Reusable) principles for data stewardship and management (Wilkinson et al. 2016). Developers should coordinate with NOAA Fisheries to identify suitable virtual data repositories and formats.

All protected species interactions should be reported to the appropriate federal agency or agencies as outlined in the respective permits.

9. Define performance indices and establish a schedule for evaluating monitoring plan performance

Performance indices should characterize the ability of the monitoring plan to detect a change in the biological responses measured within acceptable levels of precision. Performance should be evaluated annually using the data provided in the vessel strike, entanglement, and incidental capture reports sent to NOAA Fisheries. If performance is deemed to be low, then plans to adapt the monitoring program should be made. Given that it is difficult to gauge performance of monitoring programs based on the amount of interactions observed, performance will be evaluated in terms of the completeness of information reported in annual reports, and the degree to which interactions are reported promptly.

- *Vessel Strike*. Annual report documenting observing effort and any known vessel strikes associated with offshore wind development and the data elements described above, including data on sighting conditions. Strike basics should also be reported when they occur.
- *Entanglement*. Annual report documenting entanglement surveys containing the data elements listed above. Entanglement summaries should be provided shortly after surveys occur.
- *Incidental Capture*. Annual report documenting incidental capture surveys containing the data elements listed above. Incidental capture should also be reported shortly after the event is observed.

10. Review the performance of the monitoring program using meaningful metrics and adapt approach to improve performance as needed

The performance of the monitoring program should be evaluated every year using the performance indices identified in section 9. Response variables that have high levels of uncertainty should be evaluated to determine if an increase in sample size or other adaptations to the sampling design could increase certainty.

11. Interconnections with other OWD data collections

11.1 Connection to Data Collected for Survey Mitigation

Monitoring ship strikes and entanglements, although not a direct element of survey mitigation, could provide information on the sources of mortality which could be used in population assessments.

11.2 Connection to Data Collected for Monitoring Ecological Effects

Developers should engage with the NMFS and state agencies to secure the permits and authorizations necessary to conduct monitoring. Early coordination is critical, particularly to ensure compliance with the ESA and MMPA if interactions with such species could occur. Additional consultation with the U.S. Department of State may be necessary if foreign vessels are involved with project monitoring plan/study activities.

Optical methods used to monitor epibenthos on structures could also be used to monitor for entanglements or secondary entanglements at offshore wind structures (See the Artificial Reef effects monitoring).

12. Permits and Authorizations

12.1 State Permit Requirements

Each state may require individual permits to conduct study activities. Consultation with each state with project components and/or monitoring studies directly in or adjacent to its waters is recommended to determine specific state permit requirements.

12.2 Federal Permit Requirements

All project monitoring plan/study activities operating in federal waters (more than three miles from shore) must comply with existing fishing regulations (50 CFR 648 or 697) or be exempted from specific regulations. There are two options to document plan activities, depending on the type of vessel being used to conduct the work (see NMFS summary of scientific research and exempted fishing permits for more information):

- Activities conducted aboard scientific research vessels: A vessel that is chartered and controlled by a state/Federal government agency, university, or research institution that operates under a scientific research plan is exempt from federal fishing regulations. A commercial/recreational fishing vessel can serve as a scientific research vessel provided it is operating consistent with a fisheries project monitoring plan and under the direction of a state/federal agency, university, or scientific institution. While not required, a Letter of Acknowledgement (LOA) formally documents project monitoring plan/study activities and can minimize delay from any enforcement inquiries.
- Activities conducted aboard commercial/recreational fishing vessels: If not operating as a scientific research vessel as described above, a commercial/recreational vessel may need exemptions from existing fishing regulations (size/possession limits, gear requirements, etc.) to conduct project monitoring plan/study activities. Such vessels must request an exempted fishing permit (EFP) from NMFS.
- Contact the GARFO Sustainable Fisheries Division (978-281-9344) for additional information on the issuance of LOAs and EFPs. Project monitoring study activities may affect threatened or endangered species of fish and marine mammals, depending on where and how survey activities are conducted. Efforts should be made to avoid or minimize interactions with these species and to avoid or minimize effects on their habitat. Unless interactions are already covered as part of conventional fishing activities when operating under an EFP (NMFS guidance is under development and should be published soon on the Greater Atlantic Region's wind energy development page), you may need special permits or consultations from NMFS. Such permits may take several months or a year to be issued. Survey/monitoring plan coordinators should consult with NMFS well before study operations are expected to begin.
- For marine mammal questions, contact NOAA's Office of Protected Resources (301-427-8400).
- For questions regarding ESA Scientific Research and Enhancement Permits of Atlantic salmon, contact the USFWS at (207 827-5938 ext. 13).
- For questions regarding ESA Scientific Research and Enhancement Permits of other endangered fish including sturgeon, contact the Permits and Conservation Division of the Office of Protected Resources at (301-427-8401).

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SECTION 6

Artificial Reef Effects Monitoring

PURPOSE: The purpose of this monitoring standard is to define standard methods for addressing specific questions about the artificial reef effect and gain an understanding of the distribution and abundance of fisheries species that aggregate around structures, their biological indices, diet composition, habitat, and the epibenthic forage base for these species that live on the surface of structures, scour protection, and surrounding soft sediment habitats. Fixed foundation offshore wind developments are the focus of these standards with additional standards for floating offshore wind to be addressed in a future document. *Following the Fundamental Principles of Monitoring and Research* presented in the Preface (Section VI), this document describes recommended best practices for addressing this priority research topic.

TAXA ADDRESSED BY THIS MONITORING STANDARD

- Fisheries Species
- Protected Fish Species
- Epifauna
- Infauna

1. Define clear hypotheses and/or questions

The monitoring priorities defined by the NEFSC Regional Offshore Wind Science Plan (in prep.) and the GARFO draft habitat monitoring recommendations guided the development of specific questions to be addressed using these monitoring standards.

Table 6. Specific questions to be addressed by this monitoring standard – Artificial Reef Effects

1. Fisheries Species: What is the distribution, abundance, biomass, species composition, condition, size distribution, age, maturity state, and stomach contents of fisheries species around turbine foundations, and how do these indices change vertically, with distance from structure and season, before construction and over time after construction? Denote any invasive species that are identified.
2. Epifauna: What is the distribution, abundance, biomass, and species composition of epifauna living on the surface of turbine foundations and scour protection, and how do these indices change vertically through the water column, with distance from structure and season, before construction and over time after construction? Denote any invasive species that are identified.
3. Infauna: What is the distribution, species composition, biomass of infauna in soft sediment habitats in the vicinity of the turbine foundations? How do these indices change with season, sediment composition, sediment organic content, with distance from structure, and over time during baseline compared to each phase of offshore wind development?
4. Contaminant Concentrations in Sediments and Organisms: What is the concentration of heavy metal contaminants (specifically those commonly used in corrosion-protection systems) in sediments

and in the tissues of infauna, epifauna, benthic, and demersal fish species living on or near offshore wind structures? How do these levels compare to food safety levels?

5. Protected Fish Species: What is the distribution, abundance, and size distribution of protected fish species around turbine foundations, and how do these indices change vertically, with distance from structure and season, before construction and over time after construction?

2. Select relevant focal species or indicators that are expected to be vulnerable to the IPFs being evaluated

2.1 Fisheries Species Recommended for Monitoring

In addition to the *Criteria for Focal Species Selection* defined in the Preface of this document, an additional consideration for artificial reef effects monitoring is that the species should be sampleable using the NEFSC hook and line survey methods. The NEFSC hook and line survey is currently in pilot phase and is expected to be able to sample multiple species managed by the Mid-Atlantic Fishery Management Council (MAFMC), New England Fishery Management Council (NEFMC), and Atlantic States Marine Fisheries Commission (ASMFC). Species recommended for monitoring which meet the *Criteria for Focal Species Selection* include: black sea bass (*Centropristis striata*), summer flounder (*Paralichthys dentatus*), Atlantic surf clam (*Spisula solidissima*) and Atlantic cod (*Gadus morhua*). Additional species that hook and line methods may also sample include: red hake (*Urophycis chuss*), scup (*Stenotomus chrysops*), bluefish (*Pomatomus saltatrix*), spiny dogfish (*Squalus acanthias*), and Atlantic croaker (*Micropogonias undulatus*) (NEFSC 2024, Hook and Line Survey Mitigation Plan).

2.3 Protected Fish Species Recommended for Monitoring

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and Giant Manta Ray (*Mobula birostris*) are recommended for protected fish species monitoring. The list of focal protected fish species may be updated in the future as more research is conducted and more information becomes available. Particular emphasis should be given on protected fish species identified to be highly vulnerable to offshore wind development through formal vulnerability assessments or targeted offshore wind and wildlife research efforts.

3. Collect sufficient baseline information

Baseline data collection should occur during each of the four seasons for a minimum of 3 years. This will allow observation of interannual variability and existing trend directionality.

4. Conduct monitoring and research at spatial and temporal scales that are relevant to the question/hypothesis being addressed

4.1 Temporal Scale

Following baseline data collection, monitoring should continue to occur for the lifetime of the project including during pre-construction activities, operation, and decommissioning. For each year sampled, sampling should be conducted during each of the four seasons. No monitoring is expected during construction. Monitoring should occur more frequently during the initial period of operation.

Monitoring frequency will decrease over time. Sampling years during the operational phase include: years 1, 2, 3, 4, 5, 7, 9, 11, 15, 20, 25, 30. Sampling for fisheries species, protected fish species, hard substrate epifauna, soft sediment epifauna, and infauna should occur annually during the decommissioning phase.

4.2 Spatial Scale

Sampling should occur within a 500 m radius of each turbine sampled and consider the spatial gradient imposed by the structure. For each season and year of sampling, a random selection of wind turbine foundations and associated scour protection and surrounding sediment and water column should be monitored. The number of randomly sampled foundations should be equal to 10% of the total number of foundations at the project. In addition, another 5% of turbines should be assigned to be sentinel turbine foundations that are monitored during each season and year of sampling. Because sampling is centered on wind farm structures and surrounding habitats, a virtual map of the wind lease plans should be used to design the spatial distribution of sampling for each phase of development. This map should be based on the construction and plan which includes the locations of turbines, substations, and cables (e.g., Rudders et al. 2024).

5. Apply standardized methods and approaches across all individual wind projects within a region

5.1 Sampling Gear and Instrumentation to Monitor the Finfish Community

Overview: Pairing active acoustics to estimate fish abundance with optical methods (e.g., S-BRUVs and ROV-video) to positively identify species is recommended for monitoring finfish around structures (Felt 2023; Monk et al. 2020; Jech et al. 2023; Johnston et al. 2020; White et al. 2023). Biological sampling of finfish should be conducted by pairing hook and line methods and trap-video methods. Simultaneous eDNA sampling is recommended to evaluate the fisheries species community composition.

Stereo Baited Remote Underwater Video (S-BRUVs): This method utilizes S-BRUVs to evaluate abundance by species and fish size with identification to the lowest practical taxon. This approach is currently applied by NOAA SEFSC and the Florida Fish and Wildlife Conservation Commission to conduct the Gulf Fishery Independent Survey of Habitat and Ecosystem Resources (G-Fisher) in the Gulf of America region. Details on field set up, field deployment and retrieval, field downloading, laboratory processing, video annotation, database entry, and QA/QC are described in the G-Fisher Standard Operating Procedure (Felt et al. 2023). S-BRUVs should be used in tandem with active acoustics.

ROV-Video: This method utilizes video imagery collection via remotely operative vehicle (ROV). It is used to evaluate metrics for fish species and epifauna associated with turbine foundations, scour protections, and soft sediment habitats. Physical samples of epifauna can also be collected via a scraper mounted on the ROV.

Active Acoustics: This method samples the relative abundance of mobile finfish throughout the water column very near the turbine foundation and over the area surrounding the foundation at high resolution. This can be deployed via a traditional research vessel (Jech et al. 2023) or an uncrewed surface vehicle (USV) (Hanegard et al. 2024). Star pattern transects as described in White et al. (2023) are recommended. This should consist of 8 linear transects that begin 500 m from the foundation, proceed toward the foundation, passing it as close as possible (minimally within 30–50 m), and continuing straight to the opposite side of the turbine until reaching a distance of 500m from the foundation on the opposite side (White et al. 2023). *Ad hoc* transects may also be conducted to survey aggregations of fish observed (Jech et al. 2023). 15% of turbines within the array should be surveyed.

This should include 10% of turbines that are randomly selected for each time interval and an additional 5% of turbines that are sampled during every sampling interval (sentinel locations).

eDNA Samples: Water samples for eDNA analysis should be collected simultaneously with biological sampling with (e.g., hook and line and trap-video) following Liu et al. (2019) and Dahlgren et al. (2023). This sampling strategy aligns with NEFSC's eDNA survey mitigation plan as a non-extractive method for examining the presence of additional species within the biological community.

Biological Sampling: Biological sampling should follow the methods in the NEFSC Survey Mitigation Plans whenever possible (NEFSC 2024). Two of the methods that are currently being considered to collect data in the vicinity of offshore wind structures for the purposes of survey mitigation are Hook and Line sampling and Trap-Video sampling. Conducting these methods concurrently to collect biological monitoring samples to study the artificial reef effect will also advance the development of each method for survey mitigation and monitoring. Because catchability varies between these sampling methods, side-by-side, or multi-modal, data collection may enable a broader array of fisheries species to be sampled. Multi-modal sampling will also provide valuable information for the function and utility of these new scientific surveys that are being developed for the Northeast U.S. Continental Shelf ecosystem to mitigate offshore wind effects on scientific surveys. As no standardized methods for biological sampling around marine infrastructure are yet established in the Northeast Region, these methods should be viewed as adaptive, i.e., as the methods are implemented and more is learned about their utility and practicality, adaptation of the methods may be needed for effective sampling of different species (See Section 10 below).

- Hook and Line Sampling:* Gear standardization and biological sampling approaches should follow the methods of the NEFSC Hook and Line Survey (NEFSC 2024) to maximize opportunities for data integration. The NEFSC Hook and Line Survey is currently in a pilot phase and is expected to be able to sample multiple species managed by the Mid-Atlantic Fishery Management Council (MAFMC), New England Fishery Management Council (NEFMC), and Atlantic States Marine Fisheries Commission (ASMFC). This includes but is not limited to: Atlantic cod (*Gadus morhua*), red hake (*Urophycis chuss*), summer flounder (*Paralichthys dentatus*), scup (*Stenotomus chrysops*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), spiny dogfish (*Squalus acanthias*), and Atlantic croaker (*Micropogonias undulatus*) (NEFSC 2024, Hook and Line Survey Mitigation Plan). If the hook and line gear is intended to provide catch-per-unit-effort to track changes in abundance and demographics over time, the terminal tackle and bait should be standardized in consultation with fishing industry representatives from the region. In addition, individual reel timers should be deployed on each reel to track active bottom fishing time. At a minimum, aggregate weights and individual lengths of each species should be recorded. Methods for biological data (length and individual weights, age, growth, sex, maturity, condition, and diet composition) should follow NEFSC sampling protocols. Ages may be determined from otoliths, shellfish valves, elasmobranch vertebrae, or genomic methods. NEFSC age and growth protocols are described in Penttila and Dery (1988). Maturity may be classified from macroscopic observation, gonad histology, or genomic methods. NEFSC macroscopic maturity sampling and classification protocols described in Burnett et al. (1989) are recommended. Diet may be determined from macroscopic/microscopic observation, stable isotopes, or genomic methods. NEFSC food habits protocols should be followed as described in Link and Almeida (2000). Contaminant concentration sampling should be conducted following EPA methods (EPA 2000). Diet composition, otoliths, tissue samples, or any other physical sample should not be taken from protected species if any protected fish species are captured during hook and line sampling.

- Trap-Video:** Gear standardization and biological sampling approaches should follow the methods of the NEFSC Atlantic Trap Video Survey (ATVS) to maximize opportunities for data integration (NEFSC 2024). This method has been employed by the Southeast Fisheries Science Center (SEFSC) Southeast Reef Fish Survey (SERFS) to monitor fisheries species with chevron traps since 1990 (Bacheler et al. 2023; Bachelor and Carmichael 2017). In the Northeast U.S. Continental Shelf, this method could potentially be used to biologically sample finfish such as black sea bass (*C. striata*), eels, striped bass (*Morone saxatilis*), and scup (*S. chrysops*), bottom-dwelling crustaceans such as lobster, crabs, and whelks as well as other managed species including sharks and skates. Trap video can be used to evaluate occurrence, relative abundance, and geographic distribution, as well as demographic information. At a minimum, aggregate weights and individual lengths of each species should be recorded. Methods for biological data (length and individual weights, age, growth, sex, maturity, condition, and diet composition) should follow NEFSC sampling protocols. Ages may be determined from otoliths, shellfish valves, elasmobranch vertebrae, or genomic methods. NEFSC age and growth protocols are described in Penttila and Dery (1988). Maturity may be classified from macroscopic observation, gonad histology, or genomic methods. NEFSC macroscopic maturity sampling and classification protocols described in Burnett et al. (1989) are recommended. Diet may be determined from macroscopic/microscopic observation, stable isotopes, or genomic methods. NEFSC food habits protocols should be followed as described in Link and Almeida (2000). Contaminant concentration sampling should be conducted following EPA methods (EPA 2000). Diet composition, otoliths, tissue samples, or any other physical sample should not be taken from protected species if any protected fish species are captured during trap-video sampling.

Additional Considerations for Protected Fish Species: All protected fish should be released alive after sampling. No stomach content analyses should be performed on protected species and no otoliths of protected species should be retained. Collection of genetic samples of Atlantic sturgeon should be coordinated with the USGS, and follow existing NOAA Fisheries Protocol (NOAA Fisheries 2019). The directed capture and handling of protected fish species can only occur if capture and handling have been authorized by an ESA permit and must follow existing best practices, such as *A protocol for use of shortnose, Atlantic, Gulf, and green sturgeons* (Kahn and Mohead 2010). Capture of animals for tagging should be completed through existing fisheries sampling techniques, and may be adjusted as technology develops. The preferred sampling technique will differ from species to species and will be dependent on the location of sampling. Proper documentation of injuries and deaths during all activities associated with this monitoring standard is required.

5.2 Sampling Gear and Instrumentation to Monitor Epifaunal and Infaunal Macroinvertebrates

Overview: ROV video combined with physical sampling of epifauna on the structure, in the scour protection, as well as epifauna and infauna in soft sediment habitats is recommended.

Turbine Foundations: Percentage cover, estimated biomass, and epifaunal community composition of epibenthic species on turbine foundations should be monitored with ROV video transects and physical samples collected by ROV. Video transects should be taken along the entire length of monopile foundation from the water line to the sea bottom using the methods described in Johnston et al. (2020) and Monk et al. (2020, pgs. 9-18). One transect on each the north, south, east, and west facing sides of the foundation for a total of 4 transects on each foundation should be sampled. Frame grabs (i.e., still images) should be taken from every 5 meters of the video for analysis. An example of physical sample collection from an offshore wind turbine foundation using a scraper mounted on an ROV is provided by Coolen et al. (2025).

Scour Protection: ROV video transects and physical samples collected by the ROV should be used to monitor the scour protection zone. Variables to be measured include: percentage cover, estimated biomass, and epifaunal community composition in the scour protection. Refer to Johnston et al. (2020) and Monk et al. (2020, pgs. 9-18) for standard operating procedures. One transect on each the north, south, east, and south facing sides of the scour protection zone for a total of 4 transects in each scour protection zone should be collected. Frame grabs (i.e., still images) should be taken every 5 meters of the video for analysis. The length of the transect may vary from project to project depending on the radius of scour protection. An example of physical sample collection from an offshore wind turbine foundation using a scraper mounted on an ROV is provided by Coolen et al. (2025).

Soft Sediment with Epifauna: ROV video and physical samples collected by the ROV should be used to monitor soft sediments. Variables to be measured include: percentage cover, estimated biomass, and epifaunal community composition on soft sediments surrounding the scour protection zone. Transects conducted in soft sediment should be a continuation of the transects conducted in the scour protection zone. The soft sediment portion of the transect should extend until a distance of 500 m from the turbine foundation is reached. The transect should begin at the edge of the scour protection zone and extend to 500 m from the foundation. This length of the soft sediment portion of the transect may vary from project to project depending on the radius of scour protection. Physical samples should be collected along the transect at distance intervals of 0m from the edge of the scour protection (i.e., where soft sediment habitat begins beyond the scour protection), 50 m from the edge of the scour protection, 100 m from the edge of the scour protection, 200 m from the edge of the scour protection, and 500 m from the turbine foundation. One transect should be conducted for each the east, west, north, and south facing sides of the turbine, for a total of 4 transects per turbine. ROV-video transects of soft-sediment habitat using the methods of Johnston et al. (2020) and Monk et al. (2020, pgs. 9-18). Frame grabs (i.e., still images) should be taken from every 5 meters of the video for analysis. These methods are consistent with the recommendations for EFH monitoring that are currently under development at GARFO (NOAA Fisheries 2021; 2025 in prep.).

Soft Sediment with Infauna: SPI/PV along with sediment grab or cores should be used to sample soft sediment infauna, sediment composition, and sediment organic content. Transects conducted in soft sediment should be a continuation of the transects conducted in the scour protection zone. The soft sediment portion of the transect should extend until a distance of 500 m from the turbine foundation is reached. The length of the soft-sediment portion of the transect may vary from project to project depending on the radius of scour protection. Samples should be collected along the transect at distance intervals of 0m from the edge of the scour protection (i.e., where soft sediment habitat begins beyond the scour protection), 50 m from the edge of the scour protection, 100 m from the edge of the scour protection, 200 m from the edge of the scour protection, and, 500 m from the turbine foundation. One transect should be conducted for each the east, west, north, and south facing sides of the turbine, for a total of 4 transects per turbine. Cores or grab sampling should be conducted. Grabs should be conducted using 0.04 sq m Young-modified Van Veen grab with the depth of the sediment grab being at least 7 cm deep or greater to be consistent with other state and federal survey activities. Triplicate grab or core samples should be collected at each distance interval along the gradient. These methods are consistent with GARFO's fish habitat recommendations (NOAA Fisheries 2021) and GARFO's recommendations for EFH monitoring that are currently under development at GARFO (NOAA Fisheries 2025 in prep.).

GARFO is currently developing recommendations for benthic habitat monitoring to support Essential Fish Habitat (EFH) consultations. While these recommendations are under development, please refer to

methods presented in the Recommendations for Mapping Fish Habitat described in NOAA Fisheries 2021.

5.3 Sampling Platform

Vessels and sampling gear that are small and sufficiently feasible to maneuver within an offshore wind farm should be used for sampling. A vessel capable of launching or deploying the sampling gear is recommended.

5.4 Sampling Design

For each year of sampling, sample a random selection of wind turbine foundations and associated scour protection and surrounding sediment and water column. If there is $\geq 20\text{m}$ of depth change across the project, site selection should be stratified by depth. The total number of foundations sampled should be equal to 10% of the total number of foundations at the project. In addition, sampling at 5% sentinel turbine foundations should be maintained for each year of sampling. Transect gradient-based designs should be employed as described above.

5.5 Data Elements

Units of reporting should match those in NEFSC sampling protocols where applicable.

Stereo Baited Remote Underwater Video (BRUVs) (Refer to Felts et al. 2023)

ROV video transects – (Refer to Monk et al. 2020)

Active Acoustics (Refer to Jech et al. 2023)

Trap-Video – Data elements should follow the methods of the NEFSC Atlantic Trap Video Survey mitigation plan (NEFSC 2024); Tissue contaminant concentration sampling should follow EPA methods (EPA 2000)

Hook and Line Sampling – Data elements should follow the methods of the NEFSC Hook and line survey mitigation plan (NEFSC 2024); Tissue contaminant concentration sampling should follow EPA methods (EPA 2000)

eDNA – Data elements should follow the methods of the eDNA survey mitigation plan (Liu et al. 2019 and Dahlgren et al. 2023)

Epifauna Scrape Samples – Refer to Coolen et al. (2025) for example of ROV-scraper methods

Sediment Grabs/Cores – Sediment grain size, organic matter content, and metal concentrations (Al, Zn, and In, see Watson et al. 2025 for methods for measuring concentrations)

SPI – Penetration depth, boundary roughness, grain size, and the apparent redox potential discontinuity [aRPD] depth and biogenic features (e.g., worms, burrows, etc.)

PV – Grain size, shell fragments, and presence, count, and species ID of marine species such as benthic fish and epifaunal invertebrates that are observed

Protected Fish Species: For protected species, no destructive sampling methods should be employed (i.e., stomach content analyses). If captured, the following samples should be collected, and all individuals should be released alive.

- Fork Length (mm)
- Total Length (mm)
- Weight (g) (if possible)
- Pelvic Finclip for Atlantic Sturgeon only

6. Determine sample size and statistical power for each response variable of interest

A power analysis should be conducted using existing data sets for the system. The power analysis should use a method appropriate for the study design and associated statistical tests planned.

7. Apply valid analytical methods to evaluate change

Statistical methods that are appropriate for the data collected and the questions being addressed should be employed. For example, Generalized Linear Models (GLMs), Generalized Additive Models (GAMs), Generalized Linear Mixed Models, and Generalized Additive Mixed Models (GAMMs) may be used depending on the assumptions made and whether relationships between response variables are observed to linear or nonlinear. Environmental variables including depth, temperature, salinity, and current speed and direction should be included as covariates or main effects in analyses. Other main effects or covariates may include distance from structure, year, season, sex, and fish size. Multivariate methods may be used to evaluate changes in community composition. Statistical outcomes appropriate for the analytical methods or models employed should be reported alongside estimates of the magnitude of change and its biological relevance (e.g., Wood 2025; Methratta 2025).

8. Establish and carry out a plan for data storage, access, information sharing, and public data accessibility

Data, meta-data, and relevant code should be made publicly available and follow the FAIR (Findable, Accessible, Interoperable, Reusable) principles for data stewardship and management (Wilkinson et al. 2016). Offshore wind developers should coordinate with NOAA Fisheries to identify suitable data repositories and formats. Data products such as summary data tables, the results of data analyses, and the interpretation of results that address the monitoring questions should be provided as soon as they are prepared by the principal investigator.

9. Define performance indices and establish a schedule for evaluating monitoring plan performance

Performance indices should characterize the ability of the monitoring plan to detect a change in the biological responses measured within acceptable levels of precision. Performance indices for abundance estimates and biological measures including those listed below should be evaluated annually. If performance is deemed to be low, then plans to adapt the monitoring program should be made.

Performance Indices

- 95% confidence intervals around the means of biological indices
- Effect size and associated confidence intervals (Methratta 2025)
- Image quality
- Rarefaction Curves (sampling effort versus species richness)

10. Review the performance of the monitoring program using meaningful metrics and adapt approach to improve performance as needed

The performance of the monitoring program should be evaluated every year using the performance indices identified above. Response variables that have high levels of uncertainty should be evaluated to determine if an increase in sample size or other adaptations to the sampling design could increase certainty.

11. Interconnections with other OWD data collections

11.1 Connection to Data Collected for Survey Mitigation

Whenever possible, monitoring methods should generate data streams that are equivalent to those collected by the long-term scientific surveys conducted by NEFSC outside of wind energy. Sampling for abundance and/or biology should thus match the methods for collection of the focal species in the NEFSC Survey Mitigation Plans (NEFSC 2024). For example, when collecting biological samples with hook-and-line methods or trap-video methods, using the methods outlined in the respective survey mitigation plans is recommended. By implementing the same sampling methodology, the information can also serve as a datastream for survey mitigation needs. In cases where exact sampling methods are impossible to match to NEFSC survey methods (i.e., due to the presence of wind structures in the sampling area), other methods may be deemed equivalent if NEFSC scientists deem them to be precise, accurate, reliable, and useful for assessment purposes.

11.2 Connection to Data Collected for Monitoring Ecological Effects

Optical methods mounted on an ROV may also be used to monitor for entanglement of protected species.

12. Permits and Authorizations

Monitoring plan developers should engage with the NMFS and state agencies to secure the permits and authorizations necessary to conduct monitoring. Early coordination is critical, particularly to ensure compliance with the ESA and MMPA if interactions with such species could occur. Additional consultation with the U.S. Department of State may be necessary if foreign vessels are involved with project monitoring plan/study activities.

12.1 State Permit Requirements

Each state may require individual permits to conduct study activities. Consultation with each state with project components and/or monitoring studies directly in or adjacent to its waters is recommended to determine specific state permit requirements.

12.2 Federal Permit Requirements

All project monitoring plan/study activities operating in federal waters (more than three miles from shore) must comply with existing fishing regulations (50 CFR 648 or 697) or be exempted from specific regulations. There are two options to document plan activities, depending on the type of vessel being

used to conduct the work (see NMFS summary of scientific research and exempted fishing permits for more information):

- Activities conducted aboard scientific research vessels: A vessel that is chartered and controlled by a state/Federal government agency, university, or research institution that operates under a scientific research plan is exempt from federal fishing regulations. A commercial/recreational fishing vessel can serve as a scientific research vessel provided it is operating consistent with a fisheries project monitoring plan and under the direction of a state/federal agency, university, or scientific institution. While not required, a letter of acknowledgement (LOA) formally documents project monitoring plan/study activities and can minimize delay from any enforcement inquiries.
- Activities conducted aboard commercial/recreational fishing vessels: If not operating as a scientific research vessel as described above, a commercial/recreational vessel may need exemptions from existing fishing regulations (size/possession limits, gear requirements, etc.) to conduct project monitoring plan/study activities. Such vessels must request an exempted fishing permit (EFP) from NMFS.
- Contact the GARFO Sustainable Fisheries Division (978-281-9344) for additional information on the issuance of LOAs and EFPs. Project monitoring study activities may affect threatened or endangered species of fish and marine mammals, depending on where and how survey activities are conducted. Efforts should be made to avoid or minimize interactions with these species and to avoid or minimize effects on their habitat. Unless interactions are already covered as part of conventional fishing activities when operating under an EFP (NMFS guidance is under development and should be published soon on the Greater Atlantic Region's wind energy development page), you may need special permits or consultations from NMFS. Such permits may take several months or a year to be issued. Survey/monitoring plan coordinators should consult with NMFS well before study operations are expected to begin.
- For marine mammal questions, contact NOAA's Office of Protected Resources (301-427-8400).
- For questions regarding ESA Scientific Research and Enhancement Permits of Atlantic salmon, contact the USFWS at (207 827-5938 ext. 13).
- For questions regarding ESA Scientific Research and Enhancement Permits of other endangered fish including sturgeon, contact the Permits and Conservation Division of the Office of Protected Resources at (301-427-8401).

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SECTION 7

Electromagnetic (EMF) Field Effects Monitoring

PURPOSE: The purpose of this monitoring standard is to define standard methods for addressing specific questions about the effects of electromagnetic fields (EMFs) on the movement and behavior of fisheries species and protected fish species. Fixed foundation offshore wind developments are the focus of these standards with additional standards for floating offshore wind to be addressed in a future document. Following the *Fundamental Principles of Monitoring and Research* presented in the Preface (Section VI), this document describes recommended best practices for addressing this priority research topic.

TAXA ADDRESSED BY THIS MONITORING STANDARD

- Fisheries Species
- Protected Fish Species

1. Define clear hypotheses and/or questions

The monitoring priorities defined by the NEFSC Regional Offshore Wind Science Plan (in prep.) guided the development of specific questions to be addressed using these monitoring standards.

Table 7. Specific questions to be addressed by this monitoring standard – EMF
1. What is the horizontal and vertical spatial extent and magnitude of EMFs around energized buried/unburied AC cables and DC cables?
2. What behavior(s) does the focal species exhibit at energized inter-array and export cables?: attraction, repulsion, no effect, or other behaviors. What is the duration of the observed behavior(s)?
4. How do inter-array or export cables alter the horizontal or vertical movement of the focal species?

2. Select relevant focal species or indicators that are expected to be vulnerable to the IPFs being monitored

2.1 Fish Species Recommended for Monitoring

Species that utilize EMF sensory mechanisms including demersal species such as spiny dogfish (*Squalus acanthias*) and skate species such as little skate (*Leucoraja erinacea*) are recommended for monitoring if they meet one or more of the criteria listed in the Preface section entitled, *Criteria for Selecting Focal Species*. The highly migratory species, bluefin tuna (*Thunnus thynnus*), is also recommended for monitoring given that some congeners demonstrate magnetoreceptive capabilities (Walker et al. 1984).

2.2 Protected Fish Species Recommended for Monitoring

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and Giant Manta Ray (*Mobula birostris*) have been selected as the focal species for 2025 monitoring. The list of focal protected fish species may be updated in the future as more research is conducted and more information becomes available. Particular emphasis should be given on protected fish species identified to be highly vulnerable to OWD through formal vulnerability assessments or targeted offshore wind and wildlife research efforts.

All Fish Species: Baseline data collection should occur for a minimum of 3 years. This provides an opportunity to observe interannual variability and directionality of any existing trends. Data collection should occur during the season(s) that the focal species is expected to be present in the project area.

Protected Fish Species Additional Considerations: Note that there is a lack of baseline data on many protected fish species and their life stages in areas where offshore wind development is set to occur in the NES region (RWSC 2024). Data collection of protected fish species should occur year round, though the season(s) that the focal species are expected to be present in the project area can be prioritized.

3. Collect sufficient baseline information

Baseline data collection should occur during each of the four seasons for a minimum of 3 years. This will allow observation of interannual variability and existing trend directionality.

4. Conduct monitoring and research at spatial and temporal scales that are relevant to the question/hypothesis being addressed

4.1 Temporal Scale

EMFs will be emitted from cables during operation once cables are energized and energy is being transferred to land. Following baseline data collection, monitoring should continue to occur for the lifetime of operation for the duration of time that energy is being transmitted via the cables.

4.2 Spatial Scale

EMF emissions are relatively localized, but can affect movement and behavior of species over both local and broad spatial scales. Given the potential spatial extent of fish movement, coordination among developers with adjacent leases within a WEA is recommended to optimize receiver placements, maximize efficiency, and synergize the collection of information, e.g., movement of a tagged individual from one wind project into another.

5. Apply standardized methods and approaches across all individual wind projects within a region

5.1 Sampling Gear and Instrumentation

5.1.1 Collection of Fish for Tagging

Fish Species: Focal species should be collected following the methods in the NEFSC Survey Mitigation Plans that address the focal species (e.g., hook and line, baited trap video, etc.) whenever possible (NEFSC 2024). Efforts should be taken to minimize harm during capture and handling, and maximize the survival of tagged animals (Matley et al. 2024).

Protected Fish Species Additional Considerations: The directed capture and handling of protected fish species can only occur if capture and handling have been authorized by an ESA permit and must follow existing best practices, such as *A protocol for use of shortnose, Atlantic, Gulf, and green sturgeons* (Kahn and Mohead 2010). Capture of animals for tagging should be completed through existing fisheries sampling techniques, and may be adjusted as technology develops. The preferred sampling technique will differ from species to species and will be dependent on the location of sampling. Proper documentation of injuries and deaths during all activities associated with this monitoring standard is required.

5.1.2 Measurements of Fish Movement and Behavior in Response to EMFs: Tagging and Telemetry

Acoustic, satellite, and/or pop-up satellite archival tagging (PSAT) and telemetry may be used to track movement patterns of focal species (References: RWSC 2024a, b; Bowers et al. in prep.; Gervelis and Kneebone 2022; Hussey et al. 2015). Deployed tags should also have pressure, temperature, acceleration, salinity, or other sensors for the simultaneous collection of environmental and behavioral data. Acoustic telemetry receivers may also be integrated with existing or new multi-disciplinary data collection platforms (e.g., PAM stations, data buoys, gliders, survey vessels) to maximize concurrent animal and environmental data streams. Instruments capable of measuring the electromagnetic field intensity should be co-deployed with a subset of the fixed receivers.

Locations of fixed acoustic telemetry receiver moorings and PAM stations should be shared with the fishing industry, USCG, RWSC and other marine users to avoid gear conflicts through Notice to Mariners and other communication mechanisms.

5.2 Sampling Platform

Vessels and sampling gear that are small and sufficiently feasible to maneuver within an offshore wind farm should be used for sampling. A vessel capable of launching or deploying the sampling gear and instrumentation is recommended.

5.3 Sampling Design

An array of receivers should also be placed along select sections of the inter-array cables and the export cable(s). A number of receivers sufficient to provide coverage along and across a minimum of 5 km of cable length should be used. A gradient design should be used with receivers placed along a gradient of increasing distance from the cable route being monitored.

Receiver data should be downloaded routinely, at minimum once every 6-12 months. Receivers around the perimeter and within the wind energy area should be maintained throughout baseline data collection and for the lifetime of the project, with periodic maintenance, battery recharge, or receiver replacements as needed.

5.4 Range Testing

Range testing of each deployed array should be conducted prior to the initiation of the study. An underlying assumption of acoustic telemetry is that fish within 500 m to 1000 m (1 km) are detected by the receivers, but that can vary with water column depth, season, pycnocline strength, and other factors. Ground truthing that the receivers will pick up fish moving by at varying depths, speeds, and frequency is important.

5.5 Data Elements

5.5.1 Tag Data and Biological Data

All Fish Species

Sample size selection will depend on the focal species. For more sedentary species, larger sample sizes ($n = 30-40$ individuals) may be achievable. For highly migratory species or protected fish species, only smaller sample sizes ($n = 10-20$) may be achievable. Attempts should be made to tag the largest sample size practicable, but not exceed 40 individuals. For protected fish species, sample size must not exceed the total number allowed by the principal investigator's permit.

Acoustic detection data should be stored in raw form (Bowers et al. in prep) and should follow the templates provided by the ACT MATOS network (Appendix 1; ACT MATOS 2021). Coding scripts should be used for any post-processing such as filtering duplicates. Any established script used for filtering or analysis or new scripts developed for the analysis should be clearly documented. New scripts should be made available via shared repositories such as GitHub.

All tagged individuals should be measured for length, sex, weight, and other standard biological metrics, and also inspected visually for previous tags.

Protected Fish Species Additional Considerations

The directed capture and handling of protected fish species can only occur if capture and handling have been authorized by an ESA permit and must follow existing best practices, such as *A protocol for use of shortnose, Atlantic, Gulf, and green sturgeons* (Kahn and Mohead 2010). Acute injuries and mortalities that occur during all activities associated with this monitoring standard should be documented.

6. Apply valid statistical methods for determining sample size and statistical power for each response variable of interest

Attempts should be made to tag the largest sample size practicable within these ranges noted above. For protected fish species, sample size must remain within the number allowed by the investigator's permit.

7. Apply valid analytical methods to evaluate change

7.1 Response Variables to be assessed

- Date that the focal species encounters the cable noting whether the cable was energized on that (those) date(s)
- Duration of time the focal species spends at the cable(s) over a month, season, and year
- Movement patterns exhibited in the vicinity of the cable (avoidance, attraction, no effect)
- Number of times the cable is crossed per unit time
- Date that focal species leaves the vicinity of the cable(s)
- Frequency of return and the duration of time spent near the cables following return
- Whether or not the cable is energized on the dates recorded should be noted
- Electromagnetic field (volts/meter and milligauss)

7.2 Statistical Methods

Statistical methods that are appropriate for the data collected and the questions being addressed should be employed. Several papers provide guidance on statistical methods for analyzing acoustic telemetry data (e.g., Joo et al. 2019; Whoriskey et al. 2019; Jonsen et al. 2022). Generalized Linear Models (GLMs), Generalized Additive Models (GAMs), Generalized Linear Mixed Models, and Generalized Additive Mixed Models (GAMMs) may be used depending on the assumptions made and whether relationships between response variables are observed to be linear or nonlinear (Livermore et al. 2023). Environmental variables including depth, temperature, salinity, or other variables relevant to the study species should be included as covariates in analyses. Other covariates may include year, season, sex, and size. Statistical outcomes appropriate for the analytical methods or models employed should be reported alongside estimates of the magnitude of change and its biological relevance (e.g., Wood 2025; Methratta 2025).

8. Establish and carry out a plan for data storage, access, information sharing, and public data accessibility

Data sharing and accessibility should follow the FAIR (Findable, Accessible, Interoperable, Reusable) principles for data stewardship and management (Wilkinson et al. 2016).

8.1 Acoustic Telemetry

Acoustic-telemetry data should be submitted to the appropriate regional acoustic telemetry network (e.g., ACT Network) following any applicable data embargo period. We recommend the selection of the public data access level to best leverage the use of this data. Ideally, data submissions should occur whenever data collection and processing has been completed following retrieval of acoustic receivers. Where possible, near real-time data uploads are encouraged to support more timely regional monitoring of offshore wind impacts on trust resources.

As stated previously, all data submissions must be accompanied by comprehensive metadata that includes details on study design, acoustic transmitters deployed (e.g., tag type, tag parameterization, species tagged, tagging dates), and receiver specifications and locations. Metadata format should follow recognized standards to facilitate data interoperability and ensure that all necessary metadata is retained (MATOS 2025). Acoustic telemetry data should also be archived in raw form (Bowers et al. in prep), preferably using the template provided by ACT MATOS (Appendix 1; ACT MATOS 2021).

8.2 Satellite Telemetry

Satellite-telemetry data should be submitted to a publicly accessible repository following any applicable data embargo period. Recommended repositories include the ATN DAC, OBIS-SEAMAP, or Movebank. Ideally, data submissions should occur whenever data collection and processing has been completed following tag retirement, which may include:

- a. When a tag stops transmitting and it can reasonably be assumed that the tag is no longer attached to the animal
- b. When an archival tag uplinks data at the end of its programmed deployment (e.g., after detachment and surfacing)

Where possible, near real-time data uploads are encouraged to support more timely regional monitoring of offshore wind impacts on trust resources.

As stated previously, all data submissions must be accompanied by comprehensive metadata that includes details on study design, satellite tag deployed (e.g., tag type, deployment dates), tag parameterization (e.g., sampling intervals, duty cycles), and sensor details (e.g., salinity, CTD). Metadata format should follow recognized standards specified by the selected repository (ATN DAC, OBIS-SEAMAP, or Movebank) to facilitate data interoperability.

Protected Fish Species - Additional Considerations

All documented acute injuries and mortalities of protected fish species must be reported to the relevant Regional Office (GARFO or SERO) as well as the Office of Protected Resources (OPR).

8.3 Data Embargo Period

Data products such as summary data tables, the results of data analyses, and the interpretation of results that address the monitoring questions should be provided to NOAA Fisheries as soon as they are prepared by the principal investigator. Ideally, raw data would be made available to NOAA Fisheries as

early as possible solely to assist in management decisions. NOAA will limit data use to management purposes and will otherwise adhere to a 24 month embargo limitation with regards to publication in scientific journals.

9. Define performance indices and establish a schedule for evaluating monitoring plan performance

- Number and percentage of lost receivers
- Tag-induced mortality (Martinez-Ramirez et al. 2024)
- Receiver Efficiency Index (REI) (Ellis et al. 2019; Kendall et al. 2021) - the proportion of transmitter activity from an array that occurs at a particular receiver location
- Detection Range (DR) - the maximum distance over which an acoustic transmitter can be detected by a receiver (Brownscombe et al. 2019; Winter et al. 2021)
- Detection Efficiency (DE) - the number of detections in a set period as a proportion of the total number possible (Brownscombe et al. 2019; Winter et al. 2021)
- Sample Size of tagged fish
- Confidence intervals (CIs) around response variables

10. Review the performance of the monitoring program using meaningful metrics and adapt approach to improve performance as needed

The performance of the monitoring program should be evaluated every 2 years using the performance indices identified in section 9. Receivers with low efficiency (DE and REI) should be considered for relocation. Response variables that have high levels of uncertainty should be evaluated to determine if an increase in sample size (number of tagged individuals) or other adaptations to the sampling design could increase certainty.

11. Interconnections with other OWD data collections

11.1 Connection to Data Collected for Survey Mitigation

Whenever possible, monitoring methods should generate data streams that are equivalent to those collected by the long-term scientific surveys conducted by NEFSC outside of wind energy areas. Methods used to collect fish for tagging should thus match the methods for collection of the focal species in the NEFSC Survey Mitigation Plans (NEFSC 2024). By implementing the same sampling methodology, the information can also serve as a data stream for survey mitigation needs. In cases where exact sampling methods are impossible to match to NEFSC survey methods (i.e., due to the presence of wind structures in the sampling area), other methods may be deemed equivalent if NEFSC scientists deem them to be precise, accurate, reliable, and useful for assessment purposes.

11.2 Connection to Data Collected for Monitoring Ecological Effects

Tagging and telemetry methods are also recommended for monitoring responses to noise, electro-magnetic fields (EMFs), and as a supplemental source of information in monitoring the artificial reef effect if the array is placed around offshore wind structures (Sections 1, 6, and 7).

12. Permits and Authorizations

Monitoring plan developers should engage with the NMFS and state agencies to secure the permits and authorizations necessary to conduct monitoring. Early coordination is critical, particularly to ensure compliance with the ESA and MMPA if interactions with such species could occur. Additional consultation with the U.S. Department of State may be necessary if foreign vessels are involved with project monitoring plan/study activities.

12.1 State Permit Requirements

Each state may require individual permits to conduct study activities. Consultation with each state with project components and/or monitoring studies directly in or adjacent to its waters is recommended to determine specific state permit requirements.

12.2 Federal Permit Requirements

All project monitoring plan/study activities operating in federal waters (more than three miles from shore) must comply with existing fishing regulations (50 CFR 648 or 697) or be exempted from specific regulations. There are two options to document plan activities, depending on the type of vessel being used to conduct the work (see NMFS summary of scientific research and exempted fishing permits for more information):

- Activities conducted aboard scientific research vessels: A vessel that is chartered and controlled by a state/Federal government agency, university, or research institution that operates under a scientific research plan is exempt from federal fishing regulations. A commercial/recreational fishing vessel can serve as a scientific research vessel provided it is operating consistent with a fisheries project monitoring plan and under the direction of a state/federal agency, university, or scientific institution. While not required, a letter of acknowledgement (LOA) formally documents project monitoring plan/study activities and can minimize delay from any enforcement inquiries.
- Activities conducted aboard commercial/recreational fishing vessels: If not operating as a scientific research vessel as described above, a commercial/recreational vessel may need exemptions from existing fishing regulations (size/possession limits, gear requirements, etc.) to conduct project monitoring plan/study activities. Such vessels must request an exempted fishing permit (EFP) from NMFS.
- Contact the GARFO Sustainable Fisheries Division (978-281-9344) for additional information on the issuance of LOAs and EFPs. Project monitoring study activities may affect threatened or endangered species of fish and marine mammals, depending on where and how survey activities are conducted. Efforts should be made to avoid or minimize interactions with these species and to avoid or minimize effect on their habitat. Unless interactions are already covered as part of conventional fishing activities when operating under an EFP (NMFS guidance is under development and should be published soon on the Greater Atlantic Region's wind energy development page), you may need special permits or consultations from NMFS. Such permits may take several months or a year to be issued. Survey/monitoring plan coordinators should consult with NMFS well before study operations are expected to begin.
- For marine mammal questions, contact NOAA's Office of Protected Resources (301-427-8400).

- For questions regarding ESA Scientific Research and Enhancement Permits of Atlantic salmon, contact the USFWS at (207 827-5938 ext. 13).
- For questions regarding ESA Scientific Research and Enhancement Permits of other endangered fish including sturgeon, contact the Permits and Conservation Division of the Office of Protected Resources at (301-427-8401).

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PART II: PROJECT-LEVEL MONITORING STANDARDS TO EVALUATE OFFSHORE WIND DEVELOPMENT
EFFECTS ON FISHERIES SOCIO-ECONOMIC CONDITIONS

Draft

1. Purpose

This document provides standards for the development of project level programs for monitoring effects of offshore wind energy development (OWED) on fisheries socio-economic conditions. While this document focuses on fixed-foundation projects, the socio-economic monitoring standards could be applied to floating offshore wind projects in the future. We define monitoring as the collection of data to quantify the change over time in socio-economic responses to offshore wind development during baseline and all phases of the wind project: pre-construction surveys, construction, operation, and decommissioning. Components of fisheries socio-economic conditions include individuals, fleets and communities involved in commercial and recreational (for-hire and private angler) fisheries at various scales. Monitoring of fisheries socio-economic conditions should include economic, social, and cultural elements, such as but not limited to changes to fishing behavior, business operations, demographics, employment, human and social capital, costs and revenues, and attitudes and perceptions. Monitoring programs may require the development of targeted research projects. Targeted research concentrates on shorter-term studies that address specific questions about potential causal relationships. As such, targeted research projects should be designed to collect and analyze data to increase knowledge and understanding of the relationships between IPFs and socio-economic elements. The findings of said studies can inform and refine the design of monitoring programs. Targeted research does not need to be implemented with the same frequency as monitoring efforts, but should be identified at the planning stage and throughout the monitoring project implementation.

2. Core Components of a Monitoring Plan

Best practices for developing monitoring programs should consider the core components described below in order to collect data and generate information that are useful, informative, accessible, and applicable to the needs of stakeholders. A more detailed guide on how to use and consider the contents of this document when developing monitoring programs is included in Part II, Section 5 below.

2.1. Monitoring Questions and Affected Communities

The monitoring process should start by defining clear hypotheses and/or questions that define the purpose, goal, and context of the effort, i.e., what should be monitored? The conceptual models included in this document should be used to guide the development of initial questions and hypotheses. The human communities that are expected to be most affected should also be identified and considered. Differences between individual, fleet, and community effects should be accounted for in the monitoring questions and approaches.

2.2. Scale

The monitoring standards in this document were developed to address project level monitoring questions. Consistency and standardization among projects in the spatial and temporal scales will facilitate the integration of data sets across projects and potentially at regional scales. However, recommendations and methods can also be used in the development of regional or national level programs.

2.2.1. Temporal

Monitoring programs typically include a combination of new and existing data streams. For new data collection efforts, a minimum of 3 years of baseline data is typically recommended (Petruny-Parker et al. 2015; ROSA 2021; Methratta et al. 2023). Data should be collected every year during construction and decommissioning, and every 3-5 years during operation for the lifetime of the project. Temporal scale considerations of new and existing data collection and analyses should be appropriate for the question/hypothesis being addressed as well as site specific context.

2.2.2. Spatial

Spatial scale considerations for data collection (e.g., single turbine v. array, inside/outside project area comparisons, use of control site) should be appropriate for the question/hypothesis being addressed as well as site specific context (see Stokesbury et al. 2022 for a discussion on spatial and temporal considerations for interactions between OWED and fisheries).

2.3. Methodology and Assessment

Social science methodologies and indicators should be applied consistently and, whenever possible, in a standardized manner across projects to enable the evaluation of region and ecosystem scale effects (Willis-Norton et al. 2024). Examples of survey questions to collect data on socio-economic responses to OWED from affected stakeholders is also included in Appendix III.

Performance of the socio-economic monitoring program should be assessed using adaptive approaches to evaluate and improve performance as needed (Figure 1). Frequency of evaluation will depend on the needs of the program, with assessments occurring more frequently during the earlier stages of implementation to make sure baseline data and immediate effects are being captured. As the program progresses, the frequency of evaluation may be adjusted to reflect monitoring needs. The feedback loop allows the incorporation of new data and developments as they emerge.

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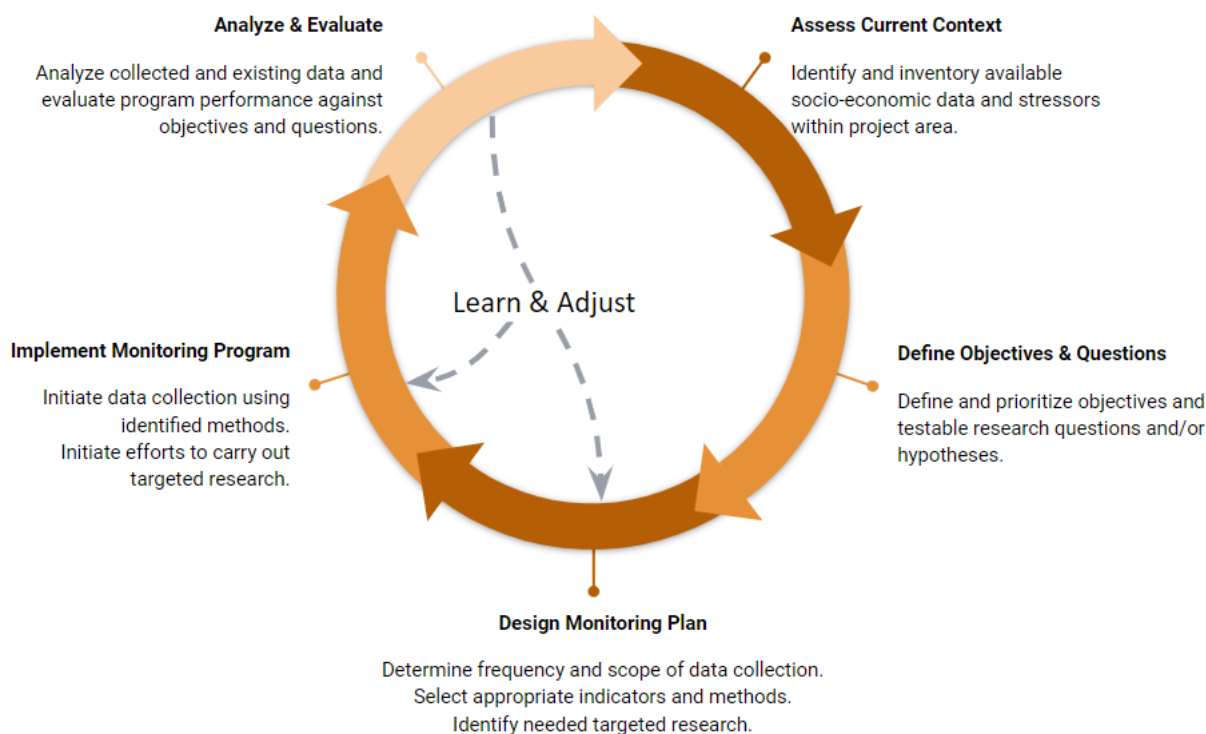


Figure 1. Adaptive approach to develop and implement a socio-economic monitoring program.

2.4. Data Storage, Management, and Sharing

Monitoring programs should establish and carry out a plan for data storage, access, and information sharing that follows the FAIR (Findable, Accessible, Interoperable, Reusable) principles for data management and stewardship (Wilkinson et al. 2016). This includes following any applicable requirements for handling personal protected information for qualitative and quantitative data and making data accessible to users. Any data collection instruments, data and meta-data used or collected during monitoring efforts should be shared with NOAA Fisheries on an annual basis.

Access to NMFS confidential data for monitoring purposes will be subject to confidentiality of information restrictions as per the agency's policies.

3. Impact Producing Factors Affecting Fisheries Socio-Economic Conditions

Impact Producing Factors (IPFs) define “the cause-and-effect relationships between actions (e.g., a wind energy project) and relevant physical, biological, economic, or cultural resources” (BOEM 2019; 2020a). The IPFs that primarily affect fisheries socio-economic conditions are those associated with structure presence, installation, maintenance, and accidental releases (hereto Structure Presence), Port Utilization, and Traffic (Figure 2).

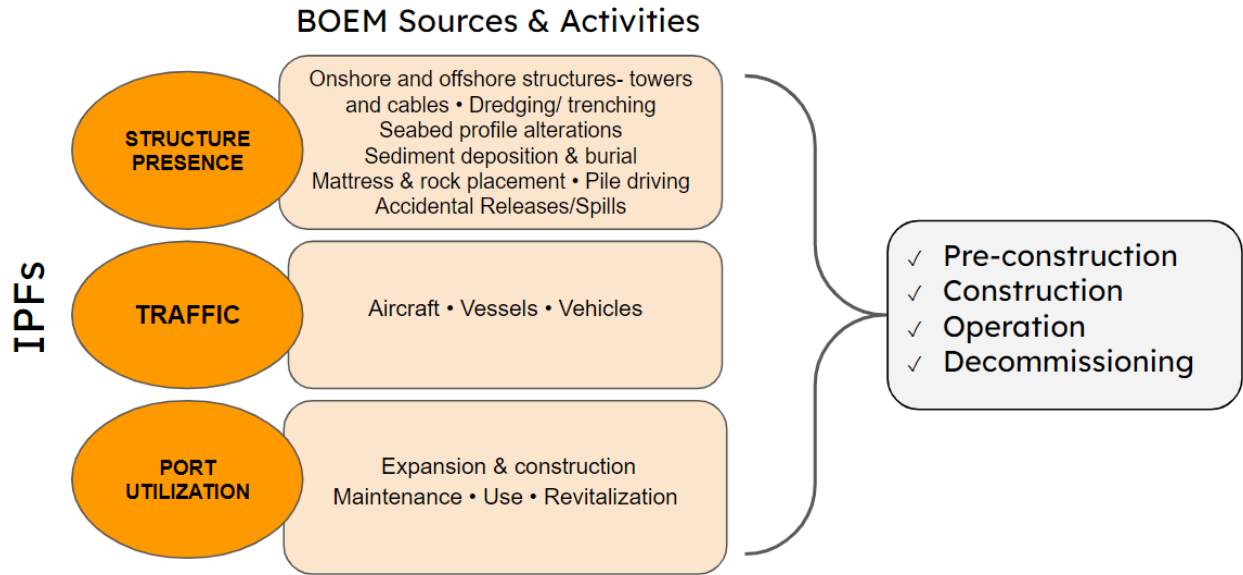


Figure 2. Offshore wind energy development Impact Producing Factors (IPFs) most relevant to the fisheries socio-economic conditions (adapted from BOEM 2019; 2024).

The relevant socio-economic IPFs and key elements to be monitored included in this document have been identified as critical to understanding the scope of socio-economic effects of OWED by academic and government scientists, fisheries management and offshore wind decision makers, and the fishing industry (Hogan et al. 2023; Methratta et al. 2023; Tyrell et al. 2024). Previous research efforts from European experience with OWED and fisheries identified 3 key effects of offshore wind development on fishery operations: (1) a potential loss of fishing grounds which could ultimately affect income and catch, (2) gear conflicts with offshore wind infrastructure, and (3) safety implications for fisheries (Alexander et al. 2013). These effects are in line with the IPFs identified in this document as well as the elements to be prioritized in the development of monitoring programs to understand effects of OWED on fisheries socio-economic conditions.

3.1. Tiered Approach for Monitoring IPFs

IPFs affect fisheries socio-economic conditions in ways that are direct and indirect. Allisions with OWED structures and collisions with vessels are examples of a direct effect, and the costs associated with vessel and gear repair as a result of damage would be an indirect effect potentially resulting from the direct effect. Indicators and methods are needed to monitor both direct and indirect effects of these IPFs on elements of fisheries socio-economic conditions. For monitoring purposes, these standards are structured using a conceptual illustration of the fisheries socio-economic impacts related to each IPF using a tiered approach differentiating between direct (Tier 1) and indirect (Tier 2) effects to allow for prioritization of monitoring efforts (Figures 3, 4, and 5). In the models, arrows represent the direction of the relationship from driver to receiver. Tier 2 elements also affect and compound each other. For example, in the conceptual model for the Structure Presence IPF (Figure 3), monitoring fisheries access (Tier 1) is critical to understanding impacts to fisheries attributes (e.g., catch) (Tier 2) which will in turn impact fisheries revenue (Tier 2). Further benefits of the tiered approach include a framework for

controlling and distinguishing between IPFs and other impacts (e.g., resource distribution, market conditions, fuel price), thus leading to a better understanding of cumulative and concomitant impacts.

Tier 1 elements should be prioritized in monitoring efforts to increase the chances that cause and effect relationships between IPFs and socio-economic elements are well understood. Monitoring programs should be designed including both Tier 1 and Tier 2 elements. However, monitoring of Tier 2 elements should be prioritized once information and data for Tier 1 indicators are available. This will allow for better understanding of cause and effects relationships between Tier 1 and Tier 2 elements.

The following sections of this document list and characterize significant elements of fisheries socio-economic conditions that are affected by each IPF defined above, as well as relationships between these different elements that may compound the impacts discussed.

4. Conceptualization of the Effects of Select IPFs on Fisheries Socio-Economic Conditions

4.1. Structure Presence

The IPF Structure Presence combines and adapts several IPFs as defined in BOEM (2024), including those related to construction and installation disturbances, cable emplacement, structure presence, and accidental releases. The Structure Presence IPF considers impacts associated with the physical presence of onshore (e.g., substations) or offshore structures (e.g., turbines), installation and maintenance activities and disturbances associated with installing and maintaining cables, turbines and substations, as well as unanticipated release or spills into receiving waters such as fuel, hazardous materials, suspended sediment, trash, or debris. Socio-economic effects associated with the Structure Presence IPF are characterized as direct (Tier 1) and indirect (Tier 2) in Figure 3 and further described below.

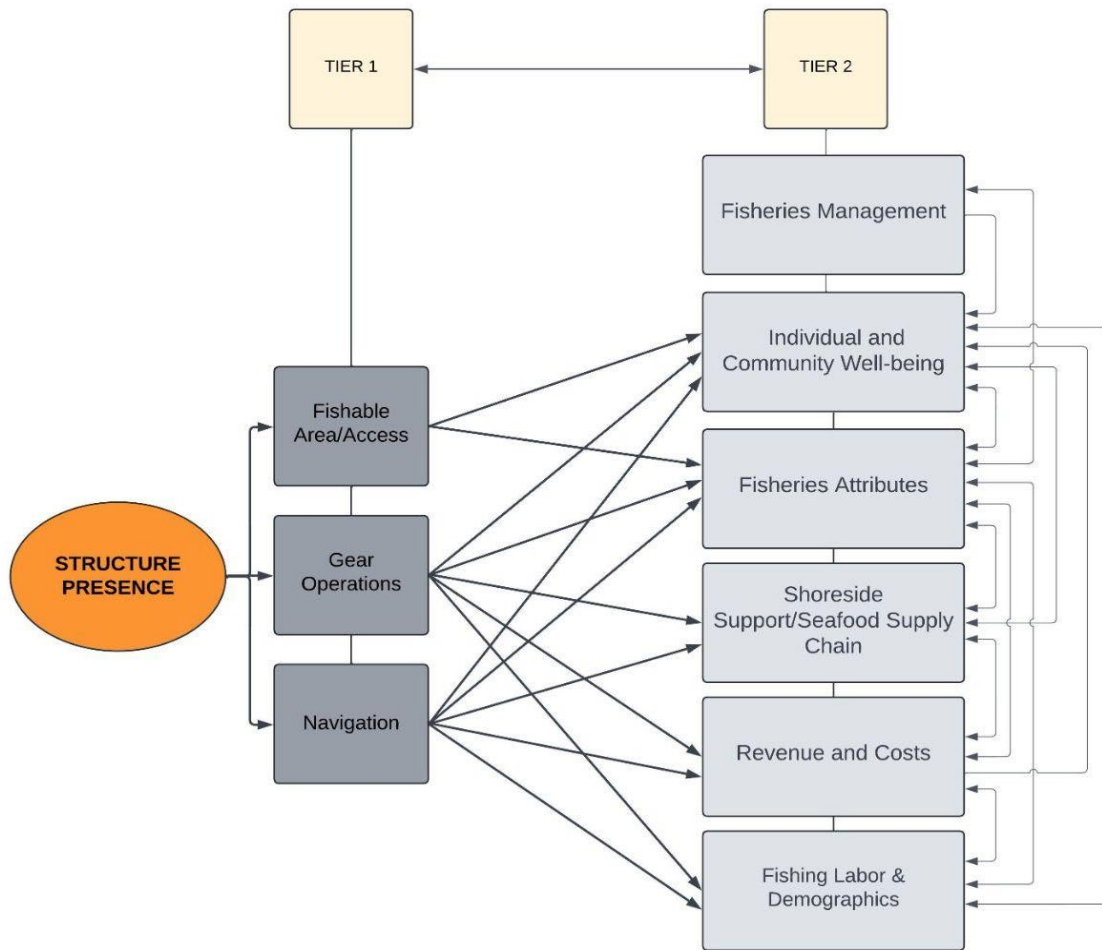


Figure 3. Conceptual model of the effects of the IPF Structure Presence on fisheries socio-economic conditions.

4.1.1. Tier 1: Elements Directly Affected by Structure Presence

Fishable Area/Access

The presence of OWED infrastructure may impact the ability of fishermen to access traditional and new fishing grounds and in some cases exclude operations within OWED areas due to navigation and gear damage risk and user conflicts (i.e., crowding) (ten Brink and Dalton 2018) or alter incentives/reasons to operate in OWED areas due to species distribution shifts. During OWED construction periods, legal exclusion of some areas will occur for designated safety zones around construction/maintenance activities (Bonsu et al. 2024), although such regulated exclusion zones may vary both spatially (location

of affected area and size of affected area) and temporally (season and duration).² During operational periods, de facto exclusion may occur due to gear incompatibilities and safety (e.g., spatial needs of deploying gear around structures, risk of gear damage/loss, presence of debris) and user conflicts (e.g., crowding by recreational anglers around turbines or relocated boulders). Displacement from fishable areas might signify that commercial fishermen with large, mobile gear which cannot operate safely around turbines, may be forced to relocate their activities entirely, while for-hire operators, who use smaller vessels and fixed gear, may be better able to adapt and even capitalize on increased fish concentrations around turbine foundations. Nonetheless, they could also experience challenges from increased crowding by anglers, for-hire vessels or other business' vessels (e.g., tour operators). The Fishable Area/Access effect focuses on the ability or inability of fishing vessels to deploy gear and continue to actively fish within OWED. See the section *Navigation* below for monitoring changes in transit through OWED areas.

Gear Operations

Gear interactions with OWED infrastructure pose risks to fishing operations, including interactions with debris from accidental releases and entanglement of fishing gear with structures and cables. Impacts will differ across OWED phases and gear types, for example during operation risks are predicted to be higher for fishing involving the use of mobile gear (e.g., trawls and dredges) (Dunkley and Solandt 2022) when compared to fixed gear operations (e.g., traps or rod and reel) (BOEM 2020b; Bonsu et al. 2024).

Navigation

The presence of OWED infrastructure poses risk of allisions and may lead to changes in vessel navigation patterns. Navigation and safety has been identified as a top concern by fishermen regarding offshore wind development (Gray et al. 2016; Mackinson et al. 2006; ten Brink and Dalton 2018). Depending on behavior of other vessels navigating the area, sea-state conditions (e.g., wind, waves, and swell), and visibility, fishermen may face risks navigating through OWED areas or decide to change their traditional navigation patterns to avoid these risks. The presence of debris as a result of accidental releases also pose navigation and safety hazards (BOEM 2024). These risks may also affect search and rescue operations.

4.1.1.1. Tier 1: Monitoring Approach of Structure Presence

Approaches for monitoring the effects of Structure Presence IPF on Tier 1 elements of fisheries socio-economic conditions should include the methods and metrics in Table 8.

Table 8. Proposed indicators and methods to monitor Tier 1 elements associated with the Structure Presence IPF.

Tier 1 Element	Monitoring Indicators	Methods
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² Safety exclusion zones implemented by the United States Coast Guard around active offshore wind construction activities consistent with [33 CFR 147.10](#) are limited to a 500 m radius from the center of the facility.

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Fishable Area/Access	Frequency of regulatory spatial exclusions (e.g., safety zones) from construction activity, maintenance activity or accidental releases.	Review of regulatory actions related to OWED activities (e.g., USCG CFR postings) and information on number, spatial extent, duration, and rationale of closures.
	Changes in space use and density of fishing vessels due to presence of OWED infrastructure.	Analysis of temporal and spatial trends in fisheries dependent data (e.g., Fishing Footprints, VTR, VMS, AIS, Observer Data); Analysis of OWED survey data.
Gear Operations	Frequency of gear interactions with structures or debris.	Number and characteristics of compensation claims for gear damage or losses; Analysis of NMFS cost survey data for presence/absence of information about gear damage/losses; Analysis of OWED survey data with fishermen and gear manufacturers.
Navigation	Changes in navigation patterns (transiting) and trip durations.	Analysis of temporal and spatial trends in fisheries dependent data (e.g., VMS, AIS)/analysis of canceled trips; Analysis of OWED survey data with fishermen.
	Frequency of allisions with OWED infrastructure.	Number and characteristics of compensation claims for vessel damage or losses; Analysis of OWED survey data with fishermen.

4.1.2. Tier 2: Elements Indirectly Affected by Structure Presence

Elements of fisheries socio-economic conditions affected by presence of structures through changes in fishable area/access, gear operations, and navigation are described below. See Appendix II for a general definition and scope of each Tier 2 element.

Individual and Community Well-being

Potential loss of fishable area and access to fishing grounds, increased gear interactions, and navigation hazards associated with offshore structures may lead to alterations in fishing activities and dynamics which could impact social networks and sense of community for both commercial and recreational fishermen. Changes to social networks may affect social and human capital generated through community ties. Social network shifts may also result in changes to human capital available for fishery participants. These changes may affect groups of individuals differently based on fishery attributes (e.g., gear type, vessel size) as well as social linkages and norms within communities. Direct effects of structure presence, including accidental releases, are also likely to result in changes to day-to-day operations or preferred fishing location and increase uncertainty, which can affect fishermen's levels of job or fishing satisfaction and perceived well-being. Changes in access to fishing grounds can also have implications for individual and community food security and provision.

Individual and community well-being is affected by all other elements listed under Tier 2 for this IPF, as changes in fisheries management, fisheries attributes, shoreside business infrastructure and seafood supply chain dynamics, changes in cost and revenue, as well as labor structure and demographics can all affect levels of individual and community well-being. Shifts in individual and community well-being may affect labor structure and demographics due to changes in level of interest of new entrants, ability to engage in fishing activities, and mental health and other social factors associated with well-being and satisfaction. Changes in levels of well-being may also lead to impacts on fishing attributes and shoreside support/seafood supply chain, as these changes can affect factors linked to the development and

maintenance of social capital. There are also complex interactions between components included in the individual and community well-being element, which should be further understood. For instance, new job opportunities in OWED (e.g., guard vessels) for the commercial fishing sector may affect social capital positively through communicating information on OWED activities with other fishing members or negatively through creating social division in communities based on values and beliefs in maintaining fishing livelihoods. Similarly, new recreational opportunities around OWEDs (e.g., artificial reef effect) may positively affect social capital through collaboration and information-sharing among anglers about productive fishing areas or it could negatively affect social cohesion by increasing competition for space and access, creating divisions between recreational fishermen, or amplifying conflicts between recreational and commercial fishermen over shared resources.

Fisheries Attributes

Impacts to fisheries attributes include changes to fishing practices, such as trip length, gear characteristics, technology, and catch composition due to the presence of OWED infrastructure.

Changes to fisheries attributes have the potential to affect all other elements listed under Tier 2 for this IPF. For example, changes to trip length may affect job satisfaction and well-being among fishermen, as well as modify trip cost and revenues associated with changes in catch rates and use of Days-at-Sea, and affect seafood supply operations (e.g., possible longer transiting time). Similar effects could extend to anglers as shifts in fishing sites may lead to changes in expenditures, travel distances, and overall fishing satisfaction. Changes to the fishery attributes will also affect labor characteristics and demographics as they may result in changes to crew structure and composition, or limit fishing opportunities for anglers if shifts create financial, logistical, or skilled-based hurdles. Changes to attributes may also trigger management actions, as changes to landings composition and effort may lead to managerial adjustments in quotas and other strategies. Fishery attributes are, in turn, affected by all other elements listed under Tier 2 for this IPF.

Shoreside Support/Seafood Supply Chain

Allisions and gear incompatibility with OWED infrastructure are likely to affect demand for different shoreside businesses (e.g., increased need for gear and vessel maintenance and replacement). There are important interactions between shoreside support/seafood supply chain and fisheries attributes and revenue and costs, as changes to the latter elements have the potential to significantly affect demand and supply for products and services. Thus, impacts of Tier 1 elements on fisheries attributes and revenue and costs will indirectly impact shoreside support and seafood supply chain dynamics for both the recreational and commercial fishing sectors.

In turn, changes to shoreside support/seafood supply chain affect individual and community well-being, revenue and costs, and fishery attributes. These changes may arise from shifts in the availability of necessary services, changes in costs due to competition and market dynamics, or the potential need to travel further to obtain such services.

Revenue and Costs

Elements potentially affecting revenue and costs due to presence of OWED infrastructure include cost of gear or vessel repair due to damage from allision and gear interaction with structures or loss of fishing revenue while gear or vessel is being repaired or replaced. Changes in revenue associated with fishable area and access are accounted for in the interaction between revenue and costs and fisheries attributes, given that such costs are associated with aspects such as trip length, insurance premiums, or operational adjustments in OWED areas from safety zones established during installation or accidental releases, affecting both the commercial and recreational sectors. New job opportunities, such as serving as guard vessel operators during construction and maintenance, can provide supplemental income for fishermen and community members. Revenue and costs are also affected by changes in shoreside support/seafood supply chain (e.g., presence and quality of processors), and fishing labor and demographics.

Changes to revenue and costs, in turn, affect all other elements listed under Tier 2 for this IPF, with the exception of fisheries management, as fluctuations in cost and revenue will affect decisions regarding the fishing activity (fisheries attributes), the availability and demand for hiring qualified crew (fishing labor and demographics), the availability and quality of landings (shoreside support/seafood supply chain), and the overall well-being of individuals and communities.

Fishing Labor & Demographics

Increased actual or perceived risk posed by potential gear entanglement and navigation hazards may affect the composition of crew and human capital (e.g., increased need for skilled labor, and decreased interest in the occupation and availability of labor). In addition, training for commercial fishers and for-hire vessel operators may be necessary to minimize risks. Changes in revenue and income due to OWED development, may cause varying interest in jobs available and modify the number of fishermen and vessels active in a fleet. These impacts may also influence patterns of permit ownership as challenges and limitations may lead to vessel and business transfers.

Changes to fishing labor and demographics affect and are affected by changes in individual and community well-being (e.g., interest in occupation, availability of crew jobs), fisheries attributes, and revenue and costs, as described in the segments above.

Fisheries Management

There are no direct relationships between Tier 1 elements and fisheries management, however there are important connections between this element and the Tier 2 elements fisheries attributes and individual and community well-being. For instance, changes in catch composition and fishing grounds as a result of presence of OWED infrastructure may trigger management actions to address potential impacts. In addition, it has been shown that managerial changes can have a significant impact on individual and community well-being, as they may modify fishing activities, which could increase uncertainty (Sorensen et al. 2022).

It is important to note that there are many important indirect connections between Tier 2 elements that are not explicitly detailed above. For instance, fisheries management indirectly affects revenue and

costs through its impacts on fisheries attributes, thus establishing a relationship between fisheries management actions and revenue levels and the cost of fishing.

4.1.2.1 Tier 2: Monitoring Approach of Structure Presence

Approaches for monitoring the impacts of Structure Presence IPF on Tier 2 elements of fisheries socio-economic conditions should include the methods and metrics in Table 9. Interconnections between elements in Tier 2 are also included in the table.

Table 9. Proposed indicators and methods to monitor Tier 2 elements associated with the Structure Presence IPF.

Tier 1 Element	Tier 2 Element	Monitoring Indicators	Methods	Tier 2 Interconnections
Fishable Area/Access	Individual and Community Well-being	Changes to measures of well-being and community identity (e.g., self-reported job satisfaction, fishing satisfaction (for anglers), community indicators).	Analysis of OWED survey with fishermen and other stakeholders and NMFS Crew survey data.	Fishing Labor & Demographics (to/from) Revenue and Costs (from) Fisheries Attributes (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (from)
	Fisheries Attributes	Changes in fishing effort, such as changes in the number, length and seasonality of fishing trips; number and size of vessels fishing; changes in catch size, composition, and landings value trends, homeport and landing ports, permit value.	Analysis of fishery dependent data (e.g., Fishing Footprints, VTR, VMS, AIS, Observer Data); Yearly trends in permit value; Analysis of OWED survey with fishermen and NMFS Crew survey data. NMFS For-hire survey	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (to/from)
Gear Operations	Individual and Community Well-Being	Changes to measures of well-being and community identity (e.g., self-reported job satisfaction, fishing satisfaction (for anglers), community indicators).	Analysis of OWED survey with fishermen and other stakeholders and NMFS Crew survey data.	Fishing Labor & Demographics (to/from) Revenue and Costs (from) Fisheries Attributes (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (from)
	Fisheries Attributes	Changes in gear type, use and configuration, new technology/equipment; number and size of vessels fishing.	Analysis of fishery dependent data (e.g., Fishing Footprints, VTR, VMS, AIS, Observer Data); Analysis of OWED survey with fishermen and gear manufacturers, and NMFS Crew survey data.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (to/from)

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	Shoreside Support/Seafood Supply Chain	Changes in number, revenue and number of employees for gear manufacturers.	Bureau of Labor statistics or other business data; Analysis of OWED survey with gear manufacturers.	Individual and Community Well-being (to) Fisheries Attributes (to/from) Revenue and Costs (to/from)
	Revenue and Costs	Changes in revenue and cost for trips associated with gear changes or interactions with OWED infrastructure.	Analysis of data from NMFS cost survey, observers, and OWED surveys with fishermen and gear manufacturers; Analysis of frequency and value of compensation claim reports submitted to developers.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)
	Fishing Labor & Demographics	Changes in permit ownership patterns and number of crew, labor/pay structure, and recruitment.	NMFS permit database; Analysis of OWED survey with fishermen and NMFS Crew survey data.	Individual and Community Well-being (to/from) Fisheries Attributes (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)
Navigation	Individual and Community Well-being	Changes to measures of well-being and community identity (e.g., self-reported job satisfaction, fishing satisfaction (for anglers), community indicators).	Analysis of OWED survey with fishermen and NMFS Crew survey data.	Fishing Labor & Demographics (to/from) Revenue and Costs (from) Fisheries Attributes (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (from)
	Fisheries Attributes	Changes in trip duration, navigation patterns to/from fishing areas, use of safety related technology/equipment.	Analysis of fisheries dependent data (e.g., VMS and AIS data); Analysis of OWED survey with fishermen and NMFS Crew survey data.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (to/from)
	Shoreside Support/Seafood Supply Chain	Changes in number, revenue and number of employees for vessel repair and manufacturer businesses.	Bureau of Labor statistics or other business data; Analysis of OWED survey with vessel repair and manufacturer businesses.	Individual and Community Well-being (to) Fisheries Attributes (to/from) Revenue and Costs (to/from)
	Revenue and Costs	Changes in revenue and cost associated with allision with OWED structures.	NMFS cost and crew survey data, analysis of OWED surveys with fishermen and vessel repair and manufacturer businesses; Analysis of frequency and value of compensation claim reports submitted to developers and US Coast Guard reports.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside

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				Support/Seafood Supply Chain (to/from)
	Fishing Labor & Demographics	Changes in permit ownership patterns, number of crew, labor/pay structure, and recruitment.	Analysis of NMFS permit databases; Analysis of OWED survey with fishermen and NMFS Crew survey data.	Individual and Community Well-being (to/from) Fisheries Attributes (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)

4.2. Traffic

The Traffic IPF includes vessel congestion and collisions across all phases, including traffic for HRG surveys and gear interactions during pre-construction periods. This section discusses monitoring needs for socio-economic impacts associated with this IPF. These effects are characterized as direct (Tier 1) and indirect (Tier 2) (Figure 4).

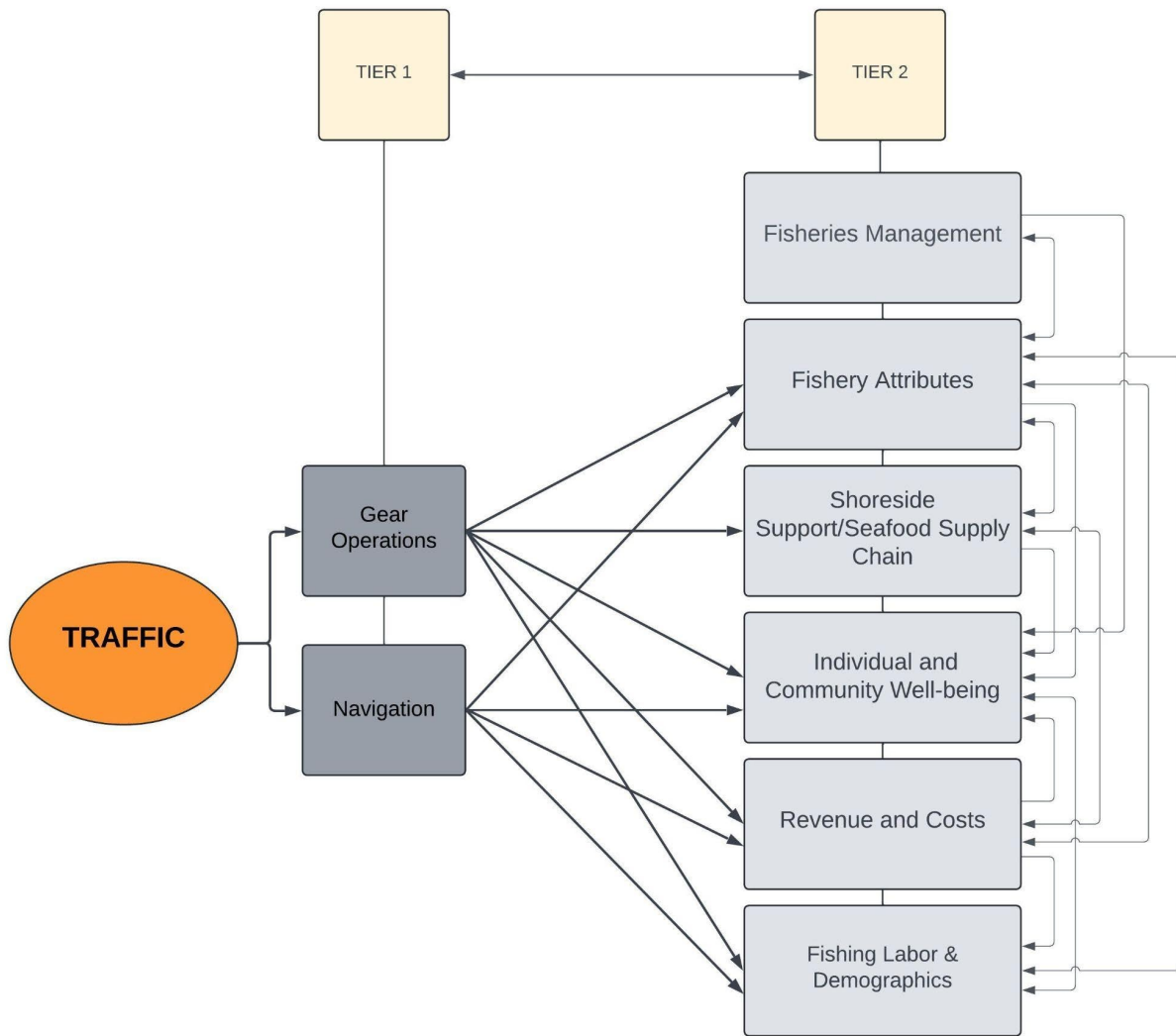


Figure 4. Conceptual model of the effects of the IPF Traffic on fisheries socio-economic conditions.

4.2.1. Tier 1: Elements Directly Affected by Traffic

Gear Operations

Changes in vessel traffic patterns and congestion are expected to occur during all four phases of OWED. Increased interaction between vessels and gears can happen as a result of project activity in and around OWED areas and ports.

Navigation

Increased vessel interactions in ports as well as in and around OWED areas pose actual and perceived safety risks associated with vessel collisions and risky behavior to avoid interactions.

4.2.1.1. Tier 1: Monitoring Approach of Traffic

Approaches for monitoring the effects of Traffic IPF on Tier 1 elements of fisheries socio-economic conditions should include the methods and metrics in Table 10.

Table 10. Proposed indicators and methods to monitor Tier 1 elements associated with the Traffic IPF.

Tier 1 Element	Monitoring Indicators	Methods
Gear Operations	Frequency of gear interactions with OWED vessels.	Number and characteristics of gear compensation claims from interactions with OWED vessels; Analysis of OWED survey data with fishermen and gear manufacturers.
Navigation	Frequency of collisions with OWED vessels.	Number and characteristics of compensation claims from collisions with OWED vessels; Analysis of OWED survey data with fishermen and vessel repair and manufacturer businesses.

4.2.2. Tier 2: Elements Indirectly Affected by Traffic

Elements of fisheries socio-economic conditions affected by Traffic through changes in gear operations and navigation are described below. See Appendix II for a general definition and scope of each Tier 2 element.

Individual and Community Well-being

Impacts to gear operations may influence dynamics within fishing communities thus potentially affecting aspects of community identity and social capital. These impacts are likely to affect individuals and groups differently, depending on their characteristics. Changes to day-to-day operations, due to increased vessel congestion and safety concerns, may also result in changes to individual and community job satisfaction and subjective well-being. Anglers may also adjust their typical practices in response to increased vessel density and safety risks, potentially leading to changes in individual and community fishing satisfaction and subjective well-being.

Individual and community well-being is affected by all other Tier 2 elements and it, in turn, affects fishing labor and demographics. These interactions have been explained in section 4.1.2 above.

Revenue and Costs

Decreased safety may lead to increased costs and revenue loss due to potential risk of collision between vessels, which can increase cost due to vessel repair or replacement and loss of fishing revenue while vessel is being repaired or replaced. Increased risk of collision may also result in increased costs of vessel insurance. Other costs associated with increasing vessel safety standards may also be incurred.

Relationships between revenue and costs and other Tier 2 elements can be seen in section 4.2.1 above.

Fishery Labor & Demographics

Gear operation concerns may impact crew needs thus affecting labor characteristics and human capital. Increased actual and perceived risk may also lead to challenges recruiting skilled crew. These impacts

may also influence patterns of permit ownership as challenges and limitations may lead to vessel and business transfers.

Relationships between fishery labor and demographics and other Tier 2 elements can be seen in section 4.2.1 above.

Fisheries Attributes

Gear operation concerns and potential collisions may result in changes to fishery attributes including trip length, gear attributes, catch composition, and vessel characteristics.

Relationships between fisheries attributes and other Tier 2 elements can be seen in section 4.2.1 above.

Shoreside Support/Seafood Supply Chain

Gear operation and navigation concerns may affect the timing of landings and delivery of seafood to shorebased processors and dealers. Increased risk of collision and gear interaction may also result in increased demand for repair and maintenance services for shoreside businesses.

Relationships between shoreside support/seafood supply chain and other Tier 2 elements can be seen in section 4.2.1 above.

Fisheries Management

There are no relationships between Tier 1 elements and Fisheries Management regarding this IPF, however there are important connections between this element and the Tier 2 elements fisheries attributes and individual and community well-being. For instance, vessels may change their transit patterns impacting trip duration which in turn may trigger management actions.

4.2.2.1. Tier 2: Monitoring Approach of Traffic

Approaches for monitoring the effects of Traffic IPF on Tier 2 elements of fisheries socio-economic conditions should include the methods and metrics in Table 11. Interconnections between elements in Tier 2 are also included in the table.

Table 11. Proposed indicators and methods to monitor Tier 2 elements associated with the Traffic IPF.

Tier 1 Elements	Tier 2 Elements	Monitoring Indicators	Methods	Tier 2 Interconnections
Gear Operations	Individual and Community Well-being	Changes to measures of well-being and community identity (e.g., self-reported job satisfaction, fishing satisfaction (for anglers), community indicators).	Analysis of OWED survey with fishermen and NMFS Crew survey data.	Fishing Labor & Demographics (to/from) Revenue and Costs (from) Fisheries Attributes (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (from)

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	Fisheries Attributes	Changes in fishing effort, such as changes in the number and seasonality of fishing trips, number and size of vessels fishing; catch size and composition.	Analysis of fishery dependent data (e.g., Fishing Footprints, VTR, VMS, AIS, Observer Data); Yearly trends in permit value; Analysis of OWED survey with fishermen and NMFS Crew survey data.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (to/from)
	Shoreside Support/Seafood Supply Chain	Changes in demand for gear manufacturers services.	OWED surveys with fishermen and gear manufacturers.	Individual and Community Well-being (to) Fisheries Attributes (to/from) Revenue and Costs (to/from)
	Fishing Labor & Demographics	Changes in permit ownership patterns and number of crew, labor/pay structure, and recruitment.	NMFS permit database; Analysis of OWED survey with fishermen and NMFS Crew survey data.	Individual and Community Well-being (to/from) Fisheries Attributes (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)
	Revenue and Costs	Changes in revenue and costs associated with gear interactions with OWED vessels.	Analysis of data from NMFS cost survey, observers, and OWED surveys with fishermen and gear manufacturers; Analysis of frequency and value of compensation claim reports submitted to developers.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)
Navigation	Individual and Community Well-being	Changes to measures of well-being and community identity (e.g., self-reported job satisfaction, fishing satisfaction (for anglers), community indicators).	Analysis of OWED survey with fishermen and NMFS Crew survey data.	Fishing Labor & Demographics (to/from) Revenue and Costs (from) Fisheries Attributes (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (from)
	Fisheries Attributes	Changes in fishing effort, such as changes in the number and seasonality of fishing trips; number and size of vessels fishing; catch size and composition.	Analysis of fishery dependent data (e.g., Fishing Footprints, VTR, VMS, AIS, Observer Data); Yearly trends in permit value; Analysis of OWED survey with fishermen and NMFS Crew survey data.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from) Fisheries Management (to/from)

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	Revenue and Costs	Changes in revenue and costs associated with collisions with OWED vessels.	Analysis of NMFS cost and crew survey data, and OWED surveys with fishermen; Analysis of frequency and value of compensation claim reports submitted to developers and US Coast Guard reports.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)
	Fishing Labor & Demographics	Changes in permit ownership patterns and number of crew, labor/pay structure, and recruitment, safety training statistics.	NMFS permit database; Analysis of OWED survey with fishermen and NMFS Crew survey data.	Individual and Community Well-being (to/from) Fisheries Attributes (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)

4.3 Port Utilization

The Port Utilization IPF includes effects associated with port activity, upgrades, or maintenance that occur due to OWED. This can include activities related to port expansion and construction from increased economic activity and maintenance dredging or dredging to deepen channels for larger vessels. This section discusses monitoring needs for socio-economic effects associated with this IPF. These effects are characterized as direct (Tier 1) and indirect (Tier 2) (Figure 5).

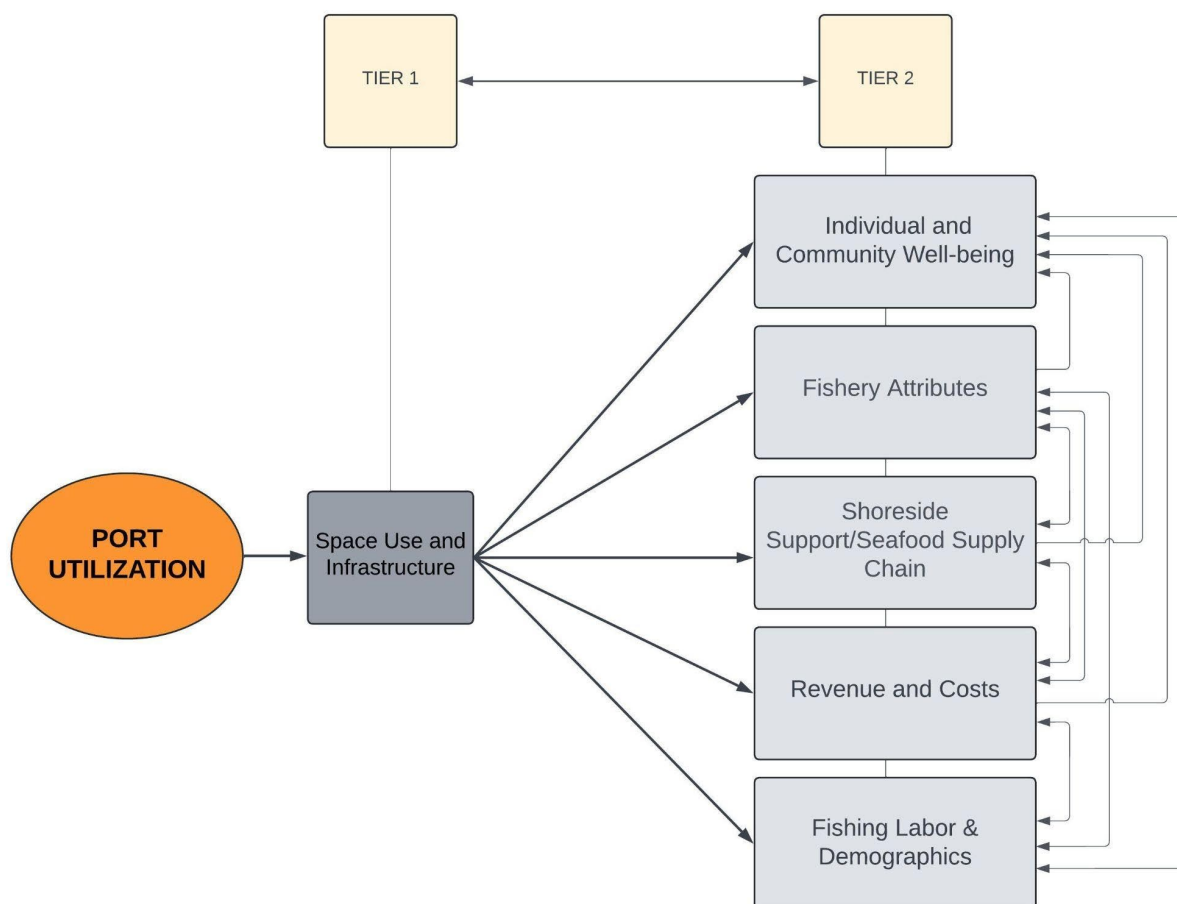


Figure 5. Conceptual model of the effects of the IPF Port Utilization on fisheries socio-economic conditions.

4.3.1. Tier 1: Elements Directly Affected by Port Utilization

Space Use and Infrastructure

The development of shore infrastructure to support OWED affects port characteristics and utilization. Changes to port infrastructure include upgrades and displacement affecting the makeup of shoreside support businesses.

4.3.1.1. Tier 1: Monitoring Approach of Port Utilization

Approaches for monitoring the impacts of Port Utilization IPF on Tier 1 elements of fisheries socio-economic conditions should include the methods and metrics in Table 12.

Table 12. Proposed indicators and methods to monitor Tier 1 elements associated with the Port Utilization IPF.

Tier 1 Element	Monitoring Indicators	Methods
Space use and Infrastructure	Changes in port use patterns and infrastructure characteristics.	Port use characteristics (e.g., # and characteristics of vessels utilizing port, area of port used, and any new development by project); Analysis of OWED survey

		with fishermen and businesses.
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4.3.2. Tier 2: Elements Indirectly Affected by Port Utilization

Effects of changes in port utilization through changes in space use and infrastructure are listed below. See Appendix II for a general definition and scope of each Tier 2 element.

Individual and Community Well-being

Changes in space use and infrastructure due to OWED may affect individual and community well-being through, for example, changes to community identity and sense of place as a traditional fishing port and perceived job and fishing satisfaction and well-being associated with the presence of commercial and/or recreational fishing infrastructure. Increased recreational fishing around turbines may increase recreational fishing infrastructure and lead to changes in port usage and interactions between fishing sectors, further affecting community identity.

Relationships between individual and community well-being and other Tier 2 elements can be seen in section 4.2.1 above.

Fisheries Attributes

Changes in space use and infrastructure in ports may affect commercial and recreational fishing operations and practices including port of landing and homeport location. Changes in the availability of products and services and the distance traveled to reach them may also affect fishing attributes and operations, such as gear, and trip frequency and duration.

Relationships between fisheries attributes and other Tier 2 elements can be seen in section 4.2.1 above.

Fishing Labor & Demographics

Changes in space use and infrastructure in ports may affect fishing operations recruitment due to competition or opportunities stemming from OWED jobs. Port upgrades are likely to change dynamics and demographics in and around ports.

Relationships between fishing labor and demographics and other Tier 2 elements can be seen in section 4.2.1 above.

Shoreside Support/Seafood Supply Chain

Revenue for shoreside support businesses may increase in some ports and decrease in others if fleets shift landing and homeports based on changes to fishing grounds. Port expansion and upgrades may also draw fishing entities and support businesses to larger ports. Changes to port infrastructure, including upgrades, may increase cost of operation for shoreside support businesses and increase competition for space, potentially disrupting services and seafood supply operations.

Revenue and costs

Space use and infrastructure changes may affect dock access and slip costs, affecting operational expenses for fishing vessels.

There are many important indirect relationships affecting this element. For instance, effects associated with changes in port activity due to OWED have the potential to change costs associated with effects on shoreside support/seafood supply chain such as marine competition (e.g., goods, labor, and services). Changes in availability of products and services may also result in the need to travel farther distances (fisheries attributes) thus incurring additional costs and affecting revenue.

All other relationships between fishing labor and demographics and other Tier 2 elements can be seen in section 4.2.1 above.

4.3.2.1. Tier 2: Monitoring Approach of Port Utilization

Approaches for monitoring the impacts of Port Utilization IPF on Tier 2 elements of fisheries socio-economic conditions should include the methods and metrics in Table 13. Interconnections between elements in Tier 2 are also included in the table.

Table 13. Proposed indicators and methods to monitor Tier 2 elements associated with the Port Utilization IPF.

Tier 1	Tier 2	Monitoring Indicators	Methods	Tier 2 Connections
Space use and Infrastructure	Individual and Community Well-being	Changes to measures of well-being and community identity (e.g., self-reported job satisfaction, fishing satisfaction (for anglers), community indicators).	Analysis of OWED survey and NMFS Crew survey data.	Fishing Labor & Demographics (to/from) Revenue and Costs (from) Fisheries Attributes (to/from) Shoreside Support/Seafood Supply Chain (to/from)
	Fisheries Attributes	Changes in homeport, primary and landing ports, and trip length.	Analysis of fishery dependent data (e.g., Fishing Footprints, VTR, VMS, AIS, Observer Data) and user application data; Analysis of OWED survey and NMFS Crew survey data.	Individual and Community Well-being (to) Fishing Labor & Demographics (to/from) Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)
	Shoreside Support/Seafood Supply Chain	Changes in number, revenue and number of employees for shoreside businesses within a port.	Bureau of Labor statistics or other business data; Analysis of OWED survey with shoreside businesses.	Individual and Community Well-being (to) Fisheries Attributes (to/from) Revenue and Costs (to/from)
	Fishing Labor & Demographics	Changes in ownership patterns and number of crew, labor/pay structure, and recruitment.	NMFS permit database; Analysis of OWED survey; NMFS Crew survey data	Individual and Community Well-being (to/from) Fisheries Attributes (to/from)

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

				Revenue and Costs (to/from) Shoreside Support/Seafood Supply Chain (to/from)
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5. Monitoring Guidance

Following the guidance and recommendations in this section will help ensure scientific accuracy and comparability in future analyses.

- Monitoring programs should include elements to assess the effects of all three IPFs identified in this document. All Tier 1 elements should be included in the monitoring plan.
- For each Tier 1 element, identify relevant questions, i.e., what should be monitored, and identify the data and information available to monitor. Existing data and data streams and existing scientific research must be identified during this process.
- Identify elements from Tier 2 to be monitored and what questions can be answered utilizing the Tier 1 data.
- Consider the regional and local context while evaluating and identifying monitoring needs, questions, and elements to be monitored.
- Tier 1 and Tier 2 elements selected for the monitoring program must be assessed throughout all phases of development. Timeline, spatial scale and frequency of assessment will depend on the phase of development and elements being assessed (see section 5.1 below for more specific guidance).
- Engage with stakeholders often to identify priorities and available data, including consulting with NMFS during planning and implementation to obtain input on methods, data access, analyses, and research priorities.
- Implement comparable indicators and methods across wind projects within a region.
- Socio-economic monitoring plans must be developed alongside and in coordination with species and habitat monitoring plans during the drafting of each project-specific Construction and Operation Plan and before project approval.
- When needed, targeted research should also be identified at the planning stage and throughout the monitoring program implementation.

5.1. Tier 1 Monitoring by IPF

This section provides guidance on the development of monitoring plans for all Tier 1 elements under each IPF affecting fisheries socio-economic conditions. The tables below outline recommendations for monitoring each Tier 1 element associated with each IPF.

5.1.1. Structure Presence

Table 14. Guidelines for monitoring the Tier 1 element Fishable Area/Access, including data availability, need for baseline data collection and specific temporal and spatial scales for each OWED phase.

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Monitoring Indicators	Data Availability	Data Needs				
		Baseline	Pre-construction	Construction	Operation	Decommissioning
Frequency of regulatory spatial exclusions (e.g., safety zones) from construction activity, maintenance activity or accidental releases.	New data provided by the developer	N/A	During HRG surveys, the area and length of time that fisheries are excluded; all years.	During construction, the area and length of time that fisheries are excluded; all years.	Buffer zones; During maintenance activity, area and length of time that fisheries are excluded; In event of accidental release/wind spill, the area and length of time that fisheries are excluded; all years of operation.	Same as construction.
Changes in space use and density of fishing vessels due to presence of OWED infrastructure.	Existing data	A minimum 3 years, or work with stakeholders to determine appropriate time series, inside OWED areas and selection of adjacent and control sites.	During HRG surveys, the spatial and temporal use of fishing activity/vessels; inside OWED areas, and in adjacent and control sites; all years.	The spatial and temporal use of fishing activity/vessels; inside OWED areas, and in adjacent and control sites; all years.	The spatial and temporal use of fishing activity/vessels; inside OWED areas, and in adjacent and control sites; yearly for the first 3 years of operation and every 3-5 years for operational period.	Same as construction.

Table 15. Guidelines for monitoring the Tier 1 element Gear Operations, including data availability, need for baseline data collection and specific temporal and spatial scales for each OWED phase.

Monitoring Indicators	Data Availability	Data Needs				
		Baseline	Pre-construction	Construction	Operation	Decommissioning
Frequency of gear interactions with structures or debris.	New data provided by the developer and existing data.	N/A	During HRG surveys, the type and extent of interactions* with structures or debris (e.g., # of traps or vessels lost or damaged); all years.	The type and extent (# of traps, vessels) of interactions with structures or debris; all years.	The type and extent (# of traps, vessels) of interactions with structures or debris; all years.	Same as construction.

Table 16. Guidelines for monitoring the Tier 1 element Navigation, including data availability, need for baseline data collection and specific temporal and spatial scales for each OWED phase.

Monitoring Indicators	Data Availability	Data Needs				
		Baseline	Pre-construction	Construction	Operation	Decommissioning

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Changes in navigation patterns (transiting) and trip durations	Existing data	A minimum 3 years, or work with stakeholders to determine appropriate time series, inside OWED areas and selection of adjacent and control sites.	During HRG surveys, the spatial and temporal uses of transiting vessels; inside OWED areas, and in adjacent and control sites; all years	The spatial and temporal uses of transiting vessels; inside OWED areas, and in adjacent and control sites; all years	The spatial and temporal uses of transiting vessels; inside OWED areas, and in adjacent and control sites; yearly for the first 3 years and every 3-5 years for operational period.	Same as construction.
Frequency of allisions with OWED infrastructure.	New data provided by the developer and existing data.	N/A	N/A	The type and extent of interactions with OWED structures; all years.	The type and extent of interactions with OWED structures; yearly for operational period.	Same as construction.

5.1.2. Traffic

Table 17. Guidelines for monitoring the Tier 1 element Gear Operations, including data availability, need for baseline data collection and specific temporal and spatial scales for each OWED phase.

Monitoring Indicators	Data Availability	Data Needs				
		Baseline	Pre-construction	Construction	Operation	Decommissioning
Frequency of gear interactions with OWED vessels.	New data provided by the developer.	N/A	During HRG surveys, the type and extent (# of traps) of interactions with OWED vessels; all years.	The type and extent (# of traps) of interactions with OWED vessels; all years.	The type and extent (# of traps) of interactions with OWED vessels; yearly for operational period.	Same as construction.

Table 18. Guidelines for monitoring the Tier 1 element Navigation, including data availability, need for baseline data collection and specific temporal and spatial scales for each OWED phase.

Monitoring Indicators	Data Availability	Data Needs				
		Baseline	Pre-construction	Construction	Operation	Decommissioning
Frequency of collisions with OWED vessels.	New data provided by the developer and existing data.	N/A	During HRG surveys, the type and extent of interactions with OWED vessels; all years.	The type and extent of interactions with OWED vessels; all years.	The type and extent of interactions with OWED vessels; yearly for operational period.	Same as construction.

5.1.3. Port Utilization

Table 19. Guidelines for monitoring the Tier 1 element Space Use and Infrastructure, including data availability, need for baseline data collection and specific temporal and spatial scales for each OWED phase.

Monitoring Indicators	Data Availability	Data Needs				
		Baseline	Pre-construction	Construction	Operation	Decommissioning
Changes in port use patterns and infrastructure characteristics.	New data provided by the developer and existing data.	A minimum of 10 years, or work with stakeholders to determine appropriate time series, selection of control site.	Patterns of port use and development (e.g., # and characteristics of vessels utilizing port, area of port used, and any new development by project); first and last years.	Patterns of port use and development (e.g., # and characteristics of vessels utilizing port, area of port used, and any new development by project); first and last years or as appropriate by consultation with stakeholders.	Patterns of port use and development (e.g., # and characteristics of vessels utilizing port, area of port used, and any new development by project); every 5 years for life of the project or as appropriate by consultation with stakeholders.	Same as construction.

5.2. Tier 2 Monitoring

Guidance for Tier 2 elements monitoring is currently being developed with plans to gather input from stakeholders. The lists of indicators in Appendix IV are comprehensive but developers are not expected to monitor every one. Nonetheless, developers should engage with stakeholders to identify priorities. The data collection timeline for Tier 2 elements should align with Tier 1 elements.

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Draft

Appendix I

ACT MATOS Templates

Draft

This data dictionary is to assist you in filling out/interpreting the fields of the act_instrument_metadata_shortform.xls Excel file. It need not be submitted with your data.

Purpose: The act_instrument_metadata_shortform.xlsx Excel spreadsheet is for the **collection of deployment, recovery, and download metadata associated with data-collecting instruments** including acoustic receivers, sentinel tags, ADCPs, benthic pods, CPODs, CTDs, etc. Deployment, download, and recovery information for each station is entered on a single line. Green-shaded fields are mandatory. When more than one instrument is deployed, downloaded, or recovered at the same station, enter each one on a separate line using the same OTN_ARRAY, STATION_NO. When sentinel tags are co-deployed with receivers, their information can be added to TRANSMITTER and TRANSMIT_MODEL columns, on the same line as the receiver deployment. If a sentinel tag is deployed alone then a new line for that station, with as much information as possible, is added. When an instrument is deemed lost, "I" should be entered in the "recovered" field; it can subsequently be unlost, by changing this field to "f" and resubmitting the metadata sheet. Please submit all data electronically via email to the ACT data manager (east.coast.telemetry@gmail.com), or upload to your secure Data Portal repository. Any and all instrument-generated files, including receiver log files, should be saved and forwarded along with the metadata, even if there are no detections. Even though there may be no detections, the file still contains other important technical data.

Deployment		
Field Name	Units/format example	Definition
OTN_ARRAY	as in: CHESBAY; format: 5-10 characters	This field is mandatory and is a unique 5-10 character acronym you create for your project. It is the same code you created for your MATOS project code. If you are unsure, leave blank and data manager will fill in.
STATION_NO	as in: EB001 or RRDock; format: integer or name you gave station.	Sequential position of the mooring assembly on the array, generally from inshore to offshore or from North to South. If your array consists of more than one subarray, use an acronym to qualify the station name. For example, for two subarrays located in East Bay and West Bay, use EB001 and WB001. *No special characters or punctuation*
DEPLOY_DATE_TIME	as in: 2009-02-26T14:05:00; format: yyyy-mm-ddThh:mm:ss	Date and time that the equipment was deployed, in 24-hour UTC. Corresponds to the time of the captured waypoint.
DEPLOY_TIMEZONE	as in: UTC or EST/EDT	UTC is preferred , but please specify EST (Eastern Standard Time) or EDT (Eastern Daylight Time)
DEPLOY_LAT	as in: 44.47815; format: dd.ddddd; places: to 5 decimals	Latitude of the actual deployment location, in decimal degrees. <i>Note: in the southern hemisphere all latitudes must be negative.</i>
DEPLOY_LONG	as in: -063.53337; format: ddd.ddddd; places: to 5 decimals	Longitude of the actual deployment location, in decimal degrees. <i>Note: in the western hemisphere all longitudes must be negative.</i>
BOTTOM_DEPTH	as in: 75; format: integer	Depth at deployment location as recorded by the vessel's depth sounder, in meters.
RISER_LENGTH	as in: 50; format: integer	Length from the anchor to the topmost float or structure of the mooring assembly, in meters.
INSTRUMENT_DEPTH	as in: 20; format: integer	Depth of the instrument, in meters.
INS_MODEL_NUMBER	as in: VR2W, VR2AR, VR2Tx (for receiver), as in: Microcat SBE 37-SM V2.6 (for Sea-Bird Electronics Microcat CTD), as in ADCP-RDI (for RDI Instruments ADCP); format: free text, not otherwise specified	Model number of the instrument as provided by the manufacturer, if NOT acoustic then prefix with instrument type and manufacturer's name or acronym. For a benthic pod, append with date of current configuration.
INS_SERIAL_NUMBER	as in: 104514; format: free text, not otherwise specified	Serial number of the instrument as provided by the manufacturer. For benthic pod, the serial numbers of the instruments associated with the pod are provided in a separate configuration file according to date because these may change with time.
CODE_SET	as in: MAP-115; format: free text, not otherwise specified	Code set, MAP code etc. of the receiver during the recorded deployment period. If the code set is not known, can enter unknown.
TRANSMITTER	as in: A69-1303-12345; format: free text, not otherwise specified	If the instrument is a transceiver (AR or Tx model, this value must be the pinger associated with the receiver. <i>If pinger is turned on, transmitter ID is required</i> . Code space and ID of the transmitter co-deployed with the instrument (Sentinel Deployment). If this is a Sentinel Deployment, a separate record line should be used.
TRANSMIT_MODEL	as in: V9, V13, V16; format: free text, not otherwise specified	Model number of the tag as provided by the manufacturer. If the instrument is a transceiver, this value can remain blank and the INS_MODEL_NUMBER field will be used.
AR_MODEL_NUMBER	as in: 867; format: free text, not otherwise specified	Model number of the acoustic release as provided by the manufacturer.
AR_SERIAL_NUMBER	as in: 48635; format: free text, not otherwise specified	Serial number of the acoustic release as provided by the manufacturer.
DEPLOYED_BY	as in: Bates D, Barthelotte J; format: Last name first initial	Names of the lead technicians responsible for the deployment.
RECOVERED	as in: y; format: y, n, I, f, moved, or failed	Was the equipment recovered successfully? Enter "y" if it was successfully recovered, even if only for downloading and redeployment . Enter "moved" if the instrument was recovered at a substantial distance from its deployment location and complete RECOVER_LAT and RECOVER_LONG fields. Enter "n" if the instrument was downloaded remotely, without recovery. Enter "failed" if the recovery attempt was not successful. Enter "I" if the equipment is presumed lost after one or more unsuccessful recovery attempts. Enter "f" if a piece of equipment that was previously reported as lost is subsequently found.
RECOVER_DATE_TIME	as in: 2009-02-26T14:05:00; format: yyyy-mm-ddThh:mm:ss	Date and time that the equipment was recovered, in 24-hour UTC. Please provide date and time for both successful recoveries and unsuccessful recovery attempts that occur on different days.
RECOVER_TIMEZONE	as in: UTC or EST/EDT	UTC is preferred , but please specify EST (Eastern Standard Time) or EDT (Eastern Daylight Time)
RECOVER_LAT	as in: 44.47815; format: dd.ddddd; places: to 5 decimals	Latitude where the equipment was recovered, in decimal degrees. Unless it is found a substantial distance from its expected location, this can be left blank. For failed recovery attempts, use this field to record the central latitude of the recovery search or the last known latitude of the equipment. <i>Note: in the southern hemisphere all latitudes must be negative.</i>
RECOVER_LONG	as in: -063.53337; format: ddd.ddddd; places: to 5 decimals	Longitude where the equipment was recovered, in decimal degrees. Unless it is found a substantial distance from its expected location, this can be left blank. For failed recovery attempts, use this field to record the central longitude of the recovery search or the last known longitude of the equipment. <i>Note: in the western hemisphere all longitudes must be negative.</i>
DATA_DOWNLOADED	as in: y; format: y or n.	Were data downloaded? Yes or no. If no, please add comment.
DOWNLOAD_DATE_TIME	as in: 2009-02-26T14:05:00; format: yyyy-mm-ddThh:mm:ss	Date and time that data were downloaded, in 24-hour UTC. If a file is saved to disk, this could correspond to the time in the file or filename.
DOWNLOAD_TIMEZONE	as in: UTC or EST/EDT	UTC is preferred , but please specify EST (Eastern Standard Time) or EDT (Eastern Daylight Time)
FILENAME	as in: VR2W_123456_20181012_1.vrl; format: free text, not otherwise specified	Filename of the logfile downloaded from the instrument. Please copy and paste filename to avoid making data entry mistakes.

INSTRUMENT METADATA DATA SHEET v1.2

Created by OTN and adapted for ACT

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TOS

itory. See Data Dictionary sheet for a detailed description of each column. The e delete before submitting.

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COMMENTS

could not be retrieved at download will try again

This data dictionary is to assist you in filling out/interpreting the fields on the proposed station locations data sheet. It need not be submitted with your data.

Purpose: The Proposed Station Locations data sheet is used in the planning of ACT Network arrays to submit proposed latitudes and longitudes of receiver stations to make other network members aware of your planned deployments.

Field Name	Units/format example	Definition
REGION	as in: Northwest Atlantic	Colloquial name of the region in which the proposed array will reside.
PROJECT_CODE	as in: HFX; format: 3 letters	This field is mandatory and is a unique acronym assigned by your Node. Leave blank for projects new to ACT (a unique acronym will be assigned when data are uploaded to the ACT_MATOS database) or if you are uncertain of the acronym that has been assigned to your array.
SERIES_CODE	as in: ACT_MATOS or ACT_OWE	This field is mandatory and keeps track of offshore wind projects within the ACT Network. If your project is not affiliated with offshore wind activity, enter ACT_MATOS. If your project is affiliated with offshore wind, enter ACT_OWE.
STATION_NAME	as in: 1, HFX035; format: string	Sequential position of the mooring assembly on the array, generally from inshore to offshore or from North to South. If your array consists of more than one subarray, use an acronym to qualify the station name. For example, for two subarrays located in East Bay and West Bay, use EB001 and WB001.
BOTTOM_DEPTH	as in: 75; format: integer	Estimate of depth at deployment location, in meters.
PROPOSED_LAT	as in: 44.47815; format: dd.ddddd; places: to 5 or more decimals	Latitude of the proposed receiver location, in decimal degrees. <i>Note: in the southern hemisphere all latitudes must be negative.</i>
PROPOSED_LONG	as in: -063.53337; format: ddd.ddddd; places: to 5 or more decimals	Longitude of the proposed receiver location, in decimal degrees. <i>Note: in the western hemisphere all longitudes must be negative.</i>



Project Code

[illegible]

[illegible]

This data dictionary is to assist you in filling out/interpreting the fields on the tagging metadata data sheet. It need not be submitted with your data.

All dates and times are to be recorded in UTC 24-hour format. All latitudes and longitudes should reference the WGS84 map datum. For help with this form, please contact your ACT data manager - east.coast.telemetry@gmail.com or 443-482-2386

Field Name	Units/format example	Definition
ANIMAL_ID (floy tag ID, pit tag code, etc.)	format: free text, not otherwise specified	Identification code that uniquely identifies each animal, as specified by the researcher. This can be a floy tag ID, pit tag ID, name, or other unique identifier.
TAG_TYPE	as in: acoustic	Type of tag attached to animal. Some possible options are: acoustic tag, satellite tag, PIT tag, ID tag, brand, business card tag.
TAG_MANUFACTURER	as in: VEMCO	Name of tag manufacturer.
TAG_MODEL	as in: V9-6L	Tag model number as provided by the manufacturer.
TAG_SERIAL_NUMBER	as in: 1036912	Serial number assigned by tag manufacturer to uniquely identify tag.
TAG_ID_CODE	as in: 1450	In the case of an acoustic tag or Vemco mobile transceiver, this is the identification code transmitted by the tag, which is available from the tag manufacturer. For a satellite tag, it is the PTT code. For a VHF tag, this is the frequency at which the tag transmits.
TAG_CODE_SPACE	as in: A69-1303	Code space as provided by the tag manufacturer.
TAG_IMPLANT_TYPE	as in: internal	Indicates how tag was attached to animal (e.g. internal, external, oral, gastric, subcutaneous, etc.).
TAG_IMPLANT_METHOD	as in: inserted into abdominal cavity through midventral line incision, closed using 2 polydioxanone monofilament sutures.	Describe method and materials used to attach tag to animal.
TAG_ACTIVATION_DATE	as in: 2007-04-23; format: yyyy-mm-dd	Date tag activated, in UTC.
EST_TAG_LIFE	as in: 90 days	Estimate of the duration of time during which the tag will be transmitting. For tags that are recovered, this is the number of days between release and recapture.
TAGGER	as in: Sue Smith	First and last name of person conducting tagging. At this time, the database can only accept one name in this field.
TAG_OWNER_PI	as in: Sue Smith	First and last name of the Principal Investigator for the project. At this time, the database can only accept one name in this field.
TAG_OWNER_ORGANIZATION	as in: Sea Sleuths International	Affiliation of the Principal Investigator for the project.
COMMON_NAME_E	as in: coho	Common name of animal that carries the tag in English.
SCIENTIFIC_NAME	as in: Oncorhynchus kisutch	Scientific name of animal that carries the tag.
CAPTURE_LOCATION	as in: Keogh River, Winter Harbor, St. Paul's Island, or Boutillier's Point	Name of capture location. Please refer to a specific nearby point of land, town, island, or body of water that uniquely identifies this tagging location. For example, Gulf of Maine is too broad a region, but Winter Harbor would be appropriate.Okay to leave blank if same as release location.
CAPTURE_LATITUDE	as in: 43.12345; format: dd.ddddd; places: to 5 decimals	Latitude of capture location. Leave blank if same as release location. <i>Note: in the southern hemisphere all latitudes must be negative.</i>
CAPTURE_LONGITUDE	as in: -123.12345; format: ddd.ddddd; places: to 5 decimals	Longitude of capture location. Leave blank if same as release location. <i>Note: in the western hemisphere all longitudes must be negative.</i>
WILD_OR_HATCHERY	as in: W	Origin of animal that carries the tag. Enter W (wild), H (hatchery for hatchery reared or adipose clipped fish), or U (unknown)
STOCK	as in: Keogh River	River of origin for fish. Water Body of origin for other species. Can enter unknown or not applicable.
LENGTH (m)	units: m; place: to 3 decimals	Length of animal, depending on length type. Recommended, but not required
WEIGHT (kg)	units: kg; place: to 3 decimals	Weight of animal that carries tag, in kilograms. Recommended, but not required
LENGTH_TYPE	as in: Fork	Specify type of length recorded (e.g. hood length, fork length, standard length, etc.). Recommended, but not required
LENGTH2 (m)	units: m; place: to 3 decimals	Secondary length measurement. Recommended, but not required
LENGTH2_TYPE	as in: Width	Specify type of secondary size measurement (e.g. width) Recommended, but not required
LIFE_STAGE	as in: juvenile	Life stage of animal. This will depend on the species being studied and can be a standard code used for that species, a description, or both.
AGE	as in: 7; format: numeric	Age of animal. Enter unknown if age not known.
AGE_UNITS	as in: months	Specify units used in AGE field. Leave blank if age unknown.
SEX	as in: M	Sex of animal. M, F or H. Can enter unknown (U).
DNA_SAMPLE_TAKEN	as in: yes	Yes/no, if the animal that carries the acoustic tag is also sampled for DNA.
TREATMENT_TYPE		Contains a designation of treatment group as appropriate for the particular study. Researchers will have to contact the authors directly for definitions. Try to make these as clear as possible (e.g. use Control instead of C, Lake release instead of Lake).
RELEASE_GROUP	as in: 1	Numerical field that increments sequentially for each release date.
RELEASE_LOCATION	as in: Keogh River, Winter Harbor, St. Paul's Island, or Boutillier's Point	Name of release location. Please refer to a specific nearby point of land, town, island, or body of water that uniquely identifies this tagging location. For example, Gulf of Maine is too broad a region, but Winter Harbor would be appropriate.
RELEASE_LATITUDE	as in: 43.12345; format: dd.ddddd; places: to 5 decimals	Latitude of release location. <i>Note: in the southern hemisphere all latitudes must be negative.</i>
RELEASE_LONGITUDE	as in: -123.12345; format: ddd.ddddd; places: to 5 decimals	Longitude of release location. <i>Note: in the western hemisphere all longitudes must be negative.</i>
UTC_RELEASE_DATE_TIME	as in: 2009-05-17T14:12:00; format: yyyy-mm-ddThh:mm:ss	Date and time that tagged animal was released, in UTC.
REALRELEASE_TIMEZONE	as in: UTC	UTC is preferred, please specify
HARVEST_DATE	as in: 2009-05-17; format: yyyy-mm-ddThh:mm:ss	*Only required if applicable. Date that the tag was recovered from a captured animal, in UTC. example: if a fish is caught and the tag returned to the researcher. Note this is the date the previously released animal was recaptured. It will affect the enddate of the previous release as well as the estimated tag life for this release.
CAPTURE_DEPTH	as in: 200	Water depth where the fish were caught, in metres.
TEMPERATURE_CHANGE	as in: 20.0; places: to 1 decimal	Difference between the water temperature at the depth at which the fish were caught and the surface water temperature, in degrees celsius.
HOLDING_TEMPERATURE	as in: 10.3; places: to 1 decimal	This measure is the highest or lowest water bath temperature the fish will experience during holding (depends if surgical water temperatures are increasing or decreasing relative to initial water temperature reading). For example, if tagging is being conducted in early summer, the recirculating bath is 10.2 degrees, and the sedation bath is 10.0 degrees, then the higher value would be recorded to one decimal place (i.e. 10.2°C).
PREOP_HOLDING_PERIOD	as in: 2 hours	Time that animal is held prior to surgery, in hours.
POST_OP_HOLDING_PERIOD	as in: 48 hours	Time the animal is held after surgery until release, in hours.
SURGERY_LOCATION	as in: Keogh River fence	Short name of surgery location (i.e. hatchery name).
DATE_OF_SURGERY	as in: 2007-04-23; format: yyyy-mm-dd	Date that surgery was conducted, in UTC.
SURGERY_LATITUDE	as in: 43.12345; format: dd.ddddd; places: to 5 decimals	Latitude of surgery location. <i>Note: in the southern hemisphere all latitudes must be negative.</i>
SURGERY_LONGITUDE	as in: -123.12345; format: ddd.ddddd; places: to 5 decimals	Longitude of surgery location. <i>Note: in the western hemisphere all longitudes must be negative.</i>
SEDATIVE	as in: aquacalm	Name of sedative used if applicable.
SEDATIVE_CONCENTRATION	units: ppm; place: to 1 decimal	Concentration of sedative.
ANAESTHETIC	as in: Tricaine methanesulfonate	Name of anaesthetic used if applicable.
BUFFER	as in: Sodium bicarbonate	Name of buffer used if applicable.
ANAESTHETIC_CONCENTRATION	units: ppm; place: to 1 decimal	Concentration of anaesthetic.
BUFFER_CONCENTRATION_IN_ANAESTHETIC	units: ppm; place: to 1 decimal	Concentration of buffer in anaesthetic.
ANESTHETIC_CONCENTRATION_IN_RECIRCULATION	units: ppm; place: to 1 decimal	Concentration of anaesthetic in recirculation bath.
BUFFER_CONCENTRATION_IN_RECIRCULATION	units: ppm; place: to 1 decimal	Concentration of buffer in recirculation bath.
DISSOLVED_OXYGEN (ppm)	units: ppm; place: to 1 decimal	Oxygen levels are of concern (we are mainly concerned with low levels unless pure oxygen is being used to aerate the water). This measure is the lowest oxygen level the fish will experience during the surgery. For example, if using regular fish pumps for air, the recirculating bath is 7.1 ppm, and the sedation bath is 8.8 ppm, the lower value would be recorded to one decimal place (i.e. 7.1 ppm).
COMMENTS	as in: fish was exposed to aluminum during surgical procedure	Any comments deemed to have scientific relevance by the tagger.

**TAGGING METADATA
DATA SHEET
version 4.3**

PLEASE SUBMIT THIS DATA SHEET to your project page or east.coastal.edu

Please fill out as many columns as possible. The **GREEN SHADED** columns are mandatory.
A row of sample data is shown. Please delete this row when completing this sheet. !

ANIMAL_ID (floy tag ID, pit tag code, etc.)										
	TAG_TYPE	TAG_MANUFACTURER	TAG_MODEL	TAG_SERIAL_NUMBER	TAG_ID_CODE	TAG_CODE_SPACE	TAG_IMPLANT_TYPE	TAG_IMPLANT_METHOD	TAG_ACTIVATION_DATE	EST_TAG_LIFE
Sample Data	Acoustic	Innovasea	V9-6L	1036912	1450	A69-1303	INTERNAL	Midventral line incision, 2 sutures	2007-03-16T00:00:00	90 days

ist.telemetry@gmail.com

istory. This data sheet was created by the Pacific Ocean Shelf Tracking (POST) Project and has been modified by OTN.
See Data Dictionary sheet for a detailed description of each column.

TAGGER	TAG_OWNER_PI	TAG_OWNER_ORGANIZATION	COMMON_NAME_E	SCIENTIFIC_NAME	CAPTURE_LOCATION	CAPTURE_LATITUDE	CAPTURE_LONGITUDE	WILD_OR_HATCHERY	STOCK	LENGTH (m)	WEIGHT (kg)	LENGTH_TYPE
JOE RESEARCHER	JANE RESEARCHER	JANE AND JOE RESEARCH INSTITUTE	CHINOOK	Oncorhynch us tshawytscha	CLEAR CREEK, KOOSKIA NFH	46.12972	-115.93472	W	Atlantic	0.152	0.045	FORK

LENGTH2 (m)		LENGTH2_TYPE	LIFE_STAGE	AGE	AGE_UNITS	SEX	DNA_SAMPLE_TAKEN	TREATMENT_TYPE	RELEASE_GROUP	RELEASE_LOCATION	RELEASE_LATITUDE	RELEASE_LONGITUDE
0.2	WIDTH		JUVENILE	7	months	M	N	ROR	1	CLEAR CREEK, KOOSKIA NFH	46.12972	-115.93472

UTC_RELEASE_DATE_TIME	RELEASE_TIMEZONE	HARVEST_DATE	CAPTURE_DEPTH (m)	TEMPERATURE_CHANGE (degrees C)	HOLDING_TEMPERATURE (degrees C)	PREOP_HOLD_PERIOD	POSTOP_HOLD_PERIOD	SURGERY_LOCATION
2007-07-05T22:15:00	UTC	9/5/2007 (this is only for tag recaptures, leave blank otherwise)	35	3.1	10.3			KOOSKIA NATIONAL FISH HATCHERY

DATE_OF_SURGERY	SURGERY_LATITUDE	SURGERY_LONGITUDE	SEDATIVE	SEDATIVE_CONCENTRATION (ppm)	ANAESTHETIC	BUFFER	ANAESTHETIC_CONCENTRATI ON (ppm)	BUFFER_CONCENTRATION_IN_ ANAESTHETIC (ppm)	ANAESTHETIC_CONCENTRATI ON_IN_RECIRCULATION (ppm)	BUFFER_CONCENTRATION_IN_ RECIRCULATION (ppm)	DISSOLVED_OXYGEN (ppm)	COMMENTS
2007-11-04T00:00:00	46.12972	-115.93472	TRICAINE METHANES ULFONATE	20.0	TRICAINE METHANES ULFONATE	SODIUM BICARBON ATE	70.0	140.0	50.0	100.0	9.4	146 FL mm; 39.04 WT g; pit tag not attached; tight fit

ACOUSTIC RECEIVER SERVICING

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded Retrieved	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	
Battery Changed: Y N Volts:			

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded Retrieved	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	
Battery Changed: Y N Volts:			

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded Retrieved	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	
Battery Changed: Y N Volts:			

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded Retrieved	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	
Battery Changed: Y N Volts:			

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	

	Retrieved	Notes:
Battery Changed: Y N	Volts:	

ACOUSTIC RECEIVER SERVICING

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded Retrieved	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	
Battery Changed: Y N Volts:			

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded Retrieved	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	
Battery Changed: Y N Volts:			

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded Retrieved	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	
Battery Changed: Y N Volts:			

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded Retrieved	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	
Battery Changed: Y N Volts:			

Date	Location	Initialization Time (UTC)	Deployment Time (UTC)
Receiver #	Action Deployed Data Downloaded	Latitude	Longitude
Water Depth (m)		Instrument Depth: Notes:	

	Retrieved	Notes:
Battery Changed: Y N	Volts:	

ACOUSTIC RECEIVER SERVICING

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded Retrieved	Notes	
Battery Changed: Y N Volts:			

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded Retrieved	Notes	
Battery Changed: Y N Volts:			

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded Retrieved	Notes	
Battery Changed: Y N Volts:			

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded Retrieved	Notes	
Battery Changed: Y N Volts:			

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded	Notes	

	Retrieved	
Battery Changed: Y N	Volts:	

ACOUSTIC RECEIVER SERVICING

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded Retrieved	Notes	
Battery Changed: Y N Volts:			

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded Retrieved	Notes	
Battery Changed: Y N Volts:			

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded Retrieved	Notes	
Battery Changed: Y N Volts:			

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded Retrieved	Notes	
Battery Changed: Y N Volts:			

Date	Location	Retrieval Time (UTC)	Deployment Time (UTC)
Receiver #	Action	Latitude	Longitude
Water Depth (m)	Deployed Data Downloaded	Notes	

	Retrieved	
Battery Changed: Y	N	Volts:

Appendix II

Definition of Tier 2 elements:

Tier 2	General Definition
Individual and Community Well-being	Includes (but not limited to): a) Community Identity - Sense of place and community, community dependence and reliance on fishing; place, symbolic value and landscape fit. b) Access and resource distribution. c) Social Capital - Refers to trust, shared values, and benefits generated via relationships and networks between fishery participants, families, social groups, businesses (owned, operated, or used) and formal institutions, within and among places, that enable individuals and groups to function effectively. d) Job Satisfaction and self-reported Well-being - Refers to levels of job satisfaction among fishermen and self-reported well-being of individuals and fishing communities (place based and activity level communities), including changes to stakeholder pressure, identity, characteristics of livelihoods, safety, time away from home, mental health, motivation, preference, perceptions, values, beliefs, and behavior, including aspects related to adaptive capacity. e) Food security and food provision- refers to the ability to produce enough food to meet needs (provision) and the ability to access enough safe and nutritious food to maintain a healthy life (security).
Fisheries Attributes	Includes (but not limited to): Commercial and recreational fishing operations and practices, including fishing grounds and locations, landings characteristics (amount, size, quality) and species composition, gear use and configuration, spatial and temporal use patterns, fishing effort (number of vessels and trips, trip duration, gear deployment time), fleet and vessel characteristics (e.g., length, use of fish-finding equipment, horsepower), and fishing mode, port of landing and homeport location.
Shoreside support/seafood supply chain	Shoreside support: Infrastructure capacity for servicing necessary operations for commercial and recreational fishing. This includes changes in the number and characteristics of shoreside support service companies, employees in seafood sectors, average annual wages and location quotient for wages and employment, and employment characteristics (e.g., owner-operator vs. company owned). Seafood supply chain: Operations including primary wholesaling and processing (the initial phase of distribution typically unloading vessels and/or purchasing directly from the harvesters), import-export operations (receiving and/ or preparing products for shipment and brokering), secondary wholesaling or distributing (all distribution, storage, packing, or repacking that takes place between the wholesale market or processor), final retail point of sale, food service (all activities resulting in the sale of prepared foods to

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

	the end consumer, such as restaurants), and retail markets (establishments selling seafood for at-home consumption including supermarkets, independent grocers, and specialty seafood markets (adapted from Murray 2016).
Fisheries Management	Refers to the management of marine fisheries. In the U.S. EEZ fisheries management is regulated by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) which works to "sustain, protect and increase domestic seafood supply, maintain and enhance recreational and subsistence fishing opportunities, protect ecosystem health and sustainability, create jobs, support related economic and societal benefits, and sustain community resilience" (NOAA Fisheries 2024). U.S. fisheries management is also guided by the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). Individual states are responsible for fishery management from their coastline out to three miles.
Revenue and costs	Commercial and recreational fisheries physical, financial capital, revenue and cost of fishing both fixed (e.g., insurance) and trip (e.g., fuel, bait, groceries).
Fishery Labor & Demographics	Characteristics of the commercial and recreational fishing sectors and labor dynamics, including role (e.g., crew, captains, owners), age, gender, ethnicity, race, marital status, education, income level, residence location, type and household size, crew size and composition, hours worked, years employed in fishing, part time v. full time crew and seasonal employment, salary/payroll, training/education requirements, recruitment, employment rates and structure, and fleet dynamics and ownership patterns (e.g., company owned vs. family owned, fleet consolidation), and social stratification. Human capital - refers to the skills and knowledge of people (individually and collectively).

Appendix III

Sample questions for survey to collect data on baseline fisheries socio-economic conditions. Additional surveys should follow a similar line of questioning for other OWED phases and stakeholders.

Fishermen Survey Example

Objectives

The survey was developed to gather insights from commercial and recreational (for-hire and private angler) fishermen about topics related to Tier 2 elements (i.e., fisheries attributes, well-being, costs, etc.) to better understand the potential effects of offshore wind energy development (OWED) on fisheries socio-economic conditions. More importantly, this survey was developed to help establish a baseline understanding before offshore wind projects begin construction.

Instructions

Participation is voluntary, and responses will be confidential. The survey should take approximately 15-20 minutes to complete. For open-ended questions, provide as much detail as you are comfortable sharing.

Interviewer: _____ Date: _____ Time: _____
 Location: _____ Sample ID: _____

Background Information

1. Fishing type (choose one):

Commercial

Recreational (private angler)

For-hire (i.e., party, charter)

1.1 Has your fishing type changed from last year?

1.2. If commercial fisherman, what is your primary role in the fishing industry?

Vessel owner

Captain

Crew member

Other: _____

1.2.1. Has your primary role changed from last year?

1.2.2. If captain or vessel owner, how many crew do you typically employ during your main fishing season?

1.1.3. Compared to last year, has the number of crew you employ changed?

1.2. If recreational fisherman, what percentage of your fishing last year was conducted from the following modes (total must add up to 100)?

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Shore/pier:	____%
For-hire vessel (i.e., party/ charter boat):	____%
Private vessel:	____%
Did not fish last year:	____%
Total	100%

2. What type(s) of fishing gear do you primarily use? (Choose all that apply)

- Trawl
- Dredge
- Longline
- Gillnet
- Pot/Trap
- Hook and line
- Other: _____

2.1 Has your primary gear changed from last year?

If yes, what gear did you use before?

3. What species do you primarily target?

3.1 Compared to last year, have your primary targeted species changed?

If yes, what species did you used to target?

4. How many years have you been involved in fishing (commercial or recreational)?

Fisheries Attributes

5. What is the average duration of your fishing trips (specify hours or days)?

5.1. Has the duration of your fishing trips changed over the past year?

If yes, what was the average duration of your fishing trips before?

6. What is your primary fishing area (coordinates, distance from shore, or specific zones)?

6.1. Has your primary fishing area changed over the past year?

If yes, where did you used to fish?

7. What is your primary port of landing or fishing base?

7.1 Has your primary port of landing or fishing base changed over the past year?

If yes, what was your primary landing port/fishing base?

8. How would you describe the availability of fish in your fishing area over the last year?

Increased

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Decreased

Stayed the same

9. Over the last year, have you been excluded from any or parts of your traditional fishing ground(s)?

If yes,

- 9.1. Why were you excluded?
 9.2. For how long were you excluded?
 9.3. How many fishing days did you lose?
 9.4. Have you been able to return to this area?
 9.5. What is the estimated income lost compared to last year from this exclusion?

Individual and Community Well-being

10. How much do you agree or disagree with the following statements?

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
10.1. Fishing is a critical part of my identity and way of life.					
10.2. I feel supported by my fishing community.					
10.3. My current income or enjoyment from fishing meets my expectations.					
10.4. I feel confident in the future of fishing in my area.					

11. How satisfied or dissatisfied are you with the following items relating to the job of fishing? *(For commercial fisherman only)*

	Very Dissatisfied (1)	Somewhat Dissatisfied (2)	Neither satisfied nor dissatisfied (3)	Somewhat Satisfied (4)	Very Satisfied (5)
11.1. Your actual earnings					
11.2. The predictability of your earnings					

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

11.3. Job safety (e.g., physical risks to you from working as a fisherman)					
11.4. The amount of time spent away from home					
11.5. Physical fatigue of the job					
11.6. Healthfulness of the job (e.g., how your job as a fisherman may affect your physical and mental health)					
11.7. Adventure of the job					
11.8. Challenge of the job					
11.9. Opportunity to be your own boss					

12. How much do you agree or disagree with the following statements?

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
12.1. I have many options available if I decide to no longer be a fisherman.					
12.2. I am confident that I could get work elsewhere if I needed to.					
12.3. I am too young to retire and too old to find work elsewhere.					
12.4. I would be nervous trying something else.					
12.5. I can cope with small changes in industry.					
12.6. I have planned for my financial security.					
12.7. Every time there is a change, I plan a way to make it work for me.					

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

12.8. I am more likely to adapt to change compared to other fishermen.					
12.9. I do not think I am competitive enough to continue fishing much longer.					
12.10. I am confident things will turn out well for me.					
12.11. If there are any more changes I will not continue much longer.					
12.12. I am interested in learning new skills outside of the industry.					

13. What are the main challenges you currently face in fishing?

14. What community resources or support systems would improve your fishing experience or operations?

15. Have you considered or are considering leaving the fishing industry?

15.1. If yes, please explain why:

Perspectives on Offshore Wind

16. How informed do you feel about offshore wind energy development?

Very informed

Somewhat informed

Not very informed

Not informed at all

17. To what extent do you agree or disagree with the following statements about offshore wind energy development?

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
17.1. Offshore wind energy development will create opportunities for the fishing industry.					
17.2. I am concerned about potential effects on fish abundance and behavior.					

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

17.3. Offshore wind projects will make fishing more challenging in my area.					
17.4. Offshore wind energy development will reduce access to traditional fishing grounds.					
17.5. Offshore wind projects will lead to competition for space in the ocean.					
17.6. I am concerned about safety risks (e.g., navigation challenges) posed by offshore structures.					

18. What are your greatest concerns or expectations about offshore wind development?

Shoreside Support and Seafood Supply Chain

19. What shoreside services are essential for your fishing activities? (Choose all that apply)

Docking facilities

Fish processing plants

Gear repair shops

Other: _____

20. Have there been any recent changes in the availability or quality of these services?

20.1 If yes, please describe these changes:

Revenue and Costs

21. Compared to last year, how have your fishing revenues changed?

Increased

Decreased

Stayed the same

22. Compared to last year, how have your operational costs or expenditures (e.g., fuel, gear) changed?

Increased

Decreased

Stayed the same

Fishery Labor

23. Do you currently have sufficient crew or labor to meet your fishing needs?

24. Overall, do you anticipate needing additional crew or training to adapt to changes in fishing operations or regulation?

Demographics

25. What is your age?
26. What town/city do you live in? (Include zip code)
27. How long have you lived in your current community?
28. What is the last grade or degree you completed in school?
29. What is your gender identity?
30. What is your approximate annual income from fishing activities?
- Under \$10,000
 - From \$10,000 to \$19,000
 - From \$20,000 to \$29,000
 - From \$30,000 to \$39,000
 - From \$40,000 to \$49,000
 - From \$50,000 to \$59,000
 - From \$60,000 to \$69,000
 - From \$70,000 to \$79,000
 - From \$80,000 to \$89,000
 - From \$90,000 to \$99,000
 - \$100,000 and above
 - Prefer not to answer
31. Do you have any additional income sources?
- 31.1 If yes, what are your additional sources of income?
32. Any additional comments you would like to share?

Appendix IV

Monitor Guidance for Tier 2 Elements

The tables below outline recommendations of suggested indicators to monitor each Tier 2 element, as well as data sources or methods for collecting data. Since most of the indicators listed interact with all three IPFs (Structure Presence, Traffic, and Port Utilization), we eliminated the redundancy of including a dedicated IPF column in each table. It is important to note that these indicators typically reflect the combined and overlapping effects of OWED outcomes, rather than being attributable to a single IPF in isolation. Indicators have been gathered from previous studies and articles (Mackinson et al. 2006, Pinello et al. 2017, Hélène et al. 2022, Kruse et al. 2024, Willis-Norton et al. 2024). Pinello et al. (2017) provides general guidance on developing fisheries socio-economic surveys, but does not provide information on evaluating impacts from OWED.

Table 1. Individual and community well-being indicators alongside brief descriptions and relevant data sources and/or methods.

Indicator	Description	Data Source/ Method
Job satisfaction	Perceived satisfaction with fishing livelihood	NMFS Crew Survey; Survey/ interview
Mental health status	Self-reported stress, anxiety, or depression symptoms	Survey/ interview
Perceived safety	Fishermen's perceived risk while at sea	Survey/ interview
Social cohesion	Sense of connection/ trust among fishermen/ community	Survey/ interview
Perceived fairness of OWED process	View on how fair/inclusive OWED decision-making has been	Survey/ interview
Community identity	Sense of place and connection to fishing community	Survey/ interview
Perceived ability to continue fishing	Confidence in long-term viability of fishing as a livelihood	Survey/ interview
Community dependence on fishing	Proportion of local income or employment from fishing	Census; CSVI; Survey / interview
Fishing dependence (individual)	Proportion of income from fishing at individual or household level	Survey, economic profiles, NOAA surveys
Dependents supported by fishing	Number of dependents supported by fishermen's income	Survey
Access and resource distribution	Fair access to fishing grounds and resources	Survey/ interview

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Social capital	Trust, shared values, and benefits from social networks in fishing communities	Survey/ interview
Social network connectivity	Strength and structure of social or professional networks	Survey/ interview; social network analysis
Well-being perceptions	Self-reported well-being and livelihood satisfaction	Survey/ interview
Economic well-being (qualitative)	Perceived economic status and stability	Survey/ interview
Employment flexibility	Ability to switch to alternative employment (diversification)	Survey/ interview
Previous employment	Employment history prior to fishing	Survey/ interview
Fleet clustering	Number of vessels from the same fleet per harbor/ports	Permit data
Trips during dangerous conditions	Trips during bad weather	Logbooks; Observer data; Survey/ interview
Years spent fishing	Time invested in the fishing occupation	Survey/ interview
Fishing from other ports/boats	Access or ability to operate from alternative ports or vessels	Survey/ interview
Member of association or partnership	Fishermen participating in associations, co-ops, or partnerships	Survey; Registry of Association
Tenure in leased area	Years vessel or fisherman has operated in OWED lease area	Survey, VTR / logbooks
Subsistence fishing households	Households relying on fishing for direct household consumption	Survey/ interview
Food availability	Availability of local seafood to community members	Survey/ interview
Seafood market distribution	Proportion of local seafood for domestic v. export markets	Dealer data and Market data
Seafood affordability	Cost of seafood for local consumers	Market data, survey

Table 2. Fishery attributes indicators alongside brief descriptions and relevant data sources and/or methods.

Indicator	Description	Data Source/ Method
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REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Change in fishing grounds	Relocation of fishing effort	VMS; AIS; Fishing footprint data; Survey/ interview
Days at sea	Number of days during which the vessel is at sea	VTR; Logbooks; Survey/ interview
Change in type of gear	Type of gear used during a fishing trip.	VTR; Logbooks; Survey/ interview
Change in gear use characteristics	Soak time (passive gear); length of tow (mobile gear)	VTR; Logbooks; Survey/ interview
Gear configuration	Specific gear setup and modifications	Survey/ interview
Change in target species	Main species targeted by fishermen	VTR; Logbooks; Survey/ interview
Catch composition (diversity)	Species richness; Relative abundance; Diversity indices	Observer data; VTR; Logbooks
Landings characteristics	Species composition, numbers, lengths, sex ratio	Observer data; Survey/ interview
Total catch	Weight per year; Number caught by length class	VTR; Logbooks; Observer data
Catch quality	Size, appearance, and texture of catch	Survey/ interview
Fishing effort	Catch per unit effort, Landings per unit effort, Catch per unit area	VTR; Logbooks; Observer data; Survey/ interview
Relative fishing effort	Effort inside OWED areas relative to regional effort	VMS; AIS; Logbooks
Change in bycatch	Amount and type of non-target catch	Observer data
Fleet activity level	Number of vessels operating	Permit data; VMS; AIS; Survey/ interview
Effort concentration and displacement	Degree of overlap in fishing areas (crowding)	VMS; AIS; Fishing footprint data; Survey/ interview
Vessel characteristics	Length, age, and engine power of vessel	Permit data; Survey/ interview
Use of fish finding equipment	Presence or type of sonar/ fish-finding tech	Survey/ interview
Number of permits per vessel	Total fishery permits associated with a vessel	Permit data; Survey/ interview

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Change in trip frequency (commercial)	Number of trips (weekly, monthly, annually)	VTR; Logbooks; Survey/ interview
Fishing time	Time actively fishing	VTR; Logbooks
Steaming distance	Distance traveled to fishing grounds	VMS; AIS; Logbooks
Steaming time	Time spent traveling to fishing grounds	Logbooks; Survey/ interview
Total distance per day	Sum of steaming and fishing distances	VMS; AIS; Logbooks
Total time at sea (length)	Trip duration in hours or days	Logbooks; Survey/ interview
Vessel home port	Registered home port of vessel	Permit data
Primary landing port	Port most frequently used for landings	VTR; Logbooks; Dealer data'; Survey/ interview
Change in trip frequency (recreational)	Number of trips (weekly, monthly, annually)	Fishing Effort Survey; Survey/ interview
Number of anglers	Number of individuals participating in recreational fishing	State permit data
Recreational harvest	Targeted species by anglers	Access Point Angler Intercept Survey; Survey/ interview
Recreational abundance	Number of fish harvested recreationally	Access Point Angler Intercept Survey; Survey/ interview
Mode of recreational trip	Shore, private or rental boat, or for-hire vessel	Access Point Angler Intercept Survey; Survey/ interview

Table 3. Revenue and costs indicators alongside brief descriptions and relevant data sources and/or methods.

Indicator	Description	Data Source/ Method
Bait cost	Expenditure of bait per trip	NMFS cost survey; Survey/ interview
Purchasing ice	Quantity and cost of ice used to preserve catch	NMFS cost survey; Survey/ interview
Fuel	Volume and cost of fuel used per day or trip	NMFS cost survey; Survey/ interview
Licenses/permits	Total cost of required licenses and permits	NMFS cost survey; Survey/ interview
Insurance cost	Insurance premiums or claim	Survey/ interviews

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

	frequency	
Mooring fees	Cost of docking vessel at port	NMFS cost survey; Survey/ interview
Vessel repair/ maintenance	Maintenance and repair expenses, including propulsion engine, deck equipment/ other machinery, hull, lost or damaged fishing gear, processing/ refrigeration, safety equipment, haul-out costs	NMFS cost survey; Survey/ interview
Gear upgrade cost	Cost associated with changing or upgrading gear	NMFS cost survey; Survey/ interview
Safety equipment cost	Expenditures for new or upgraded safety gear	NMFS cost survey; Survey interview
Catch value	Total value (\$) of daily landings	Dealer data; Logbooks; Survey/ interview
Value per unit effort (VPUE)	Revenue per unit effort	VTR; Logbook; Dealer data
Average fleet cost (total cost divided by catch)	Total cost per unit of catch for a fleet	Survey/ interview
Fishermen income	Average income earned by fishermen	Survey/ interview
Total revenue	Catch weight multiplied by unit price of species	Dealer data; Logbooks; Survey/ interview
Economic dependence on fishing	Percentage of revenue from within an OWED area compared to total revenue	Fishing footprint data; VTR
Profit (revenue - cost)	Yearly profit, i.e., revenue minus total cost	Survey/ interview
Overhead Costs	Includes: business vehicle, usage costs, business travel costs, association fees paid, professional fees paid, advertising costs, communications costs office/ workshop/ storage, expenses, non-crew labor payments	NMFS cost survey; Survey/ interview

Table 4. Shoreside support/seafood supply chain indicators alongside brief descriptions and relevant data sources and/or methods.

Indicator	Description	Data Source/ Method
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REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Destination of landings	Percentage of the different channels fishermen use to sell their product (e.g., wholesaler, retail market, processors, restaurant, direct export, others)	Logbooks; Dealer data; Survey/ interview
Number of shoreside service companies	Count and types of businesses providing fuel, ice, repairs, etc.	Survey/ interview
Changes to support services	Availability of fuel, ice, gear supply, repairs, etc.	Survey/ interview
Changes to cost of services	Prices for fuel, ice, slips, repairs, etc.	Survey/ interview; invoices
Employees in shoreside services	Number of workers employed in port-based service industries	Census Bureau stats; IMPLAN; Survey/ interview
Wages in shoreside services	Average wages of seafood and port service workers	Labor statistics
Number of active dealers	Change in the number of seafood dealers in a port	Dealer reports
Changes in product form	Shifts in how catch is processed (fresh, frozen, filleted)	Survey/ interview
Employees in seafood sectors	Number of workers employed in seafood processing, transport, sales	Census Bureau stats; IMPLAN; Survey/ interview
Employment characteristics	Ratio of owner-operators to company-owned labor	Survey/ interview
Revenue share from fisheries	Percentage of shoreside business revenue from fisheries	Survey/ interview
Changes in seafood import/exports	Variations in international trade of seafood	USDA Foreign Agricultural Service data;

Table 5. Fishing labor and demographics indicators alongside brief descriptions and relevant data sources and/or methods.

Indicator	Description	Data Source/ Method
Role	Job title or role (e.g., crew, captains, owners)	Survey/ interview
Age	Year of birth	Survey/ interview
Gender	Proportion of fishermen by gender	Survey/ interview
Ethnicity	Ethnic or cultural background	NMFS crew survey; Survey/ interview

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Race	Racial category: White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, Other	NMFS crew survey; Survey/ interview
Marital status	Marital status of fisherman	Survey/ interview
Education level	Highest level of education attained by fisherman	Survey/ interview
Residence location	Home residence of fishermen (county, state, zip code)	Survey/ interview
Household size	Number of people living in fisherman's household	Survey/ interview
Income	Average pay or salary per trip or year	Survey/ interview
Crew size	Number of crew members per trip	VTR; Logbooks; Survey/ interview
Fleet dynamics and ownership patterns	Ownership structure (family, company, cooperative)	Permit data; Survey/ interview
Work hours (on and off the vessel)	Hours worked daily, weekly, monthly, annually	Logbooks; Survey/ interview
Employment characteristics	Employment type (part-time, full-time, seasonal; salary/payroll)	Survey/ interview
Years employed in the fishing industry	Years of experience	Survey/ interview
Training/education requirements	Certification or training required for employment	Regulatory documents; Survey/ interview
Recruitment challenges	Difficulty finding deckhands or skilled labor	Survey/ interview
Problem of succession	Perceived or observed difficulty passing business to next generation	Survey/ interview

Table 6. Fishery management indicators alongside brief descriptions and relevant data sources and/or methods.

Indicator	Description	Data Source/ Methods
Changes in catch limits	Adjustment to allowable catch limits in response to OWED	FMPs

REGIONAL STANDARDS FOR OFFSHORE WIND PROJECT-LEVEL MONITORING

Changes in closures	Creation or modification of seasonal or area fishing closures due to OWED	FMPs; regulatory documents
Changes to gear restrictions	New or modified rules on gear type, use, or configuration	FMPs; regulatory documents
Changes to buffer zones	Adjustment of spatial buffer areas around OWED areas	USCG notices/ documents

Draft



DEPARTMENT OF THE ARMY

**US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011**

August 19, 2025

Louis A. Chiarella
Assistant Regional Administrator
NOAA Fisheries
Habitat Conservation Division
55 Great Republic Drive
Gloucester, MA 01930

RE: Federal Agency Response – York River Entrance Channel, Maintenance
Dredging; Essential Fish Habitat Assessment

Dear Mr. Chiarella:

This letter is in response to the Essential Fish Habitat (EFH) conservation recommendations for the York River Entrance Federal Navigation Project. Pursuant to Section 305(b)(4)(A) of the Magnuson Stevens Fisheries Conservation and Management Act (MSA), the National Marine Fisheries Service (NMFS) provided the following conservation recommendations to the U.S. Army Corps of Engineers, Norfolk District (USACE).

As required by Section 305(b)(4)(B) of the MSA, we are providing a written response within 30 days of receiving your conservation recommendations. We have responded to each of the conservation recommendations below.

Recommendation: Conduct a condition assessment prior to 2027/2028 dredge to better estimate volumes.

USACE response: Accepted. The last channel condition survey was completed in late 2022 (see attached channel survey). Pre-dredging surveys will be conducted to accurately assess the channel condition and update the estimated volume to be removed.

Recommendation: Identify NODS cells to be used and develop a disposal placement plan for dredged material at NODS to distribute material as evenly as possible and reduce sediment accumulation/mounding.

USACE response: Accepted. Use of NODS will follow the Site Management and Monitoring Plan (SMMP) for the Norfolk Ocean Dredged Material Disposal Site, which is a joint document between the USACE and U.S. Environmental Protection Agency (USEPA) pursuant to the Water Resources Development Act Amendments of 1992 to the Marine Protection, Research, and Sanctuaries Act of 1972 for the management and monitoring of ocean disposal activities. The SMMP requires disposal zones for each

ocean disposal activity to be designated by USACE, in consultation with USEPA, within the site to reduce multiple user conflicts, facilitate monitoring and management, and reduce potential impacts to the marine environment. Disposal zones are sequentially used to ensure even distribution or spreading of the disposal material to avoid unacceptable mounding that may result in a hazard to navigation. Depths and disposal methods will be monitored to ensure there is no unacceptable mounding.

Recommendation: Conduct Marine Protection Research and Sanctuaries Act (MPRSA) Section 103 evaluation of sediments, as you have proposed.

USACE response: Accepted. The suitability of dredged material will be evaluated pursuant to Section 103 of the MPRSA and verified through coordination with USEPA that the material meets the ocean disposal criteria (40 CFR 227).

Recommendation: Conduct all dredging upriver of the Goodwin Island Thorofare and Allen's Island outside the Virginia Department of Wildlife Resources anadromous fish time of year restriction between February 15 and June 30 of any year.

USACE response: The YREC authorization extends from the 38-foot contour in the Chesapeake Bay to a point adjacent to the piers at Yorktown Naval Weapons Station. However, the sections of the channel upriver of the Goodwin Islands typically remain significantly deeper (reaching over -70 feet in some channel sections) than the authorized depth of the channel. The USACE has reviewed the historic dredging records and current surveys, and we do not foresee a need to maintenance dredge upriver of the Goodwin Islands. For reference, USACE dredged from channel stations 18+00 through 672+00 in 2003 and 10+00 through 668+00 in 1998. The most recent channel surveys indicate shoaling in similar areas between -27+00 through 715+00, all downstream of the Goodwin Islands (see attached survey). It is noted that the Department of Wildlife Resources did not recommend a time of year restriction for anadromous fish through the project's Federal Consistency Determination coordination under the Coastal Zone Management Act (CZMA).

Recommendation: Employ best management practices for operation of dredge equipment, (Appendix A, pgs. 8-9) as you have proposed.

USACE response: Accepted. USACE will employ the following Best Management Practices, as described in Appendix A, pgs. 8-9 of the YREC EFH Coordination Package.

“Depending on the method of dredging, measures would be implemented to minimize disturbances to the environment.

- Agitation and operation of a cutterhead dredge would not begin until the cutterhead is in immediate contact with the substrate.
- A similar measure would be taken for hopper dredges where dredging would not begin until the draghead is in direct contact with the substrate.

- For both cutterhead and hopper dredges, this measure reduces the intake of water and sediment and the potential uptake and entrainment of eggs and larvae as well as juvenile and adult fish species.
- By lowering the cutterhead/draghead to the bottom before starting the agitation and suction of water and sediment, potential impacts and losses of fish species in the vicinity of the dredge are minimized.
- Disposal of dredged material will occur within the confines of the NODS. Material will be tested in accordance with Section 103 of MPRSA.”

Recommendation: Limit allowable over-depth dredging to a maximum of 2 feet (1 foot of required and 1 foot of allowable overdredging) for a total of -39 ft MLLW as described in the 1993 Detailed Project Report and Environmental Assessment for this project.

USACE response: The USACE does not concur with the conservation recommendation to limit over-depth dredging to a maximum of 2 feet (1 foot of required and 1 foot of allowable overdredging) for a total of -39 ft MLLW as described in the 1993 Detailed Project Report and Environmental Assessment for this project. The 1993 Environmental Assessment for YREC will be updated with a Supplemental Environmental Assessment to account for appropriate overdepths consistent with USACE policy and guidance for pay and non-pay overdepths and the NODS placement alternative. Since the publication of the 1993 Detailed Project Report and Environmental Assessment for YREC, new guidance regarding overdepths and dredging have been established. Additionally, the size and capabilities of dredges (e.g. addition of large class hopper dredges to the industry fleet and increased bucket sizes of mechanical dredges) have increased significantly. We accounted for three different types of dredges in the EFH Coordination Package for YREC. However, the maximum depths described are specific to the dredging methods that require the most margin of error to account for maximum impacts. The USACE follows established engineering regulations and guidance to determine and fully characterize the dredging prism. Applicable regulations and policies include:

- ER 1130-2-520, Navigation and Dredging Operations and Maintenance Policies, Chapter 8, “Dredging”
- Memorandum for Commanders, Major Subordinate Commands, “Assuring the Adequacy of Environmental Documentation for Construction and Maintenance Dredging of Federal Navigation Projects”
- Engineering Research and Design Center Technical Note (ERDC TN) EEDP-04-37, Overdepth Dredging and Characterization Depth Recommendations

The Memorandum for Commanders and ERDC TN EEDP 04-37 provide definitions for authorized dimensions, advance maintenance, paid allowable overdepth, and non-pay/unpaid overdepth. The definitions are as follows:

- Authorized dimensions are the depth and width of the channel authorized by Congress to be constructed and maintained by USACE.
- Advance maintenance is dredging to a specified depth and/or width beyond the authorized channel dimensions in critical and fast shoaling areas to avoid frequent re-dredging and ensure the reliability and least overall cost of operating and maintaining the project authorized dimensions.
- Paid allowable overdepth dredging is a construction design method for dredging that occurs beyond the required authorized dimensions and advance maintenance prism to compensate for physical conditions and inaccuracies in the dredging process and allow for efficient dredging practices.
- Non-pay dredging, also known as non-paid overdepth, is dredging outside the paid allowable overdepth that may and does occur due to such factors as unanticipated variation in substrate, capabilities and size of dredge equipment, incidental removal of submerged obstructions, or wind or wave conditions that reduce the operators' ability to control the excavation head. In environmental documentation, non-pay dredging is normally recognized as a contingency allowance on dredging quantities and may occur in varying magnitude and locations during construction and maintenance of a project.

Per ER 1130-2-520, District commanders may dredge a maximum of two feet of allowable overdepth in coastal regions and in inland navigation channels. Advance maintenance dredging, to a specified depth and/or width, may be performed in critical and/or fast-shoaling areas to avoid frequent re-dredging and ensure the least overall cost of maintaining the project. Commanders are authorized to approve advance maintenance dredging for new work dredging and maintenance dredging of the project.

The guidance detailed in the Memorandum for Commanders was established to address concerns from the USEPA that previous dredging depths may not have adequately characterized the allowable overdepth and non-pay overdepth. Inadequate characterization of the project overdepth increases the risk of unauthorized discharge of the material into Federally regulated waters. The guidance requires adequate characterization and appropriate testing of the dredging prism to include the maximum allowable and non-pay overdepth for the proposed means and methods of each project. The Memorandum also requires contracts to provide appropriate incentives and disincentives to limit overdepth dredging while assuring the design profile is achieved. This is typically achieved by defining the allowable (paid) overdepth and providing reasonable non-pay overdepth based on the project means and methods to provide a constructible dredge template for contractors to maintain a productive operation and minimize risk of exceeding regulatory limits (e.g. MPRSA). Disincentives include not providing payment for the non-pay overdepth dredging performed by the contractor.

Together, the authorized dimensions, advance maintenance, allowable (paid) overdepth, and non-pay overdepth dredging are considered the characterization depth,

which is the maximum depth to which material can reasonably be removed – intentionally or otherwise. For YREC, we have accounted for contract required depths (paid) to -40 feet. This includes -37 feet for the authorized depth + 1 foot of advanced maintenance + 2 feet of allowable overdepth. Three feet of non-pay dredging is included to account for dredging error in an open sea state.

Please note, dredging of non-pay overdepth is not expected to occur throughout the dredging footprint but may have limited occurrence due to unanticipated variation in sediments, size of equipment used (i.e. capacity/size of the bucket used for mechanical dredging, hopper dredge size) or environmental conditions (winds, waves, etc.). There is little to no incentive for the contractor to remove non-pay material and the contractor generally minimize dredging of this material to the best of their ability. Below, Figure 1 illustrates the components considered in characterizing dredging prisms.

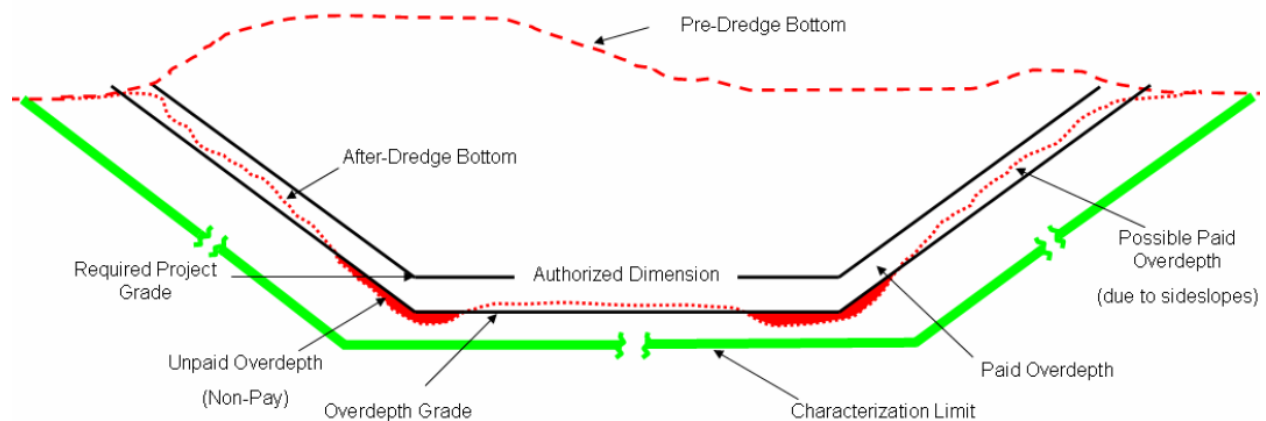


Figure 1 Various dredging prism dimensions and zones (ERDC TN EEDP-04-37).

Recommendation: Investigate the beneficial reuse of dredged material (fine silty sand) when environmentally preferable and practicable.

USACE response: Accepted. USACE is evaluating beneficial use options throughout Virginia. Any beneficial use of suitable dredged material from YREC will be analyzed under separate coordination.

If you have any questions or need additional information, please contact Shannon Reinheimer at 757-201-7074 or by email at Shannon.J.Reinheimer@usace.army.mil.

Sincerely,

Robert S. Pruhs
Chief, Technical Support Section
U.S. Army Corps of Engineers, Norfolk District

References

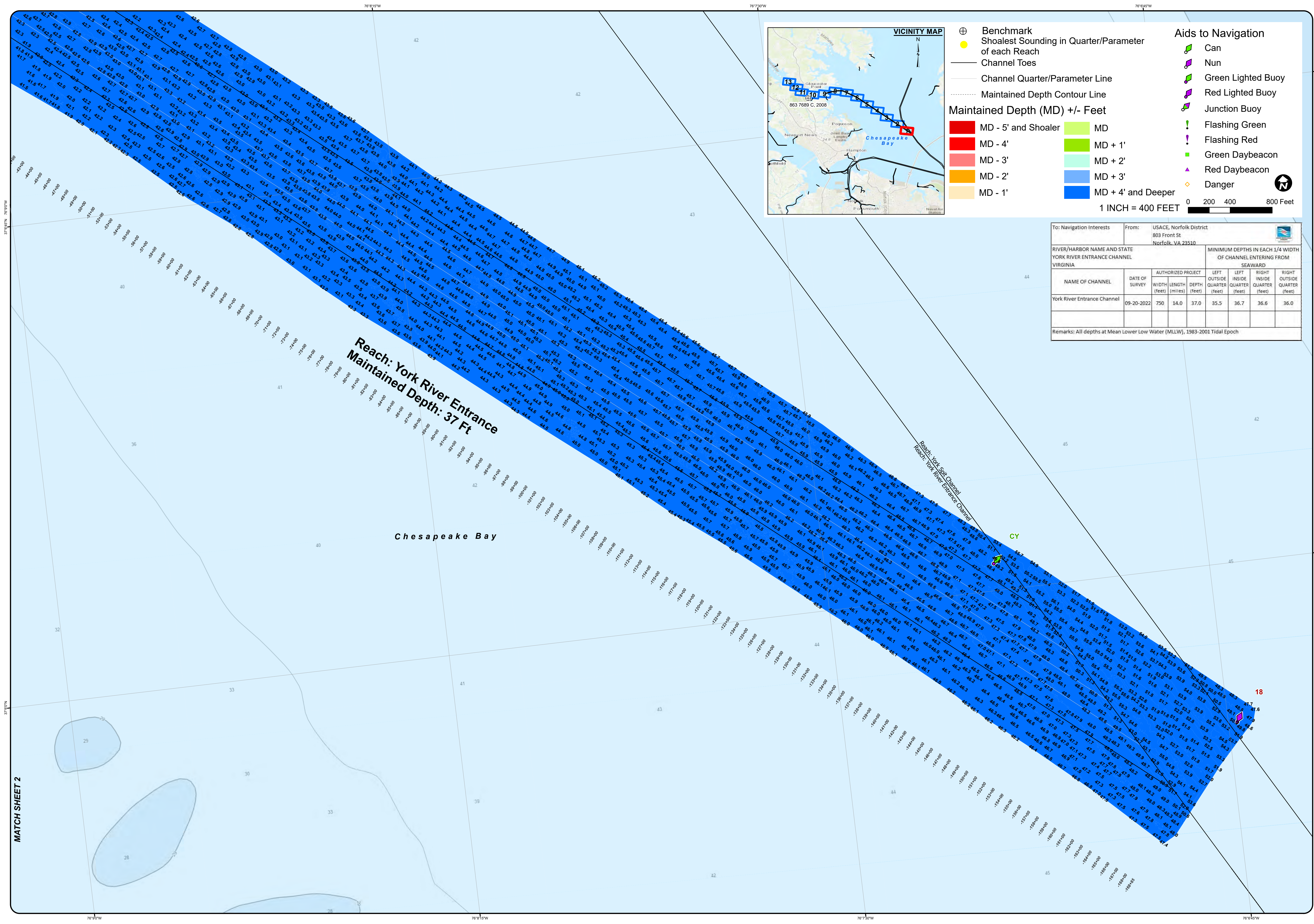
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US Army Corps of Engineers (USACE). 1996. ER 1130-2-520, Navigation and Dredging Operations and Maintenance Policies, Chapter 8, "Dredging"

US Army Corps of Engineers (USACE). 1986. Environmental Effects of Dredging Technical Notes. Compiled by U.S. Army Engineer Waterways Experiment Station, Environmental Laboratory. EEDP-09-1.

US Environmental Protection Agency and US Army Corps of Engineers. 2019. Site Management and Monitoring Plan for the Norfolk Ocean Disposal Site.



- ⊕ Benchmark
- Shoalest Sounding in Quarter/Parameter of each Reach
- Channel Toes
- Channel Quarter/Parameter Line
- Maintained Depth Contour Line

Maintained Depth (MD) +/- Feet

- MD - 5' and Shoaler
- MD - 4'
- MD - 3'
- MD - 2'
- MD - 1'
- MD
- MD + 1'
- MD + 2'
- MD + 3'
- MD + 4' and Deeper

Aids to Navigation

- Can
- Nun
- Green Lighted Buoy
- Red Lighted Buoy
- Junction Buoy
- Flashing Green
- Flashing Red
- Green Daybeacon
- Red Daybeacon
- Danger

1 INCH = 400 FEET

To: Navigation Interests	From: USACE, Norfolk District 803 Front St Norfolk, VA 23510							
RIVER/HARBOR NAME AND STATE YORK RIVER ENTRANCE CHANNEL VIRGINIA		MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD						
NAME OF CHANNEL	DATE OF SURVEY	AUTHORIZED PROJECT			LEFT OUTSIDE QUARTER (feet)	LEFT INSIDE QUARTER (feet)	RIGHT INSIDE QUARTER (feet)	RIGHT OUTSIDE QUARTER (feet)
		WIDTH (feet)	LENGTH (miles)	DEPTH (feet)				
York River Entrance Channel	09-20-2022	750	14.0	37.0	35.5	36.7	36.6	36.0
Remarks: All depths at Mean Lower Low Water (MLLW), 1983-2001 Tidal Epoch								



NOTES

- PROJECT A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPT CHANNEL IN THE CHESAPEAKE BAY INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.
- NOT FOR NAVIGATION USE. THE INFORMATION DERIVED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATE(S) INDICATED & CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
- SOUNDINGS SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADIUS.
- BACKGROUND: ESRI TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE.
- AIDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.
- SURVEY XYZ (.XYZ) AND METADATA (.MET) FILE NAME REFERENCED BY eHYDRO FILE NAME.

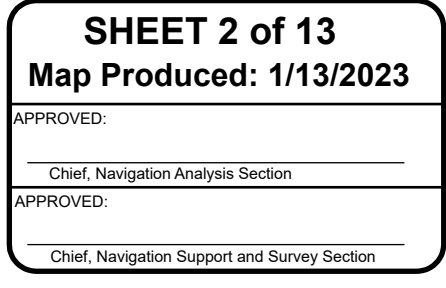
VERTICAL REFERENCE DATUM: NOS MLLW IMPLIED VERTICAL ACCURACY: +/- 0.5 FEET VERTICAL CONTROL: RTK/LEICA SMARTNET TIDE APPLICATION: RTK/NOAA DATUM MLLW BIN SIZE: 5'x5' BIN SELECTION METHOD: AVERAGE CELL CENTER		MEAN RANGE OF TIDE 2.80' 2.27'	
PROJECTED COORDINATE SYSTEM: STATE PLANE VIRGINIA SOUTH ZONE US SURVEY FEET IMPLIED HORIZONTAL ACCURACY: +/- 1 FOOT HORIZONTAL CONTROL: RTK/LEICA SMARTNET		MONUMENT USC&GS 1, 418, 1983" NOS 77689 C, 2008"	
GEODETIC CONTROL MONUMENTS		NAV/D88 7.90'(GEOID18) 27.11'(GEOID18)	

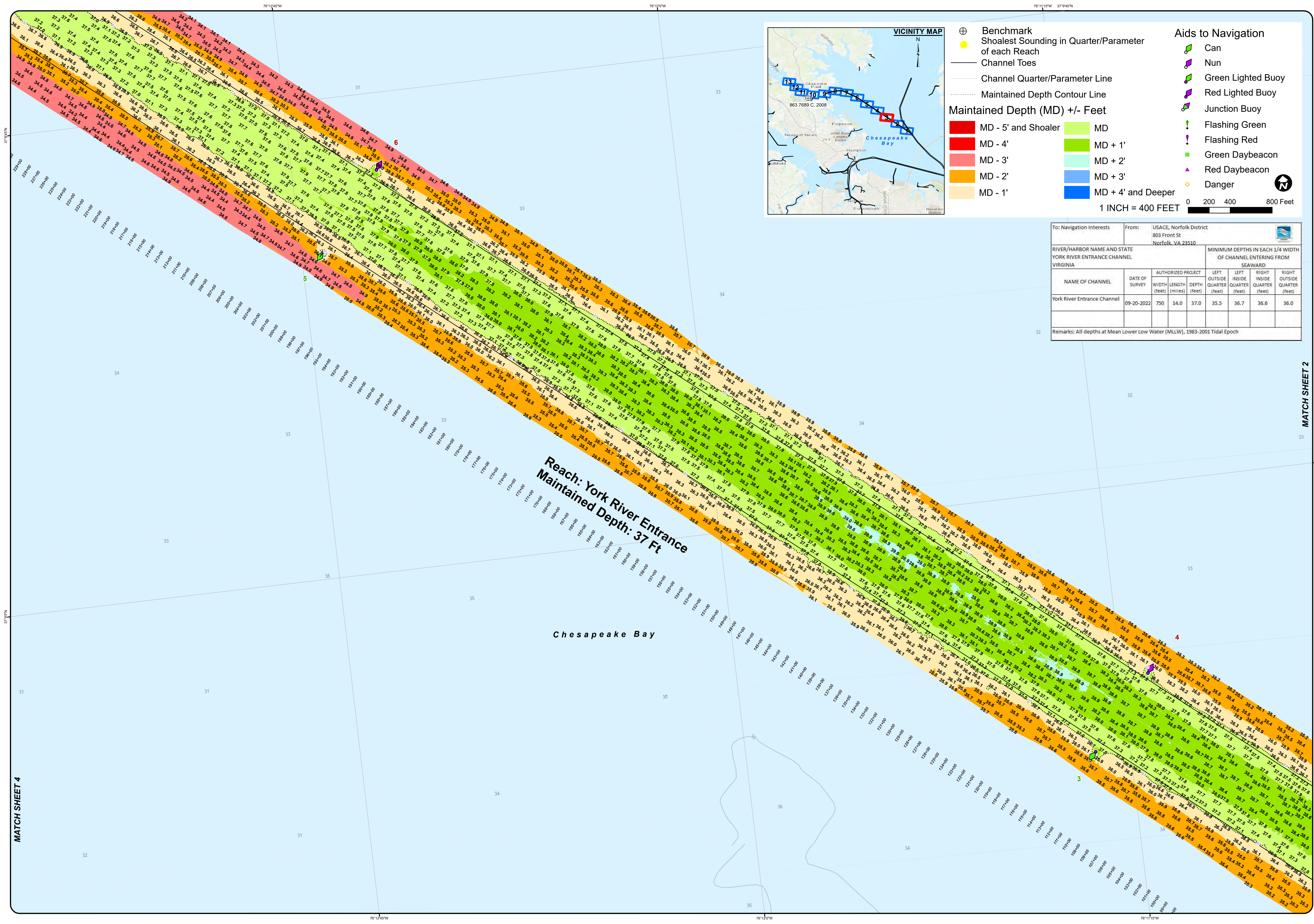
YORK RIVER ENTRANCE CHANNEL

PROJECT CONDITION SURVEY

SURVEY DATES:
September 20, 21, 27 & 28;
October 6, 11, 16, 19 & 25 November 1, 2022

SURVEY BY: USACE Team Lead, Larry Bawick
eHYDRO FILE: YR-01-YRE-20220901_CS





- ⊕ Benchmark
- Shoalest Sounding in Quarter/Parameter of each Reach
- Channel Toes
- Channel Quarter/Parameter Line
- Maintained Depth Contour Line

Maintained Depth (MD) +/- Feet

MD - 5' and Shoaler	MD
MD - 4'	MD + 1'
MD - 3'	MD + 2'
MD - 2'	MD + 3'
MD - 1'	MD + 4' and Deeper

- Aids to Navigation
- Can
 - Nun
 - Green Lighted Buoy
 - Red Lighted Buoy
 - Junction Buoy
 - Flashing Green
 - Flashing Red
 - Green Daybeacon
 - Red Daybeacon
 - Danger

1 INCH = 400 FEET

0 200 400 800 Feet

To: Navigation Interests		From: USACE, Norfolk District 803 Front St Norfolk, VA 23510							
RIVER/HARBOR NAME AND STATE YORK RIVER ENTRANCE CHANNEL VIRGINIA					MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD				
NAME OF CHANNEL	DATE OF SURVEY	AUTHORIZED PROJECT			LEFT OUTSIDE QUARTER (feet)	LEFT INSIDE QUARTER (feet)	RIGHT INSIDE QUARTER (feet)	RIGHT OUTSIDE QUARTER (feet)	
		WIDTH (feet)	LENGTH (miles)	DEPTH (feet)					
York River Entrance Channel	09-20-2022	750	14.0	37.0	35.5	36.7	36.6	36.0	
Remarks: All depths at Mean Lower Low Water (MLLW), 1983-2001 Tidal Epoch									



- NOTES:
- PROJECT A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPT CHANNEL IN THE CHESAPEAKE BAY INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.
 - NOT FOR NAVIGATION USE. THE INFORMATION DERIVED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
 - SOUNDINGS SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADII.
 - BACKGROUND: ESRI TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE.
 - AIDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.
 - SURVEY XYZ (.XYZ) AND METADATA (.MET) FILE NAME REFERENCED BY eHYDRO FILE NAME.

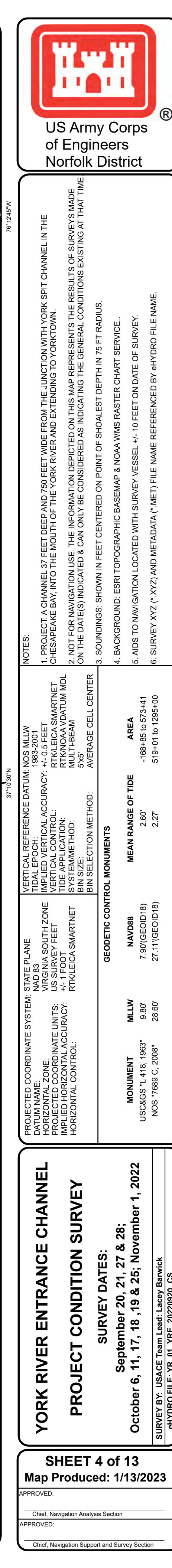
PROJECTED COORDINATE SYSTEM: DATUM NAME: NAD83 HORIZONTAL ZONE: VIRGINIA SOUTH ZONE PROJECTED COORDINATE UNITS: US SURVEY FEET IMPLIED HORIZONTAL ACCURACY: +/- 1 FOOT HORIZONTAL CONTROL: RTKLEICA SMARTNET	STATE PLANE NAD83	VERTICAL REFERENCE DATUM: NOS MLLW TIDE EPOCH: 1983-2001	MEAN RANGE OF TIDE 2.60' 2.27'	AREA -168+86 to 573+41 519+01 to 1295+00
		IMPLIED VERTICAL ACCURACY: +/- 0.5 FEET		
		VERTICAL CONTROL: RTKLEICA SMARTNET		
		TIDE APPLICATION: RTKLEICA DATUM MLLW BIN SIZE: 5' X 5' BIN SELECTION METHOD: AVERAGE CELL CENTER		
GEODETIC CONTROL MONUMENTS				
MONUMENT USC&GS 1, 418, 1983* NOS 7689 C, 2008*	MLLW 7.90(GEOD18) 28.60'	NAVDB8 7.90(GEOD18) 27.11(GEOD18)		

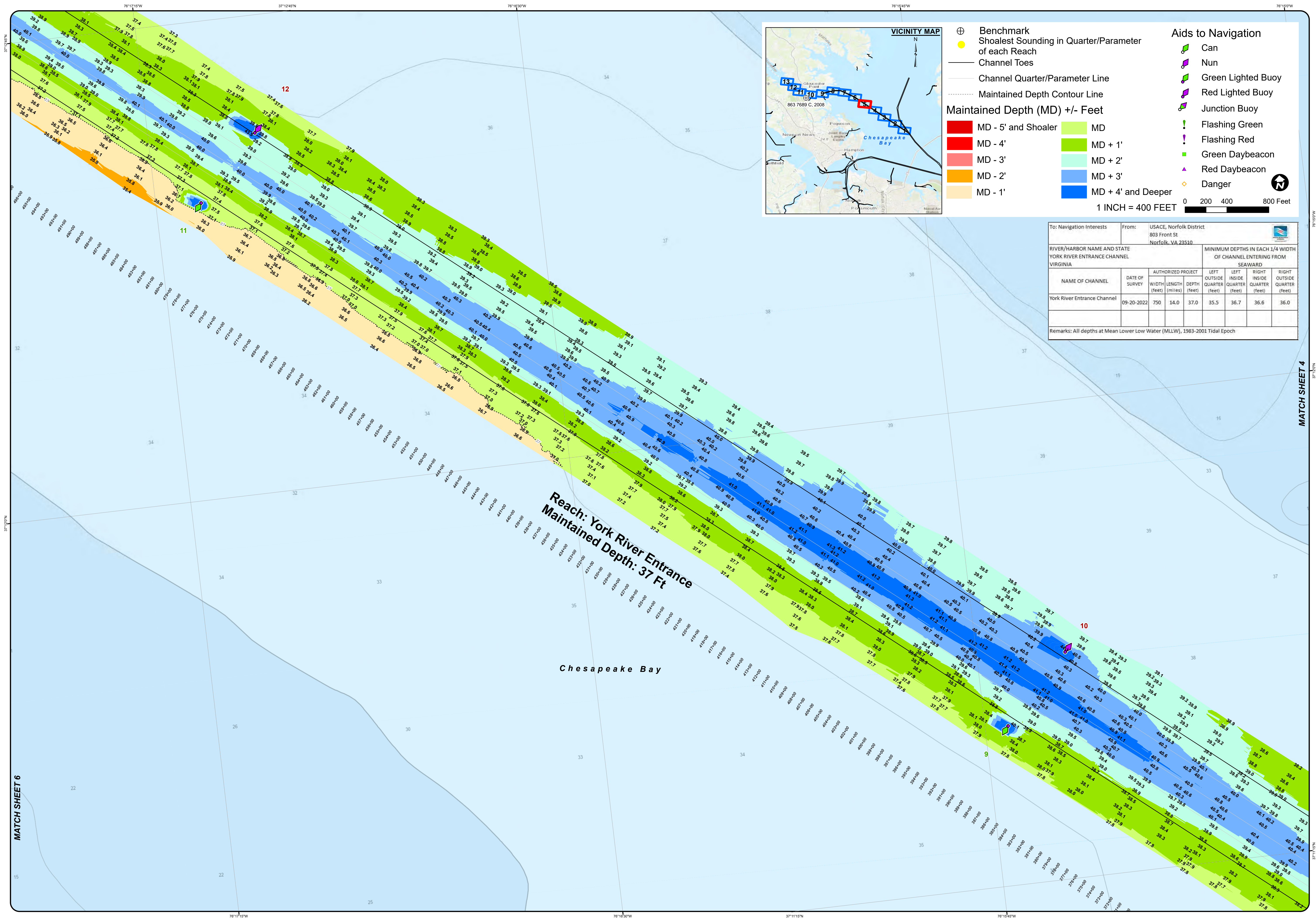
YORK RIVER ENTRANCE CHANNEL

PROJECT CONDITION SURVEY

SURVEY DATES:
September 20, 21, 27 & 28;
October 6, 11, 17, 18, 19 & 25; November 1, 2022

SURVEY BY: USACE Team Lead: Larry Bawick
eHYDRO FILE: VR-01-YRE-20220901_CS



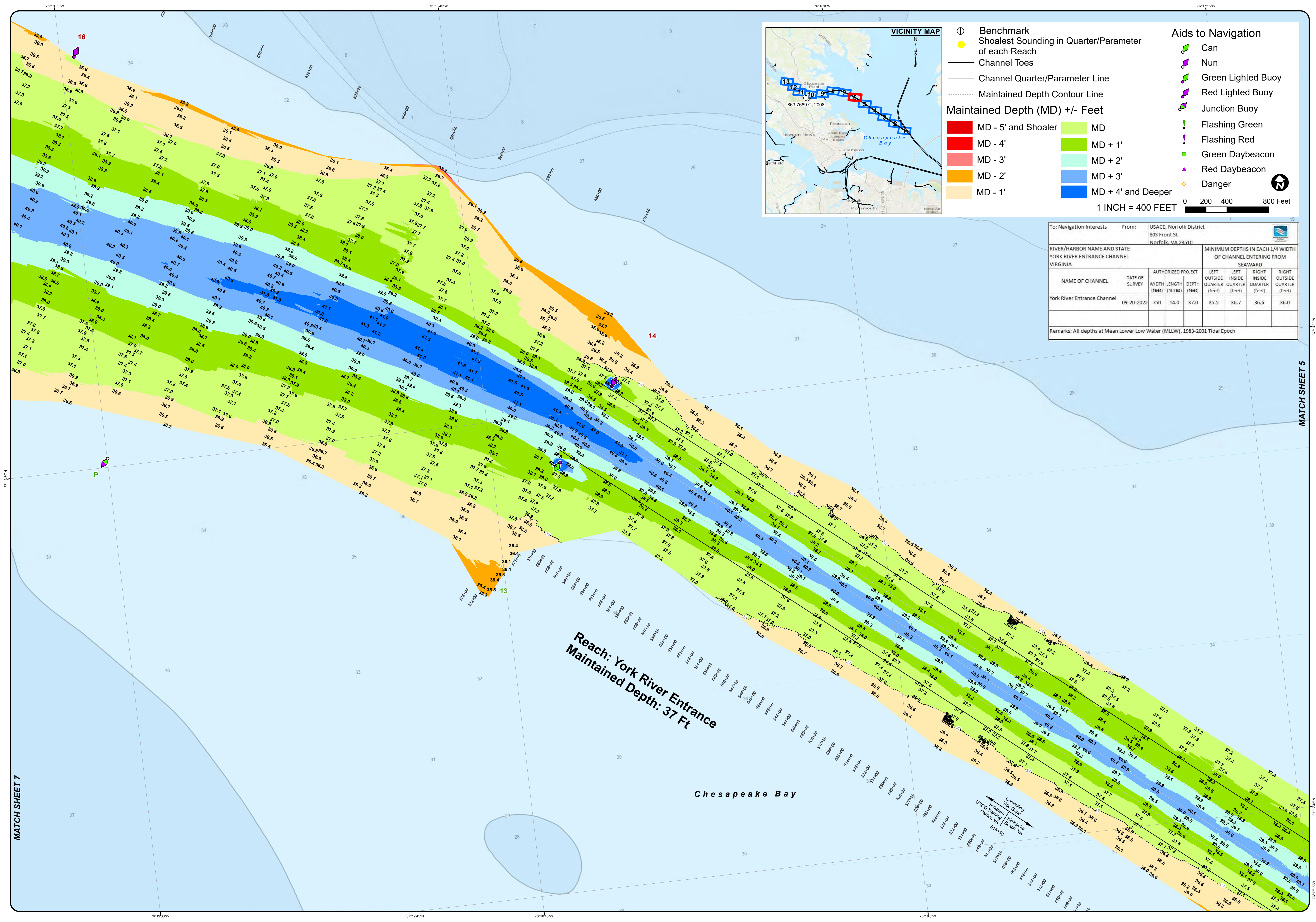


NOTES:

1. PROJECT A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPIT CHANNEL IN THE CHESAPEAKE BAY, INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.
2. NOT FOR NAVIGATION USE. THE INFORMATION REPORTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED & CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
3. SOUNDINGS: SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADII.
4. BACKGROUND: ESRI TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE..
5. AIDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.
6. SURVEY XYZ ("XYZID AND METADATA") FILE NAME REFERENCED BY @XYZID FILE NAME.

PROJECTED COORDINATE SYSTEM:	STATE PLANE	VERTICAL REFERENCE DATUM:	NOS MLLW
HORIZONTAL ZONE:	VIRGINIA SOUTH ZONE	IMPLIED VERTICAL ACCURACY:	+/- 0.5 FEET
PROJECTED COORDINATE UNITS:	US SURVEY FEET	TIDE APPLICATION:	RTKLEICA SMARTNET
IMPLIED HORIZONTAL ACCURACY:	+/- 1 FOOT	TIDE APPLICATION:	RTKINADA VDATUM M0L
HORIZONTAL CONTROL:	RTKLEICA SMARTNET	SIZE:	5/8" X 1/4" BEAM
		SIZE:	5/8"
		BIN SELECTION METHOD:	AVERAGE CELL CENTER
GEODETIC CONTROL MONUMENTS			
MONUMENT	MLLW	MEAN RANGE OF TIDE	AREA
USCGA S T 418, 1963"	9.80'	2.60'	-188.45 to 573.41
NOS 7989 C, 2008"	28.60'	2.27'	519.01 to 1285.00

YORK RIVER ENTRANCE CHANNEL PROJECT CONDITION SURVEY SURVEY DATES: September 20, 21, 27 & 28; October 6, 11, 17, 18, 19 & 25; November 1, 2022 SHEET 5 of 13 Map Produced: 1/13/2023 APPROVED: _____ Chief, Navigation Analysis Section APPROVED: _____ Chief, Navigation Support and Survey Section	SURVEY BY: Lacey Team Lead: Lacey Barwick eHYDRO FILE: YR_01_YRE_20200920_CS
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US Army Corps
of Engineers
Norfolk District

NOTES:

PROJECT: A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPIT CHANNEL IN THE CHEWAKEE BAY, INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.

NOT FOR NAVIGATION USE: THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEY'S MADE ON THE DATE(S) INDICATED & CAN ONLY BE CONSIDERED AS THE GENERAL CONDITIONS EXISTING AT THAT TIME

SOUNDINGS: SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADIIUS.

BACKGROUND: ESI1 TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE..

ADDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.

SURVEY XYZ ("X,Y,Z) AND METADATA ("MET) FILE NAME REFERENCED BY #HYDRO FILE NAME.

PROJECTED COORDINATE SYSTEM	STATE PLANE	VERTICAL REFERENCE DATUM AND MSLW TIDAL EPOCH
HORIZONTAL ZONE:	VIRGINIA SOUTH ZONE	IMPLIED VERTICAL ACCURACY +/- 0.5 FEET
PROJECTED COORDINATE UNITS:	US SURVEY FEET	RTKLEICA SMARTNET
VERTICAL COORDINATE UNITS:	VERTICAL ACCURACY	RTKLEICA SMARTNET
HORIZONTAL CONTROL:	RTKLEICA SMARTNET	MULTI-BEAM
		BIN SIZE: 5x6'
		AVERAGE CELL CENTERS
		BIN SELECTION METHOD:
GEODEIC CONTROL MONUMENTS		
MONUMENT	MLLW	MEAN RANGE OF TIDE
USC&GS "A" 1987	9.80'	2.50'
NOS "F868 C" 2008*	20.6'	2.2'
		AREA
		169,496.16 to 169,544.1
		519,901.1 to 1,295,400

YORK RIVER ENTRANCE CHANNEL

PROJECT CONDITION SURVEY

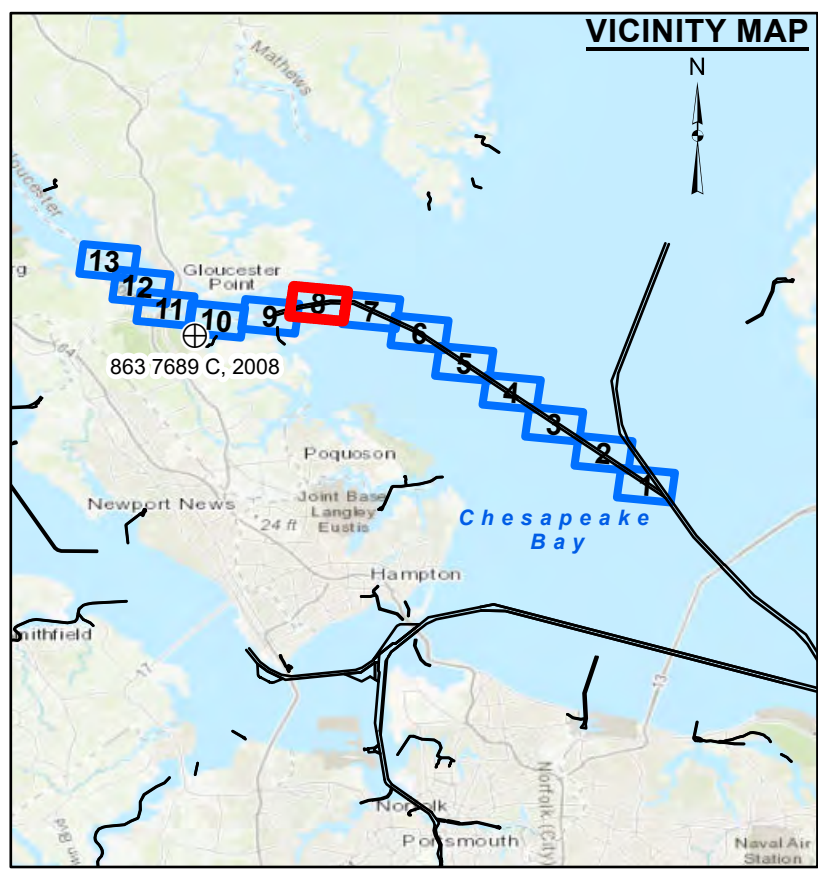
SURVEY DATES:
September 20, 21, 27 & 28;
October 6, 11, 17, 18, 19 & 25; November 1, 2022

SURVEY BY: USACE Team Lead: Lacey Barwick

SHEET 6 of 13
Map Produced: 1/13/2023

APPROVED: _____
Chief, Navigation Analysis Section

APPROVED: _____
Chief, Navigation Support and Survey Section



Legend

- Benchmark
- Shoalest Sounding in Quarter/Parameter of each Reach
- Channel Toes
- Channel Quarter/Parameter Line
- Maintained Depth Contour Line
- Maintained Depth (MD) +/- Feet
- MD - 5' and Shoaler
- MD - 4'
- MD - 3'
- MD - 2'
- MD - 1'
- MD
- MD + 1'
- MD + 2'
- MD + 3'
- MD + 4' and Deeper

Aids to Navigation

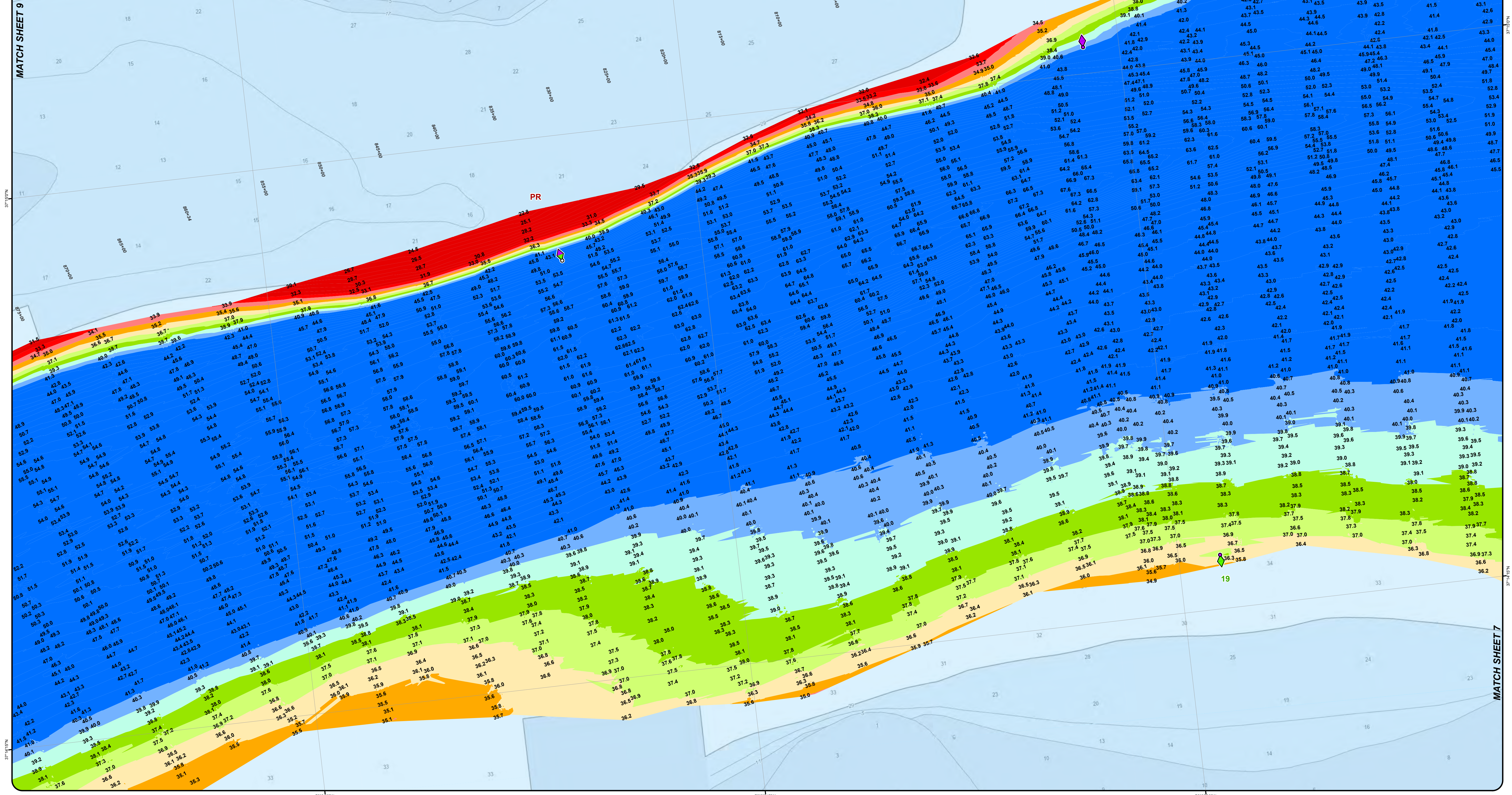
- Can
- Nun
- Green Lighted Buoy
- Red Lighted Buoy
- Junction Buoy
- Flashing Green
- Flashing Red
- Green Daybeacon
- Red Daybeacon
- Danger

1 INCH = 400 FEET

0 200 400 800 Feet

To: Navigation Interests		From: USACE, Norfolk District 803 Front St Norfolk, VA 23510	
RIVER/HARBOR NAME AND STATE YORK RIVER ENTRANCE CHANNEL VIRGINIA		MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD	
NAME OF CHANNEL	DATE OF SURVEY	AUTHORIZED PROJECT	LEFT OUTSIDE QUARTER (feet)
York River Entrance Channel	09-20-2022	750 14.0 37.0	35.5
			36.7
			36.6
			36.0
Remarks: All depths at Mean Lower Low Water (MLLW), 1983-2001 Tidal Epoch			

MATCH SHEET 9



MATCH SHEET 7



NOTES

- PROJECT A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPIT CHANNEL IN THE CHESAPEAKE BAY INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.
- NOT FOR NAVIGATION USE. THE INFORMATION DERIVED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
- SOUNDINGS SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADIUS.
- BACKGROUND: ESRI TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE.
- AIDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.
- SURVEY XYZ (.XYZ) AND METADATA (.MET) FILE NAME REFERENCED BY eHYDRO FILE NAME.

VERTICAL REFERENCE DATUM: NOS MLLW		VERTICAL CONTROL: RTK/LEICA SMARTNET	
IMPLIED VERTICAL ACCURACY: +/- 0.3 FEET		TIDE APPLICATION: RTK/NOAA DATUM MSL	
STATE PLANE: VIRGINIA SOUTH ZONE		BIN SELECTION METHOD: AVERAGE CELL CENTER	
US SURVEY FEET		MEAN RANGE OF TIDE	
IMPLIED HORIZONTAL ACCURACY: +/- 1 FOOT		AREA	
HORIZONTAL CONTROL: RTK/LEICA SMARTNET		1983-86 to 573+41	
MONUMENT		519+01 to 1295+00	
USC&GS 1418, 1983*		28.60'	
NOS 7689 C, 2008*		27.11'(GEOD18)	

YORK RIVER ENTRANCE CHANNEL

PROJECT CONDITION SURVEY

SURVEY DATES:

September 20, 21, 27 & 28;
October 6, 11, 17, 18, 19 & 25; November 1, 2022

SURVEY BY: USACE Team Lead: Larry Bawick
eHYDRO FILE: VR_01_YRE_20220921_CS



Benchmark
Shoalest Sounding in Quarter/Parameter of each Reach
Channel Toes
Channel Quarter/Parameter Line
Maintained Depth Contour Line

Maintained Depth (MD) +/- Feet

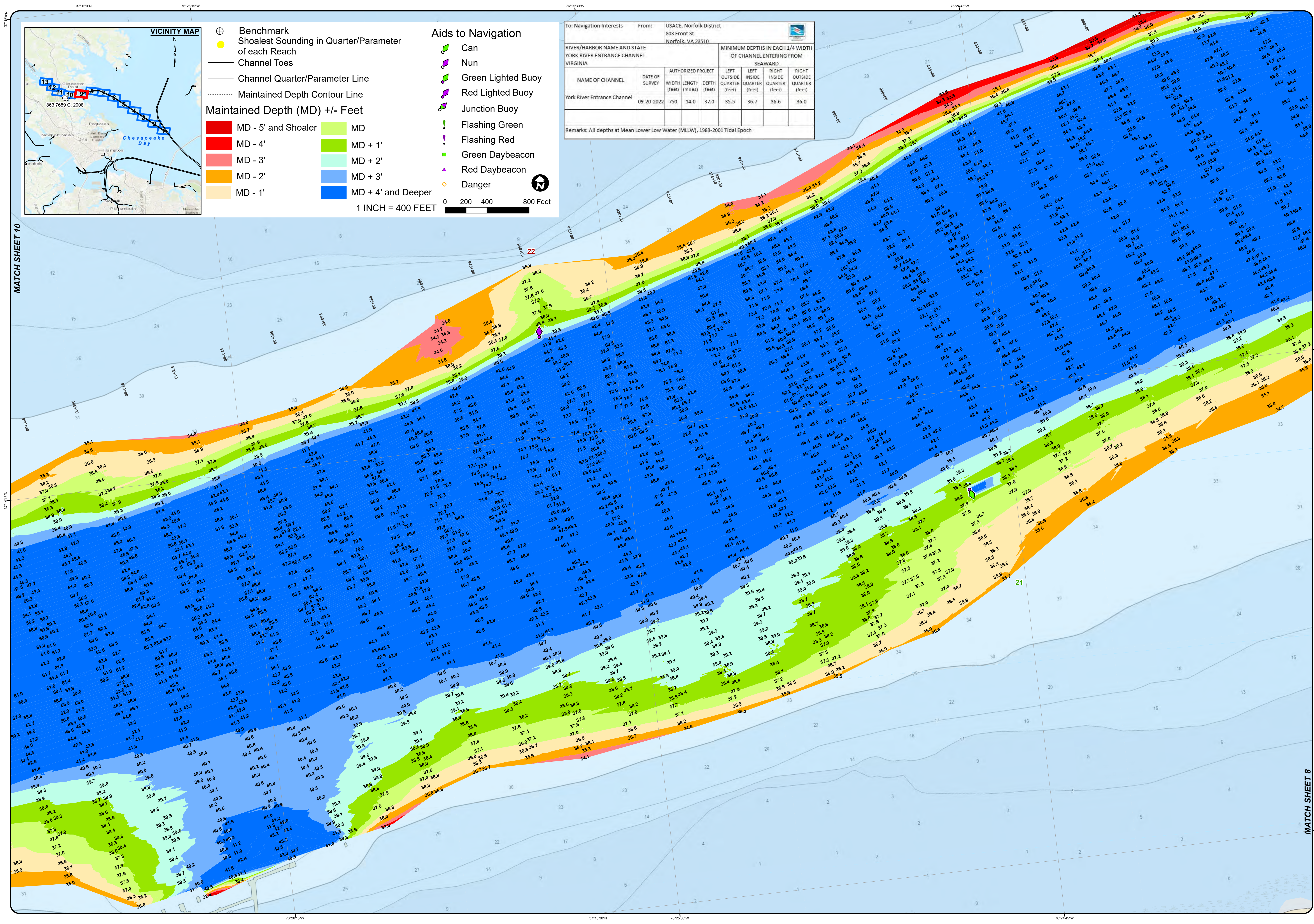
MD - 5' and Shoaler	MD
MD - 4'	MD + 1'
MD - 3'	MD + 2'
MD - 2'	MD + 3'
MD - 1'	MD + 4' and Deeper

1 INCH = 400 FEET

Aids to Navigation

- Can
- Nun
- Green Lighted Buoy
- Red Lighted Buoy
- Junction Buoy
- Flashing Green
- Flashing Red
- Green Daybeacon
- Red Daybeacon
- Danger

To: Navigation Interests		From: USACE, Norfolk District 803 Front St Norfolk, VA 23510	
RIVER/HARBOR NAME AND STATE YORK RIVER ENTRANCE CHANNEL VIRGINIA		MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD	
NAME OF CHANNEL	DATE OF SURVEY	AUTHORIZED PROJECT	LEFT OUTSIDE QUARTER (feet)
York River Entrance Channel	09-20-2022	750 14.0 37.0	35.5 36.7 36.6 36.0
Remarks: All depths at Mean Lower Low Water (MLLW), 1983-2001 Tidal Epoch			



US Army Corps of Engineers
Norfolk District

NOTES

- PROJECT A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPIT CHANNEL IN THE CHESAPEAKE BAY INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.
- NOT FOR NAVIGATION USE. THE INFORMATION DERIVED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED & CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
- SOUNDINGS SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADII.
- BACKGROUND: ESRI TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE.
- AIDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.
- SURVEY XYZ (.XYZ) AND METADATA (.MET) FILE NAME REFERENCED BY eHYDRO FILE NAME.

VERTICAL REFERENCE DATUM: NOS MLLW	STATE PLANE	MONUMENT	MLLW
IMPLIED VERTICAL ACCURACY: +/- 0.5 FEET <td>VIRGINIA SOUTH ZONE<td>NAVDSR8<td>7.90(GEOD18)</td></td></td>	VIRGINIA SOUTH ZONE <td>NAVDSR8<td>7.90(GEOD18)</td></td>	NAVDSR8 <td>7.90(GEOD18)</td>	7.90(GEOD18)
VERTICAL CONTROL: RTK/LEICA SMARTNET <td>US SURVEY FEET<td>9.80'</td><td>28.00'</td></td>	US SURVEY FEET <td>9.80'</td> <td>28.00'</td>	9.80'	28.00'
TIDE APPLICATION: RTK/NOAA DATUM MSL <td>PROJECTED HORIZONTAL ACCURACY: +/- 1 FOOT<td>27.11(GEOD18)</td><td></td></td>	PROJECTED HORIZONTAL ACCURACY: +/- 1 FOOT <td>27.11(GEOD18)</td> <td></td>	27.11(GEOD18)	
IMPL. METHOD: BIN SIZE <td>HORIZONTAL CONTROL: RTK/LEICA SMARTNET<td></td><td></td></td>	HORIZONTAL CONTROL: RTK/LEICA SMARTNET <td></td> <td></td>		
BIN SELECTION METHOD: AVERAGE CELL CENTER <td></td> <td></td> <td></td>			

GEODETIC CONTROL MONUMENTS	MEAN RANGE OF TIDE	AREA
NAVDSR8	2.80'	-168.86 to 573.41
27.11(GEOD18)	2.27'	519.01 to 1295.00

YORK RIVER ENTRANCE CHANNEL

PROJECT CONDITION SURVEY

SURVEY DATES:
September 20, 21, 27 & 28;
October 6, 11, 17, 18, 19 & 25; November 1, 2022

SURVEY BY: USACE Team Lead: Larry Barwick
eHYDRO FILE: VR-01-VR-20220901_CS

SHEET 9 of 13
Map Produced: 1/13/2023

APPROVED: _____
Chief, Navigation Analysis Section

APPROVED: _____
Chief, Navigation Support and Survey Section



Benchmark
Shoalest Sounding in Quarter/Parameter of each Reach
Channel Toes
Channel Quarter/Parameter Line
Maintained Depth Contour Line

Maintained Depth (MD) +/- Feet

MD - 5' and Shoaler	MD
MD - 4'	MD + 1'
MD - 3'	MD + 2'
MD - 2'	MD + 3'
MD - 1'	MD + 4' and Deeper

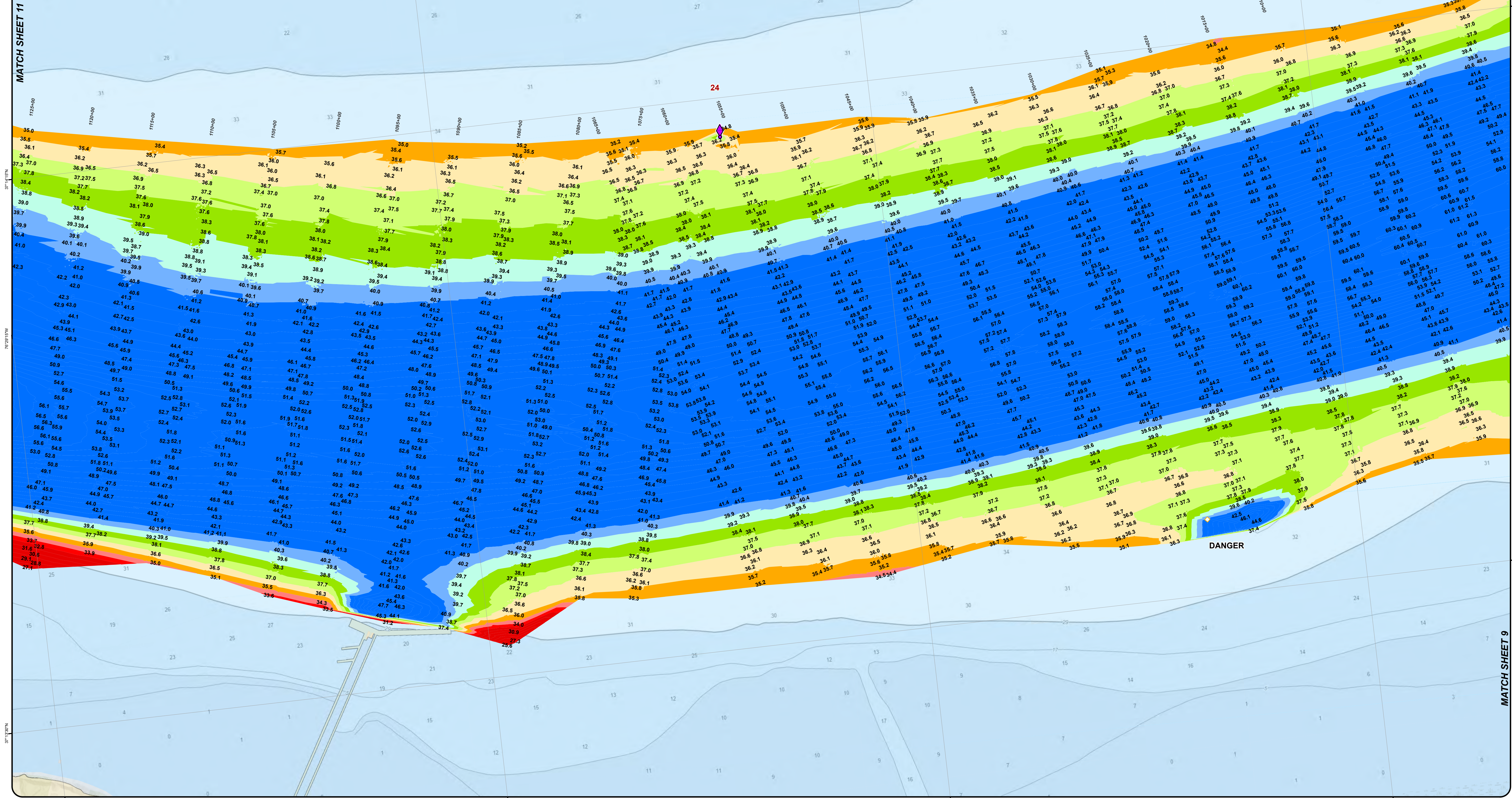
1 INCH = 400 FEET

Aids to Navigation

- Can
- Nun
- Green Lighted Buoy
- Red Lighted Buoy
- Junction Buoy
- Flashing Green
- Flashing Red
- Green Daybeacon
- Red Daybeacon
- Danger

To: Navigation Interests		From: USACE, Norfolk District 803 Front St Norfolk, VA 23510						
RIVER/HARBOR NAME AND STATE YORK RIVER ENTRANCE CHANNEL VIRGINIA				MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD				
NAME OF CHANNEL	DATE OF SURVEY	AUTHORIZED PROJECT			LEFT OUTSIDE QUARTER (feet)	LEFT INSIDE QUARTER (feet)	RIGHT INSIDE QUARTER (feet)	RIGHT OUTSIDE QUARTER (feet)
		WIDTH (feet)	LENGTH (miles)	DEPTH (feet)				
York River Entrance Channel	09-20-2022	750	14.0	37.0	35.5	36.7	36.6	36.0
Remarks: All depths at Mean Lower Low Water (MLLW), 1983-2001 Tidal Epoch								

MATCH SHEET 11



MATCH SHEET 9

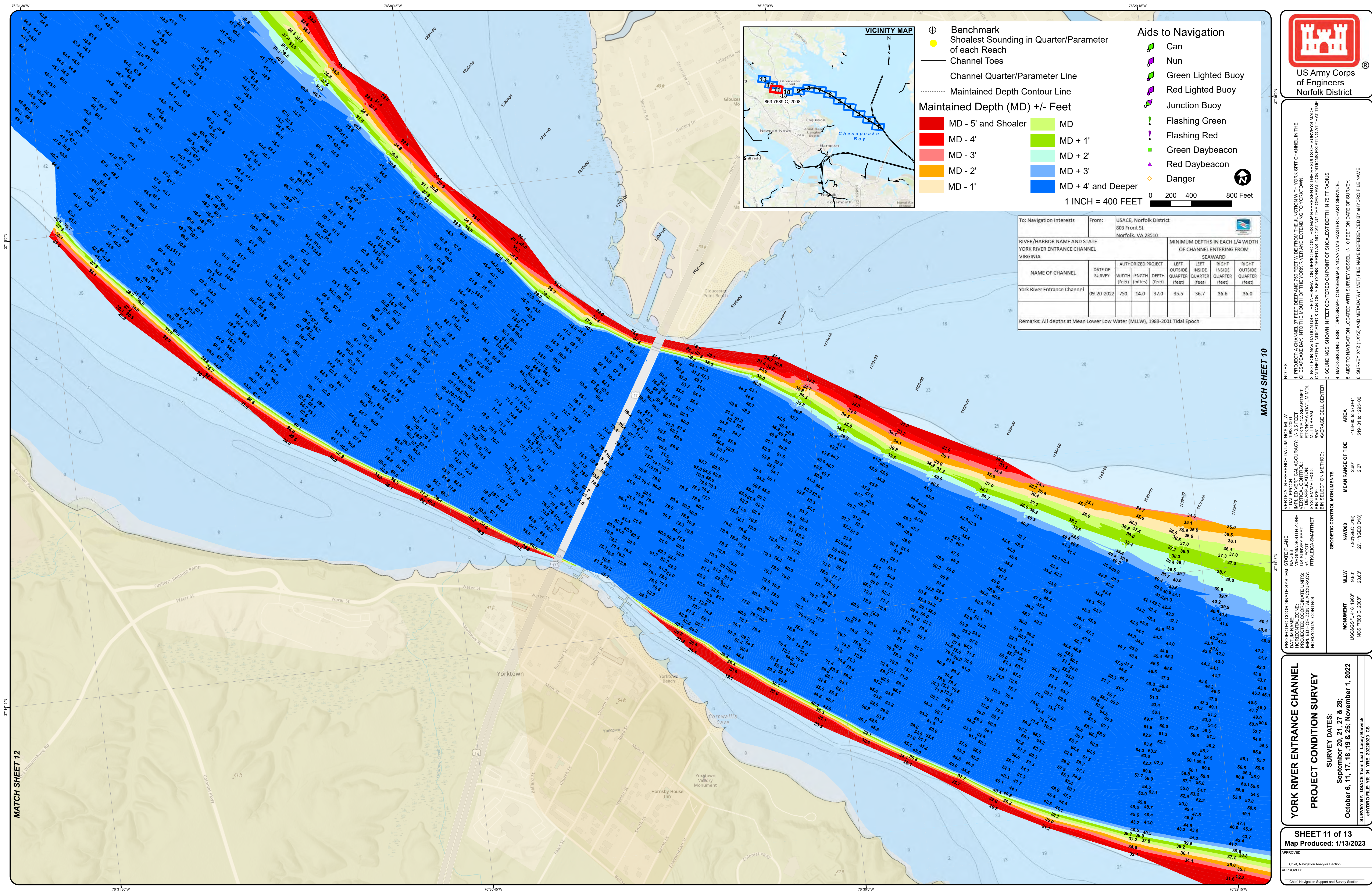


NOTES

- PROJECT A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPIT CHANNEL IN THE CHESAPEAKE BAY INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.
- NOT FOR NAVIGATION USE. THE INFORMATION DERIVED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATE(S) INDICATED & CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
- SOUNDINGS SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADIUS.
- BACKGROUND: ESRI TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE.
- AIDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.
- SURVEY XYZ (.XYZ) AND METADATA (.MET) FILE NAME REFERENCED BY eHYDRO FILE NAME.

VERTICAL REFERENCE DATUM: NOS MLLW		VERTICAL CONTROL: RTKLEICA DATUM MLL	
IMPLIED VERTICAL ACCURACY: +/- 0.5 FEET		TIDE APPLICATION: RTKLEICA DATUM MLL	
STATE PLANE: VIRGINIA SOUTH ZONE		HORIZONTAL CONTROL: RTKLEICA DATUM MLL	
PROJECTED COORDINATE UNITS: US SURVEY FEET		BIN SELECTION METHOD: 5'x5'	
IMPLIED HORIZONTAL ACCURACY: +/- 1.0 FOOT		AVERAGE CELL CENTER	
GEODETIC CONTROL MONUMENTS		MEAN RANGE OF TIDE	
MONUMENT: NAVD83		AREA	
USC&GS 1, 418, 1983*		280'	
NOS 77899 C, 2003*		2.27'	

YORK RIVER ENTRANCE CHANNEL
PROJECT CONDITION SURVEY
SURVEY DATES:
September 20, 21, 27 & 28;
October 6, 11, 16, 19 & 25; November 1, 2022
SURVEY BY: USACE Team Lead: Larry Barwick
eHYDRO FILE: VR-01-YR-20220901_CS



- ⊕ Benchmark
● Shoalest Sounding in Quarter/Parameter of each Reach
— Channel Toes
— Channel Quarter/Parameter Line
- - - - - Maintained Depth Contour Line
- Maintained Depth (MD) +/- Feet
- | | |
|---------------------|--------------------|
| MD - 5' and Shoaler | MD |
| MD - 4' | MD + 1' |
| MD - 3' | MD + 2' |
| MD - 2' | MD + 3' |
| MD - 1' | MD + 4' and Deeper |

- Aids to Navigation
- Can
 - Nun
 - Green Lighted Buoy
 - Red Lighted Buoy
 - Junction Buoy
 - Flashing Green
 - Flashing Red
 - Green Daybeacon
 - Red Daybeacon
 - Danger

To: Navigation Interests		From: USACE, Norfolk District 803 Front St Norfolk, VA 23510			
RIVER/HARBOR NAME AND STATE YORK RIVER ENTRANCE CHANNEL VIRGINIA		DATE OF SURVEY 09-20-2022		MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD	
NAME OF CHANNEL	DATE OF SURVEY	AUTHORIZED PROJECT		LEFT OUTSIDE QUARTER (feet)	RIGHT OUTSIDE QUARTER (feet)
		WIDTH (feet)	LENGTH (miles)	DEPTH (feet)	RIGHT INSIDE QUARTER (feet)
York River Entrance Channel	09-20-2022	750	14.0	37.0	35.5
					36.7
					36.6
					36.0
Remarks: All depths at Mean Lower Low Water (MLLW), 1983-2001 Tidal Epoch					



- NOTES
1. PROJECT A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPIT CHANNEL IN THE CHESAPEAKE BAY INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.
 2. NOT FOR NAVIGATION USE. THE INFORMATION DERIVED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
 3. SOUNDINGS SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADII.
 4. BACKGROUND: ESRI TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE.
 5. AIDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.
 6. SURVEY XYZ (.XYZ) AND METADATA (.MET) FILE NAME REFERENCED BY eHYDRO FILE NAME.

VERTICAL REFERENCE DATUM: NOS MLLW		IMPLIED VERTICAL ACCURACY: +/- 0.5 FEET		TIDE APPLICATION: RTKLEICA SMARTNET	
HORIZONTAL CONTROL: US SURVEY FEET		TIDE APPLICATION: RTKLEICA SMARTNET		BIN SELECTION METHOD: AVERAGE CELL CENTER	
PROJECTED COORDINATE SYSTEM: NAD83		STATE PLANE: NAD83		MEAN RANGE OF TIDE	
VIRGINIA SOUTH ZONE		VIRGINIA SOUTH ZONE		AREA	
US SURVEY FEET		US SURVEY FEET		-168.86 to 573.41	
IMPLIED HORIZONTAL ACCURACY: +/- 1 FOOT		IMPLIED HORIZONTAL ACCURACY: +/- 1 FOOT		519.01 to 1295+00	
HORIZONTAL CONTROL: RTKLEICA SMARTNET		HORIZONTAL CONTROL: RTKLEICA SMARTNET		2.27'	
MONUMENT		MONUMENT		28.60'	
USC&GS 1, 418, 1983*		USC&GS 1, 418, 1983*		28.60'	
NOS 7689 C, 2008*		NOS 7689 C, 2008*		28.60'	

YORK RIVER ENTRANCE CHANNEL

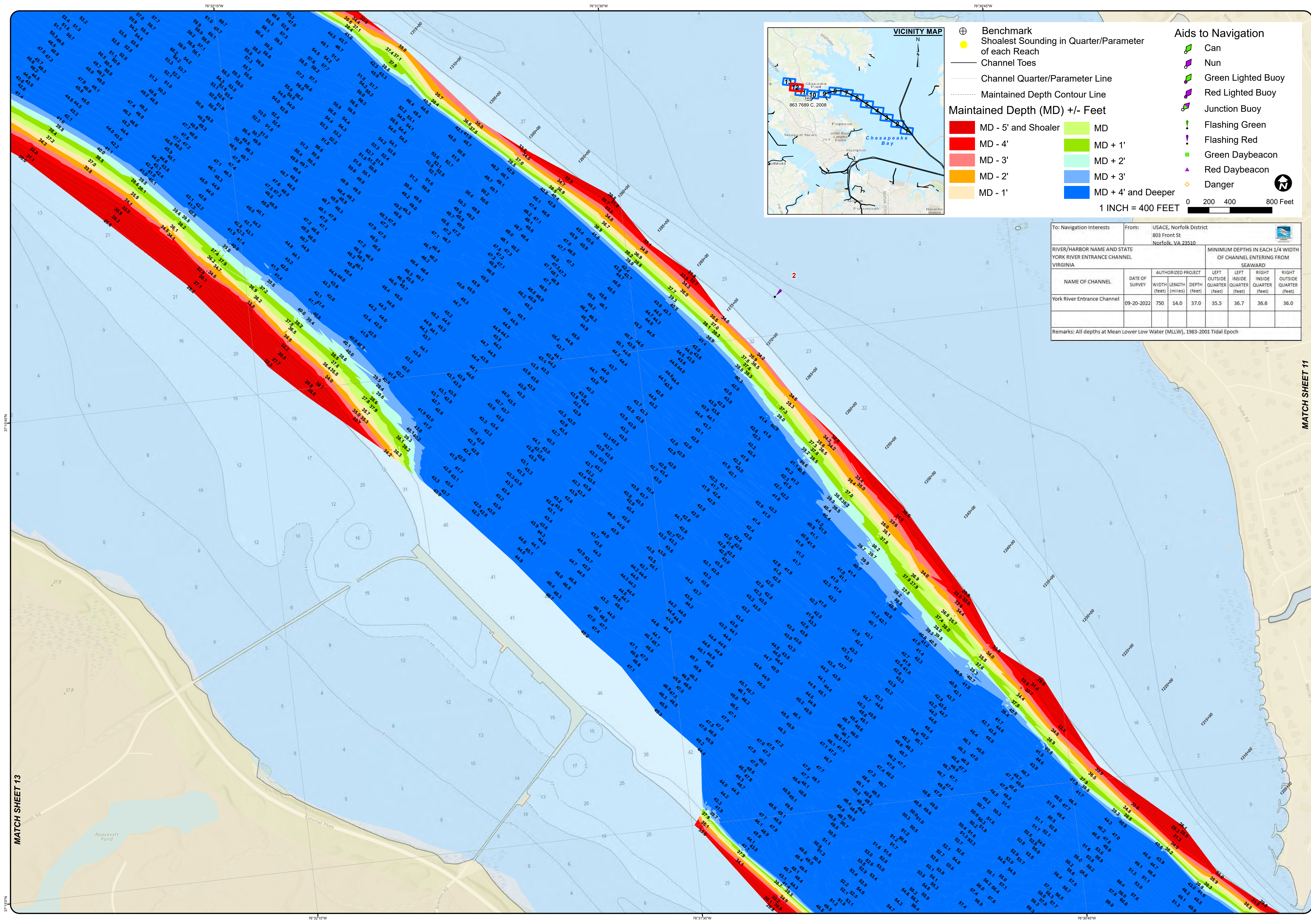
PROJECT CONDITION SURVEY

SURVEY DATES:
September 20, 21, 27, 28;
October 6, 11, 17, 18, 19 & 25; November 1, 2022

SHEET 11 of 13
Map Produced: 1/13/2023

APPROVED: _____
Chief, Navigation Analysis Section

APPROVED: _____
Chief, Navigation Support and Survey Section



- ⊕ Benchmark
● Shoalest Sounding in Quarter/Parameter of each Reach
— Channel Toes
— Channel Quarter/Parameter Line
- - - - - Maintained Depth Contour Line
- Maintained Depth (MD) +/- Feet
- | | |
|---------------------|--------------------|
| MD - 5' and Shoaler | MD |
| MD - 4' | MD + 1' |
| MD - 3' | MD + 2' |
| MD - 2' | MD + 3' |
| MD - 1' | MD + 4' and Deeper |
- 1 INCH = 400 FEET

- Aids to Navigation
- Can
 - Nun
 - Green Lighted Buoy
 - Red Lighted Buoy
 - Junction Buoy
 - Flashing Green
 - Flashing Red
 - Green Daybeacon
 - Red Daybeacon
 - Danger
- 0 200 400 800 Feet

To: Navigation Interests		From: USACE, Norfolk District 803 Front St Norfolk, VA 23510			
RIVER/HARBOR NAME AND STATE YORK RIVER ENTRANCE CHANNEL VIRGINIA		DATE OF SURVEY 09-20-2022		AUTHORIZED PROJECT WIDENING AND DEEPENING OF THE YORK RIVER ENTRANCE CHANNEL	
NAME OF CHANNEL	DATE OF SURVEY	WIDENING AND DEEPENING OF THE YORK RIVER ENTRANCE CHANNEL		MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD	
		WIDENING AND DEEPENING OF THE YORK RIVER ENTRANCE CHANNEL	DEEPENING OF THE YORK RIVER ENTRANCE CHANNEL	LEFT INSIDE QUARTER (feet)	RIGHT INSIDE QUARTER (feet)
York River Entrance Channel	09-20-2022	750	14.0	37.0	35.5
					36.7
					36.6
					36.0
Remarks: All depths at Mean Lower Low Water (MLLW), 1983-2001 Tidal Epoch					



NOTES:

- PROJECT A CHANNEL 37 FEET DEEP AND 750 FEET WIDE FROM THE JUNCTION WITH YORK SPIT CHANNEL IN THE CHESAPEAKE BAY INTO THE MOUTH OF THE YORK RIVER AND EXTENDING TO YORKTOWN.
- NOT FOR NAVIGATION USE. THE INFORMATION DERIVED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED & CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS EXISTING AT THAT TIME.
- SOUNDINGS SHOWN IN FEET CENTERED ON POINT OF SHOALEST DEPTH IN 75 FT RADIUS.
- BACKGROUND: ESRI TOPOGRAPHIC BASEMAP & NOAA WMS RASTER CHART SERVICE.
- AIDS TO NAVIGATION LOCATED WITH SURVEY VESSEL +/- 10 FEET ON DATE OF SURVEY.
- SURVEY XYZ (.XYZ) AND METADATA (.MET) FILE NAME REFERENCED BY eHYDRO FILE NAME.

VERTICAL REFERENCE DATUM: NOS MLLW IMPLIED VERTICAL ACCURACY: +/- 0.5 FEET VERTICAL CONTROL: RTK/LEICA SMARTNET TIDE APPLICATION: RTK/NOAA DATUM MLLW BIN SIZE: 5'x5' BIN SELECTION METHOD: AVERAGE CELL CENTER		MEAN RANGE OF TIDE 2.60' 2.27'	
PROJECTED COORDINATE SYSTEM: STATE PLANE VIRGINIA SOUTH ZONE US SURVEY FEET IMPLIED HORIZONTAL ACCURACY: +/- 1 FOOT HORIZONTAL CONTROL: RTK/LEICA SMARTNET		MONUMENT USC&GS 1, 418, 1983* NOS 77689 C, 2008*	
GEODETIC CONTROL MONUMENTS		NAV/D88 7.90(GEOD18) 27.11(GEOD18)	

YORK RIVER ENTRANCE CHANNEL
PROJECT CONDITION SURVEY
SURVEY DATES:
September 20, 21, 27 & 28;
October 6, 11, 16, 19 & 25 November 1, 2022
SURVEY BY: USACE Team Lead: Larry Bawick
eHYDRO FILE: VR-01-YRE-20220901_CS

From: Cait Clemmer - NOAA Affiliate <cait.clemmer@noaa.gov>
Sent: Thursday, August 21, 2025 5:04 PM
To: _NOS Hudson Canyon SAC <HUDSONCANYONSAC@NOAA.GOV>
Subject: Hudson Canyon Research Cruise Announcements

Hello everyone!

I have some updates about the upcoming Hudson Canyon research cruise aboard the *Nancy Foster*, departing from Woods Hole, MA, Sunday, September 14 – Friday, September 26, 2025.

We're excited to share opportunities for you to **tune in live** to the expedition:

Ship-to-Shore Livestreams

We will host four themed Ship-to-Shore livestreams, each roughly 30–45 minutes, featuring live footage and interviews with the team on board.

Daily ROV Livestreams

In addition, there will be **daily ROV livestreams** (from September 15–24, excluding weekends, and weather dependent) with about 8 livestreams in total. These will let you watch the deep-sea dives in action. Exact dive times will be announced roughly 24 hours in advance, and each dive is expected to last around 8–10 hours, including travel up and down the water column. We'll also have live wet lab cameras, so viewers can see samples being processed in real time.

Hosted Livestream Schedule (all at 12:00 PM EDT)

Wednesday, September 17, 2025 – *From Dock to Deep: The Start of Our Expedition*

- Kickoff livestream introducing the expedition.

Friday, September 19, 2025 – *Deep Sea Science: ROV Operations*

- Focus on ROV mechanics, operations, and coral sampling footage.

Rain Date: Monday, September 22, 2025 (if live footage is not ready).

Tuesday, September 23, 2025 – *A Century of Discovery: Women, Artists, and the Legacy of Arcturus*

- Highlighting the historical context and contributions of women, artists, scientists, and writers to the 1925 Arcturus research cruise.

Thursday, September 25, 2025 – *Deep Sea Discoveries: Closing the Expedition*

- Wrap-up livestream summarizing discoveries and key takeaways.

Where to Watch

All livestreams will be available on **YouTube**: [Inner Space Center Streams](#) and potentially other channels.

Formal community announcement with all links will be coming soon!

In Person Opportunity

There will be an open house for ship tours at **Woods Hole, MA on Friday, September 12, from 1300–1500**. This will be a great opportunity for the community to meet the crew and learn more about operations aboard the Nancy Foster. If you want to come let me know, so I know to look out for you!

Thanks!

--

Cait Clemmer

Sanctuary Advisory Council Coordinator/ Community Engagement Specialist

National Marine Sanctuary Foundation

In support of the Office of National Marine Sanctuaries

National Oceanic and Atmospheric Administration

Contact: (301) 569-2631

NY, NY





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

August 25, 2025
via electronic mail

Peter Weppler, Chief
Environmental Analysis Branch
Planning Division
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0900

RE: Draft Integrated Interim Response Feasibility Report and Environmental Assessment for Actionable Elements (Draft Report), for the New York-New Jersey Harbor and Tributaries coastal storm risk management feasibility study (NYNJHAT Study)

Dear Mr. Weppler:

We have reviewed the Draft Integrated Interim Response Feasibility Report and Environmental Assessment for Actionable Elements (Draft Report) and accompanying essential fish habitat (EFH) assessments and a Biological Assessment (BA) developed by the U.S. Army Corps of Engineers (USACE), New York District (District), in partnership with the New York State Department of Environmental Conservation and New Jersey Department of Environmental Protection. The document supplements the previous Draft Integrated Feasibility Report and Tier 1 Environmental Impact Statement that was issued in September 2022, and outlines an updated Tentatively Selected Plan (TSP) for the New York-New Jersey Harbor and Tributaries coastal storm risk management feasibility study (NYNJHAT Study) area, which includes the network of tidally influenced areas within the New York metropolitan area. The documents describe the preliminary findings of the study to determine the feasibility of constructing coastal storm risk management strategies that will support the study area's economic and community resilience. We are a cooperating agency in the National Environmental Policy Act process for this project.

While acknowledging the complexity of the overall NYNJHAT Study, the revised TSP identifies actionable elements that can be implemented in the near term. These actionable items include:

1. The East Riser Actionable Element - channel modifications, three culvert replacements, and a railroad bridge replacement on East Riser Ditch Channel in Carlstadt and Moonachie, New Jersey.
2. The Harlem River Actionable Element Site - two potential floodwall alternatives with a number of deployable vehicular gates in Northern Manhattan; a landward alignment with five deployable gates or a seaward alignment with two deployable gates.
3. The Oakwood Beach Actionable Element - a nature-based solution (NBS) wetland enhancement with three primary components: removal of non-native invasive plants, creation of a vegetative mosaic with native plants and tidal channels, and dune restoration.



We appreciate the efforts that the District has made to address our concerns with the previously identified TSP, which included storm surge barriers and complementary shore-based measures (i.e., floodwalls, levees, elevated promenades, buried seawalls/dunes, revetments, berms, bulkheads, pedestrian/vehicular gates, and road raisings) across twelve basins, as well as risk reduction features and induced flooding-mitigation features (i.e., land-based or water-based structural features such as tide gates, floodwalls, and revetments). As discussed in our letter dated March 29, 2023, these activities would have had significant negative consequences to NOAA trust resources including federally-managed species for which EFH has been designated, and other commercially, recreationally, and ecologically important species. We also appreciate and support the District's approach to undertake NBS as strategies to increase resilience and to reduce risk from future storms and compounding impacts of sea level change for the NYNJHAT Study area. However, we are unable to initiate consultation under Section 7 of the Endangered Species Act (ESA) or under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) for EFH based upon the level of information available in the Draft Report.

Magnuson-Stevens Fishery Conservation and Management Act/Fish and Wildlife Coordination Act

Because of the limited project specific information on proposed in-water activities associated with the implementation of the proposed actionable elements for the Harlem River and Oakwood Beach, the EFH assessments, included as supplemental appendix A-1c and supplemental appendix A-2c, do not contain sufficient information on the proposed actions or their effects to allow for the initiation of consultations with us under the MSA or the Fish and Wildlife Coordination Act. Information on the existing site conditions for each of the actionable elements, including detailed drawings with plan and cross section views, delineated habitats, and water lines (i.e., mean high water and mean low water), means and methods of construction, restoration goals, performance measures, success criteria, as well as monitoring and adaptive management plans are needed in order for consultation to be initiated. In addition, we recommend that the landward alignment for the Harlem River actionable item is selected to avoid and minimize potential impacts to our resources.

In our previous letters (November 26, 2018 and March 29, 2023), we provided detailed information on our joint consultation responsibilities under these authorities as well as NOAA trust resources in the study area, including federally-managed species under the MSA, diadromous fishes, and other commercially, recreationally, and ecologically important species. Please continue to coordinate with us and refer to those letters as you develop plans for the proposed actionable elements so that effects to our trust resources can be avoided and minimized early in the planning process for the activities proposed and the conservation outcomes can be maximized while still providing the desired coastal storm resilience. The information in our previous letters should also be used to develop EFH consultation documents of the actionable elements on an individual basis.

Endangered Species Act

Because of the limited project specific information on proposed in-water activities associated with the implementation of the proposed actionable elements for the Harlem River and Oakwood Beach, the Section 7 BA, included as supplemental appendix A2-B, does not contain sufficient

information on the proposed actions or their effects to allow for the initiation of consultation with us under the ESA.

Atlantic Sturgeon

Atlantic sturgeon are present in the waters of the Harlem River and its adjacent bays and tributaries. The New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPS of Atlantic sturgeon are endangered; the Gulf of Maine DPS is threatened. Adult and subadult Atlantic sturgeon originating from any of these DPSs could occur in the proposed project area. As young remain in their natal river/estuary until approximately age 2, and early life stages are not tolerant of saline waters, no eggs, larvae, or juvenile Atlantic sturgeon will occur within the waters of the Harlem River and its adjacent bays and tributaries.

Shortnose Sturgeon

Shortnose sturgeon could be present in the Harlem River and its adjacent bays and tributaries. Shortnose sturgeon are listed as endangered throughout their range. As early life stages are not tolerant of saline water, no eggs, larvae, or juvenile shortnose sturgeon will occur within the saline waters of the Harlem River and its adjacent bays and tributaries.

There is no designated critical habitat present in the Harlem River.

As project details develop, we recommend you consider the following effects of the project on sturgeon:

- For any impacts to habitat or conditions that temporarily render affected water bodies unsuitable for the above-mentioned species, consider the use of timing restrictions for in-water work.
- For activities that increase levels of suspended sediment, consider the use of silt management and/or soil erosion best practices (i.e., silt curtains and/or cofferdams).
- For activities that may affect underwater noise levels, consider the use of cushion blocks and other noise attenuating tools to avoid reaching noise levels that will cause injury or behavioral disturbance to sturgeon - see the table below for more information regarding noise criteria for injury/behavioral disturbance in sturgeon.

Organism	Injury	Behavioral Modification
Sturgeon	206 dB re 1 μ PaPeak and 187 dB cSEL	150 dB re 1 μ PaRMS

Depending on the amount and duration of work that takes place in the water, listed species of sturgeon may occur within the vicinity of your proposed project. The federal action agency will be responsible for determining whether the proposed action may affect listed species. If they determine that the proposed action may affect a listed species, they should submit their determination of effects, along with justification and a request for concurrence to the attention of the Section 7 Coordinator at nmfs.gar.esa.section7@noaa.gov. Please be aware that we have recently provided on our website guidance and tools to assist action agencies with their description of the action and analysis of effects to support their determination. See - <https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultations->

[greater-atlantic-region](#). After receiving a complete, accurate comprehensive request for consultation, in accordance with the guidance and instructions on our website, we would then be able to conduct a consultation under Section 7 of the ESA. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued.

If you would like to discuss this matter further, please contact Jessie Murray (732-872-3116; jessie.murray@noaa.gov) with our Habitat and Ecosystem Services Division and/or Edith Carson-Supino (978-282-8490; Edith.Carson-Supino@noaa.gov) with our Protected Resources Division.

Sincerely,



Karen M. Greene
Mid-Atlantic Branch Chief
Habitat and Ecosystem Services Division

cc:

USACE NAN - P. Weppner, C. Alkemeyer, B. McClanahan
USACE NAD - R. Weichenberg
GAR HESD - L. Chiarella, J. Murray
GAR PRD - C. Vaccaro, E. Carson-Supino
OPR - D. Youngkin
FWS - E. Schradin, R. Conover, M. Ciappi, S. Papa
EPA - M. Finocchiaro
MAFMC - C. Moore
NEFMC - C. O'Keefe
ASFMC - R. Beal