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Michael P. Luisi, Chairman | P. Weston Townsend, Vice Chairman
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MEMORANDUM

Date: September 20, 2022

To: Council

From: Jessica Coakley, Staff

Subject: Atlantic Surfclam and Ocean Quahog (SCOQ) Species Separation Requirements Amendment

The Fishery Management Action Team (FMAT) has prepared a draft amendment to address SCOQ Species Separation Requirements based on information provided through the prior white paper development process, which included input from advisory panel, committee, and Council meetings.

At this meeting, the Council will consider approving the draft amendment document for public hearings.

If approved, the public comment period would begin shortly after this Council meeting with 3 hearings (2 in person in Philadelphia, PA and Fall River, MA, 1 online-only) in November, and the public comment period would close November 23, 2022. Public comments would be summarized for the Committee and Council to consider at the December 2022 meeting. At that meeting, the Council will consider selecting a preferred alternative and submitting the amendment to NOAA Fisheries for review and implementation.

SPECIES SEPARATION REQUIREMENTS AMENDMENT

AMENDMENT XX TO THE ATLANTIC SURFCLAM AND OCEAN QUAHOG FISHERY MANAGEMENT PLAN

(Includes Environmental Assessment, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis)

September 2022

Mid-Atlantic Fishery Management Council

in cooperation with

the National Marine Fisheries Service (NMFS)

Draft adopted by MAFMC: MM-DD-YYYY
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MID-ATLANTIC FISHERY MANAGEMENT COUNCIL

1.0 EXECUTIVE SUMMARY

This document was prepared by the Mid-Atlantic Fishery Management Council (MAFMC or Council) in consultation with the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS). This document was developed in accordance with all applicable laws and statutes as described in section 8.0.

The purpose of this action is to modify the species separation requirements in the Atlantic surfclam and ocean quahog fisheries. This Amendment to the Fishery Management Plan (FMP) proposes modifications to the regulations to allow for mixed catches onboard vessels. This action to update fishery regulations is needed because of the increased occurrence of mixed catches in the surfclam and ocean quahog fisheries, an issue raised to the Council by the clam fishing industry. The mixing of catches in these fisheries has created issues with the reliability and quality of the catch data being collected. Therefore, these regulatory changes are needed to improve data collection and management of the Atlantic surfclam and ocean quahog Individual Transferrable Quota (ITQ) system. In addition, the ongoing or increasing frequency of mixed catches in these fisheries has the potential to impact onboard fisheries operations, creating logistically and economic challenges in the long-term that need to be addressed.

1.1 Summary of Alternatives

This document details management alternatives being considered and their expected impacts on several components of the environment. The alternatives are summarized in Box ES-1 below.

Box ES-1. Summary of the alternatives.

Alternatives	Brief Description of Alternatives
Alternative 1 (No Action/*Status Quo*)	No changes would be made to the current regulations for surfclam and ocean quahog.
Alternative 2 (Allow Combined Trip Declaration and Require Onboard Sorting)	Current requirements would be modified to create a new combined trip category that would allow for both species (surfclam/ocean quahog) to be landed on the same trip. Under any of the trip declaration categories (i.e., Surfclam only, Quahog only, or Combined Surfclam/Quahog Trip), onboard sorting will be required.
Alternative 3 (Allow Combined Trip Declaration, Mixing of Clam Species within Cages (on a Declared Combined Trip), and Require Manual Port Monitoring of Declared Combined Trips)	Current requirements would be modified to create a new combined trip category that would allow for both species (surfclam/ocean quahog) to be landed on the same trip. On a declared combined trip (i.e., a fishing trip that is allowed to land both surfclam and ocean quahog) the mixing of both clam species within the cages would be permitted with the implementation of a new NOAA Fisheries sampling program to assess catch composition.
Alternative 4 (Allow Combined Trip Declaration, Mixing of Clam Species within Cages (on a Declared Combined Trip, and Require Electronic Monitoring of Declared Combined Trips)	Current requirements would be modified to create a new combined trip category that would allow for both species (surfclam/ocean quahog) to be landed on the same trip. On a declared combined trip (i.e., a fishing trip that is allowed to land both surfclam and ocean quahog) the mixing of both clam species within the cages would be permitted with the implementation of a new onboard electronic monitoring (EM) program to assess catch composition.

1.2 Summary of Impacts

The following section presents a summary of the expected impacts by alternative and cumulatively for management alternatives being considered (Box ES-1). The impacts of each alternative, and the criteria used to evaluate them, are described in section 7.0. Impacts (qualitative and/or quantitative) are described in terms of their direction (negative, positive, or no impact) and their magnitude (slight, moderate, or high). In section 7.0, the alternatives are compared to the current condition of the valued ecosystem component (VEC) and are also compared to each other. The recent conditions of the VECs include the biological condition of the target stocks, non-target stocks, and protected species over most of the recent five years, as well as characteristics of commercial fisheries and associated human communities over the same time frame. The guidelines used to determine impacts to each VEC are described in section 7.0 (Table 10).

Impacts to Surfclam and Ocean Quahog and Non-Target Species, Physical Habitat, and Protected Resources

Under alternative 1 (no action/*status quo*), no changes would be made to the current regulations for surfclam and ocean quahog. Alternatives 2-4 propose changes to aspects of on vessel operations - such as trip declaration, onboard sorting, and/or the monitoring of catch onboard or dockside. These alternatives are expected to have no impact on the overall prosecution of these fisheries, including landings levels, distribution of fishing effort, or fishing methods while the clam dredge gear is being deployed to catch surfclam and ocean quahog. As such, none of the alternatives evaluated are expected to have impacts (direct or indirect) on the target species and non-target species when compared to current conditions. Because the overall prosecution of these fisheries would not be altered, and the fact that there have never been documented interactions between protected species (ESA-listed and/or MMPA protected) and the primary gear type (i.e., clam dredge) used to prosecute the fisheries, alternatives 2-4 are not expected to adversely affect any protected species; therefore no impacts (direct or indirect) on ESA-listed and/or MMPA-protected resources are expected. Because there is no change in the level of impacts to habitat under any of these alternatives, we expect continued minor, adverse impacts (negative impacts) to habitat will continue to occur under these alternatives (2-4), as clam dredges would be expected to continue to interact with the bottom habitat as these fisheries are prosecuted.

Impacts to Human Communities/Socioeconomic Impacts

The actions considered under alternatives 2-4, propose changes to aspects of on vessel operations - such as trip declaration, onboard sorting, and/or the monitoring of catch on board or dockside. They would not result in changes to other aspects of the of these fisheries, including landings levels, distribution of fishing effort, or fishing methods while the dredge gear is being deployed to catch surfclam and ocean quahog.

Under alternative 1 (no action/*status quo*) there would be no changes to the current species separation requirements as established in the FMP and regulations. Taking no action to address this emerging issue has the potential to result in socioeconomic impacts that range from slight negative at present, to negative in the long-term because of the potential for increased fishing operational costs and long-term degradation of the catch composition data collected for the management of these ITQ fisheries.

Current requirements would be modified under alternative 2 to create a new combined trip category that would allow for both species (surfclam/ocean quahog) to be landed on the same trip. Under any of the VMS trip declaration categories (i.e., Surfclam only, Quahog only, or Combined Surfclam /Quahog Trip), onboard sorting will be required to ensure tagged cages contain the clam species on the tag. This may slightly slow certain trips, to allow time for onboard sorting, and may result in increased operating costs for some trips. This will likely only impact some trips, not all vessel/processor groups, and it will depend on the extent to which vessels are fishing in beds with lots of surfclam and ocean quahog mixing occurring. However, alternative 2 could provide positive impacts as it would change current regulations and allow vessels to land mixed catches and allow them to operate more efficiently as requested by the industry. Alternative 2 is expected to have slight negative to slight positive impacts on the human communities when compared to current conditions, because of both the potential for some operating costs to increase for some trips and vessel/processor groups, and the modification of current regulations that allows for mixed catches.

Under alternative 3, current requirements would be modified to create a new combined trip category that would allow for both species (surfclam/ocean quahog) to be landed on the same trip. However, on a declared combined trip, the mixing of both clam species within the cages would be permitted with the implementation of a new NOAA Fisheries port sampling program to assess catch composition. Alternative 3 is expected to have negative impacts on the human communities when compared to current conditions, because of the new sampling program costs to be applied to the industry as whole. However, some slight positive impacts on the human communities are also expected when compared to current conditions, because of the modification of current regulations that allows for mixed catches and improvements to the catch composition data needed to manage these ITQ fisheries.

Alternative 4 would modify current requirements to create a new combined trip category, which would allow for both species (surfclam/ocean quahog) to be landed on the same trip. On a declared combined trip, the mixing of both clam species within the cages would be permitted with the implementation of a new onboard electronic monitoring (EM) program to assess catch composition data needed to manage these ITQ fisheries. While there may be costs associated with implementing EM technology borne by deploying the new technology to the industry (slight negative), the long-term benefits that could be realized through implementation may be slight positive. Under alternative 4, the technology and capabilities has not been fully developed so this is a longer-term solution that might take several years to implement.

When comparing all four alternatives for human communities, impacts are expected to range from negative to slight positive, compared to the current conditions. The magnitude of the negative impacts is expected to be greater under alterative 1 (i.e., slight negative to negative as a result of increased fishing operation costs and the degradation of catch data needed for management of these ITQ fisheries), followed by alternative 3 (i.e., negative due to costs of setting up new sampling program to slight positive), followed by alternative 4 (i.e., slight negative over the next few years as EM technology is developed and deployed, but slight positive longer term), and then, alternative 2 (i.e., slight negative to slight positive).

2.0 LIST OF FREQUENTLY USED ACRONYMS, CONVERSIONS, AND DEFINITIONS

Frequently Used Acronyms

ABC	Acceptable Biological Catch
ACT	Annual Catch Target
APSD	Analysis Program and Support Division
bu	Bushels
CEA	Cumulative Effects Assessment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIE	Center for Independent Experts
cm	Centimeter (0.393 inches)
DPS	Distinct Population Segment
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EMUs	Ecological Marine Units
EO	Executive Order
ESA	Endangered Species Act
F	Fishing Mortality Rate
FMAT	Fishery Management Action Team
FMP	Fishery Management Plan
FR	Federal Register
ft^3	Cubic feet (7.48052 gallons; 0.03703 cubic yards)
FONSI	Finding of No Significant Impact
GARFO	Greater Atlantic Regional Fisheries Office
GB	Georges Bank
GOM	Gulf of Maine
GSC	Great South Channel
HMA	Habitat Management Area
IFQ	Individual Fishing Quota
IRFA	Initial Regulatory Flexibility Analysis
ITQ	Individual Transferrable Quota
km	Kilometer (0.621 miles)
LPUE	Landings Per Unit of Effort
m	Meter (3.280 feet)
MAFMC	Mid-Atlantic Fishery Management Council (Council)
MEO	Market Equilibrium Output
MFP	Multi-factor Productivity
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAICS	North American Industry Classification System Codes
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NRCC	Northeast Regional Coordinating Council
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NS	National Standard
OHA2	Omnibus Essential Fish Habitat Amendment 2 (NEFMC)
OFL	Overfishing Limit
OY	Optimal Yield

P, Pr, RFF	Past, Present, Reasonably Foreseeable Future
PBR	Potential Biological Removal
PRA	Paperwork Reduction Act
PSP	Paralytic Shellfish Poisoning
R	Recruitment
R_0	Recruitment in an Unfished Stock
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SBA	Small Business Administration
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
SASI	Swept Area Seabed Impact
U.S.	United States
VEC	Valued Ecosystem Component
VMS	Vessel Monitoring Systems
WGOM	Western Gulf of Maine

Conversions

1 metric ton (mt) = 2,204.622 pounds (lb); 1 kilometer (km) = 0.621 miles; 1 meter (m) = 3.280 feet (ft); 1 centimeter (cm) = 0.393 inches; 1 Maine bushel = 11 lb meats (1.2445 ft^3); 1 surfclam bushel = 17 lb meats (1.88 ft^3); 1 ocean quahog bushel = 10 lb meats (1.88 ft^3). Number of bushels divided by 32 = number of cage tags.

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4.0 INTRODUCTION AND BACKGROUND

This document was developed in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA)[1] and National Environmental Policy Act (NEPA), the former being the primary domestic legislation governing fisheries management in the U.S. Exclusive Economic Zone (EEZ), and the Atlantic Surfclam and Ocean Quahog FMP. The management regime and objectives of the fisheries are detailed in the FMP, including any subsequent amendments which are available at: http://www.mafmc.org, and briefly described below.

4.1 PURPOSE AND NEED OF THE ACTION

The purpose of this action is to modify the species separation requirements in the Atlantic surfclam and ocean quahog fisheries. Regulations will be modified to allow for mixed catches onboard vessels that presently are declared/targeting either surfclam or quahog. Regulations may be modified at various levels to address vessel trip declaration, onboard operations (e.g., sorting), cage tagging, and other regulations as needed.

This action to update fishery regulations is needed because of the increased frequency of mixed catches in these fisheries, an issue raised to the Council by the clam fishing industry. In addition, these regulatory changes are needed to improve data collection and monitoring of the surfclam and ocean quahog catches given the current incorrect assumption at present that 100 percent of the catch on a targeted trip is the targeted clam species. This is also inconsistent with the ITQ system which requires tags and allocation for each species to be landed. No enforcement or monitoring of these mixed catches is occurring, but industry and survey data indicate that the overlap of these species distributions is increasing.

4.2 FMP OBJECTIVES

The original FMP objectives were adopted through Amendment 8 to the Atlantic Surfclam and Ocean Quahog FMP, which implemented the ITQ system in 1990 (MAFMC 1988). The FMP objectives remained unchanged until December 2019 when the Council approved revised goals and objectives as follows:

Goal 1: Ensure the biological sustainability of the surfclam and ocean quahog stocks to maintain sustainable fisheries.

Goal 2: Maintain a simple and efficient management regime.

> **Objective 2.1:** Promote compatible regulations between state and federal entities.
> **Objective 2.2:** Promote coordination with the New England Fishery Management Council.
> **Objective 2.3:** Promote a regulatory framework that minimizes government and industry costs associated with administering and complying with regulatory requirements.

Goal 3: Manage for stability in the fisheries.

[1] Magnuson-Stevens Fishery Conservation and Management Act, portions retained plus revisions made by the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSRA), and available at: http://www.nmfs.noaa.gov/sfa/magact/MSA_Amended_2007%20.pdf

Objective 3.1: Provide a regulatory framework that supports long-term stability for surfclam and ocean quahog fisheries and fishing communities.

Goal 4: Provide a management regime that is flexible and adaptive to changes in the fisheries and the ecosystem.

Objective 4.1: Advocate for the fisheries in ocean planning and ocean use discussions.

Objective 4.2: Maintain the ability to respond to short and long-term changes in the environment.

Goal 5: Support science, monitoring, and data collection that enhance effective management of the resources.

Objective 5.1: Continue to promote opportunities for government and industry collaboration on research.

4.3 MANAGEMENT UNIT

The management unit is all Atlantic surfclam (*Spisula solidissima*) and ocean quahog (*Arctica islandica*) in the Atlantic EEZ. Amendment 10 also established a management regime specific to the eastern Maine fishery for a zone north of 43° 50' north latitude (i.e., Maine mahogany quahog fishery).

4.4 AMENDMENTS AND OTHER FMP MODIFICATIONS

The Council has been involved in surfclam and ocean quahog management since its first Council meeting (September 1976). An overview of the original FMP, amendments, and framework actions that have affected management of surfclam and ocean quahog are summarized at: https://www.mafmc.org/surfclams-quahogs.

4.5 BACKGROUND ON THIS ACTION

Industry asked the Council to address issues related to the mixing of surfclam and ocean quahog in landings in the fishery. The current regulations do not allow for both surfclam and ocean quahog to be landed on the same trip or to be placed in the same cages - these are a result of the Individual Transferable Quota (ITQ) system which requires landings by species to be tracked separately. Industry noted that they currently avoid areas where species co-occur to the extent possible because mixed catches are undesirable, as processors can only process one species at a time at the processing facilities. Despite both regulatory and economic incentives to avoid mixed catches, industry has indicated that this issue needs to be addressed because co-occurrence and mixing of these clams is occurring more frequently, and it may become a larger problem in the future due to climate change. For more details on this issue see Appendix A. In addition, the Council recognizes that the monitoring and enforcement issues associated with mixed catches of surfclam and ocean quahog are already upon us. Mixed catches are occurring but no enforcement or monitoring of these mixed catches is occurring – therefore, data are not being collected in a manner consistent with the requirements of these ITQ fisheries. Therefore, the Council has prioritized development of this action to address this emerging issue.

5.0 MANAGEMENT ALTERNATIVES

This amendment considers a range of alternatives to address changes to the species separation requirements in the surfclam and ocean quahog fisheries. In recognition of the diversity of potential solutions to these goals, a range of possible options for management measures ("alternatives") were developed for consideration. This approach complies with the statutory requirements of the NEPA to include a "range of alternatives" when evaluating the environmental impacts of federal actions. The complete analyses of the biological, economic, and social impacts of the alternatives are presented in section 7.0 of this document.

Comprehensive descriptions of the current regulations for surfclam and ocean quahog as detailed in the Code of Federal Regulations (CFR) are available, respectively, at:
https://www.fisheries.noaa.gov/species/atlantic-surfclam and
https://www.fisheries.noaa.gov/species/ocean-quahog.

It should be noted that the following alternatives may provide a short-term solution to the mixing of surfclam and ocean quahog in fisheries catches (particularly alternative 2 and 3) while alternative 4 may provide a long-term solution. The Council is supportive of methods to develop longer-term solutions to this issue that provide for resilience as climate change may exacerbate this issue. The Council staff and NEFSC are actively exploring approaches that implement EM that may provide longer-term solutions. In general, the Council would be supportive of members of the fishing industry exploring long-term solutions through an exempted fishing program permit (see Appendix B) to conduct research into methods that would allow for effective monitoring of catches of both surfclam and ocean quahog.

5.1 Alternative 1 - No Action/Status Quo

Under this alternative, no changes would be made to the current regulations for surfclam and ocean quahog. This means the current requirements that state that only single species declared trips are permitted (i.e., a trip must be declared under the Vessel Monitoring System (VMS) as a surfclam or ocean quahog trip) and only that declared species may be landed and placed in cages on board the vessel, will remain in place. This alterative assumes that each ITQ tagged cage is 100% of the target species.

5.2 Alternative 2 - Allow Combined Trip Declaration and Require Onboard Sorting

Under this alternative, changes would be made to the current regulations for surfclam and ocean quahog. The current requirements that only single species declared trips are permitted would be modified to create a third declaration category to allow for trips to land both species under, combined trip (i.e., a trip must be declared under VMS as a surfclam trip, ocean quahog trip, or a combined surfclam/ocean quahog trip). The newly created combined trip category would allow for two species (surfclam/ocean quahog) to be landed on the same trip. Under any of the trip declaration categories, onboard sorting is required. For each of the trip categories:

- Surfclam trip: Onboard sorting is required to ensure the cages onboard the vessel are filled with surfclam only and the cage is tagged as surfclam.

- Ocean quahog trip: Onboard sorting is required to ensure the cages onboard the vessel are filled with ocean quahog only and the cage is tagged as ocean quahog.
- Combined trip: Onboard sorting is required to ensure the cages onboard the vessel contain either surfclam or ocean quahog only (i.e., no mixing of both species within the cages can occur) and cages are tagged as either surfclam or ocean quahog. This means those declaring combined trips must have obtained enough surfclam and ocean tags for their cages onboard.

No other changes would be made to the current regulations and all data reporting requirements would still apply. Industry identified this as a potential short-term solution that they could implement through their on-vessel operations.

5.3 Alternative 3 – Allow Combined Trip Declaration, Mixing of Clam Species within Cages (on a Declared Combined Trip), and Require Manual Port Monitoring of Combined Mixed Trips

Under this alternative, changes would be made to the current regulations for surfclam and ocean quahog. The current requirements that only single-species declared trips are permitted would be modified to create a third declaration category, which would allow for combined trips to land both species (i.e., a trip must be declared under VMS as a surfclam trip, ocean quahog trip, or a combined surfclam/ocean quahog trip). The newly created combined trip category would allow for two species (surfclam/ocean quahog) to be landed on the same fishing trip.

On a declared combined trip (i.e., a fishing trip that is allowed to land both surfclam and ocean quahog) the mixing of both clam species within the cages would be permitted with the implementation of a new NOAA Fisheries sampling program to assess catch composition. However, all cages must still be tagged prior to removal from the vessel, based on the dominant species (>50%) within each cage. This means those declaring combined trips must have obtained enough surfclam and ocean tags for their cages onboard.

A NOAA Fisheries sampling program will be developed to manually inspect and sample cages on arrival at the port of landing for all declared combined trips, to record the catch composition. The sampling intensity for each trip must be sufficient to provide reliable estimates of catch composition of both surfclam and ocean quahog for stock assessment purposes. This would be a new sampling program and would require a new suite of regulations to implement. In addition, a portion of the costs associated with this new program would be recovered through the cost recovery program for the government costs associated with implementing it.

The current ITQ tagging process presents challenges in terms of differentiating what is intended for processing (landings) versus what may be discarded and/or trashed and not processed at the facility. These issues would need to be addressed by NOAA Fisheries if this alternative were to be implemented.

5.4 Alternative 4 - Allow Combined Trip Declaration, Mixing of Clam Species within Cages (on a Declared Combined Trip), and Require Electronic Monitoring of Declared Combined Trips

Under this alternative, changes would be made to the current regulations for surfclam and ocean quahog. The current requirements that only single species declared trips are permitted would be modified to create a third declaration category to allow for trips to land both species under - combined trips (i.e., a trip must be declared under VMS as a surfclam trip, ocean quahog trip, or a combined surfclam/ocean quahog trip). The newly created combined trip category would allow for two species (surfclam/ocean quahog) to be landed on the same fishing trip.

On a declared combined trip (i.e., a fishing trip that is allowed to land both surfclam and ocean quahog), the mixing of both clam species within the cages would be permitted with the implementation of onboard EM requirements to assess the catch on those trips. However, all cages must still be tagged prior to removal from the vessel, based on the dominant species (>50%) within each cage. This means those declaring combined trips must have obtained enough surfclam and ocean tags for their cages onboard.

New EM regulations would be developed to require electronic inspection of the clams prior to the cages being filled – ideally the material would be inspected while traveling down the belt from the dredge to the cages, to record catch composition. This is a longer-term solution as it would require substantial technical development work to test and deploy this new technology. This technology may also be used in the future to assist the industry in assessing mixing levels as climate change makes this problem more relevant. In addition, a portion of the costs associated with this new program would be recovered through the cost recovery program for the government costs associated with implementing it.

The current ITQ tagging process presents challenges in terms of differentiating what is intended for processing (landings) versus what may be discarded and/or trashed and not processed at the facility. These issues would need to be addressed by NOAA Fisheries if this alternative were to be implemented.

6.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The affected environment consists of those physical, biological, and human components of the environment expected to experience impacts if any of the actions considered in this document were to be implemented. This document focuses on four aspects of the affected environment, which are defined as valued ecosystem components (VECs).

The VECs include:

- Managed species (i.e., surfclam and ocean quahog) and non-target species
- Physical habitat
- Protected species
- Human communities

The following sections describe the recent condition of the VECs.

6.1 Managed Resources and Non-Target Species

6.1.1 Description of the Fisheries

Atlantic surfclam are distributed along the western North Atlantic Ocean from the southern Gulf of St. Lawrence to Cape Hatteras. Surfclam occur in both the state territorial waters (≤ 3 miles from shore) and within the Exclusive Economic Zone (EEZ; 3-200 miles from shore). The ocean quahog is a bivalve mollusk distributed in temperate and boreal waters on both sides of the North Atlantic Ocean. In the Northeast Atlantic, quahog occur from Newfoundland to Cape Hatteras from depths of about 8 to 400 meters (26 to 1,312 ft). Ocean quahog further north occur closer to shore. The management unit is all Atlantic surfclam (*Spisula solidissima*) and ocean quahog (*Arctica islandica*) in the Atlantic EEZ. The commercial fisheries for surfclam and ocean quahog are fully described in the document titled, "Review of the Atlantic Surfclam and Ocean Quahog Individual Transferable Quota Program. Prepared for Mid-Atlantic Fishery Management Council" (Northern Economics, Inc. 2019; "Briefing Materials (Tab 2))." Clam dredges (a bottom tending mobile gear) are utilized in the commercial fisheries for both species. An overview of commercial landings for both species is provided in Table 1. Information on recent fishing trends are summarized throughout section 6.0. Additional information on these fisheries can be found in Council meeting materials available at: http://www.mafmc.org.

Table 1. Federal Surfclam and Ocean Quahog Quotas and Landings: 1999 - 2021.

	Surfclam ('000 bu)			Ocean Quahog ('000 bu)		
Year	**Landings[a]**	**Quota**	**% Harvested**	**Landings[b]**	**Quota**	**% Harvested**
1999	2,539	2,565	99%	3,832	4,500	85%
2000	2,566	2,565	100%	3,246	4,500	72%
2001	2,855	2,850	100%	3,763	4,500	84%
2002	3,113	3,135	99%	3,957	4,500	88%
2003	3,241	3,250	100%	4,148	4,500	92%
2004	3,138	3,400	92%	3,892	5,000	78%
2005	2,744	3,400	81%	3,006	5,333	56%
2006	3,057	3,400	90%	3,147	5,333	59%
2007	3,231	3,400	95%	3,431	5,333	64%
2008	2,919	3,400	86%	3,467	5,333	65%
2009	2,602	3,400	77%	3,463	5,333	65%
2010	2,332	3,400	69%	3,587	5,333	67%
2011	2,443	3,400	72%	3,160	5,333	59%
2012	2,341	3,400	69%	3,497	5,333	66%
2013	2,406	3,400	71%	3,245	5,333	61%
2014	2,364	3,400	70%	3,196	5,333	60%
2015	2,354	3,400	69%	3,022	5,333	56%
2016	2,339	3,400	69%	3,079	5,333	58%
2017	2,192	3,400	64%	3,178	5,333	59%
2018	2,110	3,400	62%	3,220	5,333	60%
2019	1,943	3,400	57%	2,464	5,333	46%
2020	1,560	3,400	46%	2,006	5,333	38%
2021	1,602[c]	3,400	47%	2,259[c]	5,333	42%

[a] 1 surfclam bushel is approximately 17 lb. [b] 1 ocean quahog bushel is approximately 10 lb. [c] Preliminary, incomplete 2021 data. NA = Not yet available. Source: NMFS Clam Vessel Logbook Reports.

6.1.1.1 Basic Biology

6.1.1.1.1 Atlantic Surfclam

Information on surfclam biology can be found in the document titled, "Essential Fish Habitat Source Document: Surfclam, *Spisula solidissima*, Life History and Habitat Requirements" (Cargnelli et al. 1999a). An electronic version is available at the following website: https://www.fisheries.noaa.gov/new-england-mid-atlantic/habitat-conservation/essential-fish-habitat-efh-northeast. Additional information on this species is available at the following website: http://www.fishwatch.gov. A summary of the basic biology is provided below.

Atlantic surfclam are distributed along the western North Atlantic Ocean from the southern Gulf of St. Lawrence to Cape Hatteras. Surfclam occur in both the state territorial waters (≤ 3 miles from shore) and within the EEZ (3-200 miles from shore). Commercial concentrations are found primarily off New Jersey, the Delmarva Peninsula, and on Georges Bank. In the Mid-Atlantic region, surfclam are found from the intertidal zone to a depth of about 60 meters (197 ft), but densities are low at depths greater than 40 meters (131 ft).

The maximum size of surfclam is about 22.5 cm (8.9 inches) shell length, but surfclam larger than 20 cm (7.9 inches) are rare. The maximum age exceeds 30 years and surfclam of 15-20 years of age are common in many areas. Surfclam are capable of reproduction in their first year of life, although full maturity may not be reached until the second year. Eggs and sperm are shed directly into the water column. Settlement to the bottom occurs after a planktonic larval period of about three weeks.

Atlantic surfclam are suspension feeders on phytoplankton and use siphons which are extended above the surface of the substrate to pump in water. Predators of surfclam include certain species of crabs, sea stars, snails, and other crustaceans, as well as fish predators such cod and haddock.

6.1.1.1.2 Ocean Quahog

Information on ocean quahog biology can be found in the document titled, "Essential Fish Habitat Source Document: Ocean Quahog, *Arctica islandica*, Life History and Habitat Requirements" (Cargnelli et al. 1999b). An electronic version is available at the following website: https://www.fisheries.noaa.gov/new-england-mid-atlantic/habitat-conservation/essential-fish-habitat-efh-northeast. Additional information on this species is available at the following website: http://www.fishwatch.gov. A summary of the basic biology is provided below.

The ocean quahog is a bivalve mollusk distributed in temperate and boreal waters on both sides of the North Atlantic Ocean. In the Northeast Atlantic, ocean quahog occur from Newfoundland to Cape Hatteras from depths of about 8 to 400 meters (26 to 1,312 ft). Ocean quahog further north occur closer to shore. The U.S. stock resource is almost entirely within the EEZ (3-200 miles from shore), outside of state waters, and at depths between 20 and 80 meters (66 to 262 ft). However, in the northern range, ocean quahog inhabit waters closer to shore, such that the state of Maine has a small commercial fishery which includes beds within the state's territorial sea (< 3 miles). Ocean quahog burrow in a variety of substrates and are often associated with fine sand.

Ocean quahog are one of the longest-living, slowest growing marine bivalves in the world. Under normal circumstances, they live to more than 100 years old. Ocean quahog off the coast of the U.S. have been aged well in excess of 200 years. Growth tends to slow after age 20, which corresponds to the size currently harvested by the industry (approximately 3 inches). Size and age at sexual maturity are variable and poorly known. Studies in Icelandic waters indicate that 10, 50, and 90% of female ocean quahog were sexually mature at 40, 64, and 88 mm (1.5, 2.5, and 3.5 inches) shell length or approximately 2, 19 and 61 years of age. Spawning occurs over a protracted interval from summer through autumn. Free-floating larvae may drift far from their spawning location because they develop slowly and are planktonic for more than 30 days before settling. Major recruitment events appear to be separated by periods of decades.

Based on their growth, longevity and recruitment patterns, ocean quahog are relatively unproductive and able to support only low levels of fishing. The current resource consists of individuals that accumulated over many decades.

Ocean quahog are suspension feeders on phytoplankton and use siphons which are extended above the surface of the substrate to pump in water. Predators of ocean quahog include certain species of crabs, sea stars, and other crustaceans, as well as fish species such as sculpins, ocean pout, cod, and haddock.

6.1.2 Description of the Stock (Including Status, Stock Characteristics, and Ecological Relationships)

Reports on stock status, including SAW/SARC (Stock Assessment Workshop/Stock Assessment Review Committee) reports, and assessment update reports are available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/population-assessments/northeast-region-stock-assessment-process. EFH Source Documents, which include details on stock characteristics and ecological relationships, are available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/habitat-conservation/essential-fish-habitat-efh-northeast/.

6.1.2.1 Atlantic Surfclam

The surfclam stock assessment was peer reviewed and approved for use by management at Stock Assessment Workshop 61 (SAW 61; NEFSC 2017a). A statistical catch at age and length model called Stock Synthesis was used. Reports on "Stock Status," including assessment and reference point updates, SAW reports, and SARC panelist reports are available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/population-assessments/northeast-region-stock-assessment-process.

The most recent assessment of the surfclam stock is a management track assessment of the existing benchmark Stock Synthesis assessment (SAW 61; NEFSC 2017). This management track assessment indicated the stock was not overfished and overfishing was not occurring (Figures 1-2). Retrospective adjustments were not made to the model results. Spawning stock biomass (SSB) in 2019 was estimated to be 1,222 ('000 mt) which is 119% of the biomass target (SSB_{MSY} proxy

= 1,027; Figure 1). The 2019 fully selected fishing mortality was estimated to be 0.036 which is 25.8% of the overfishing threshold proxy (F_{MSY} proxy = 0.141; Figure 2).

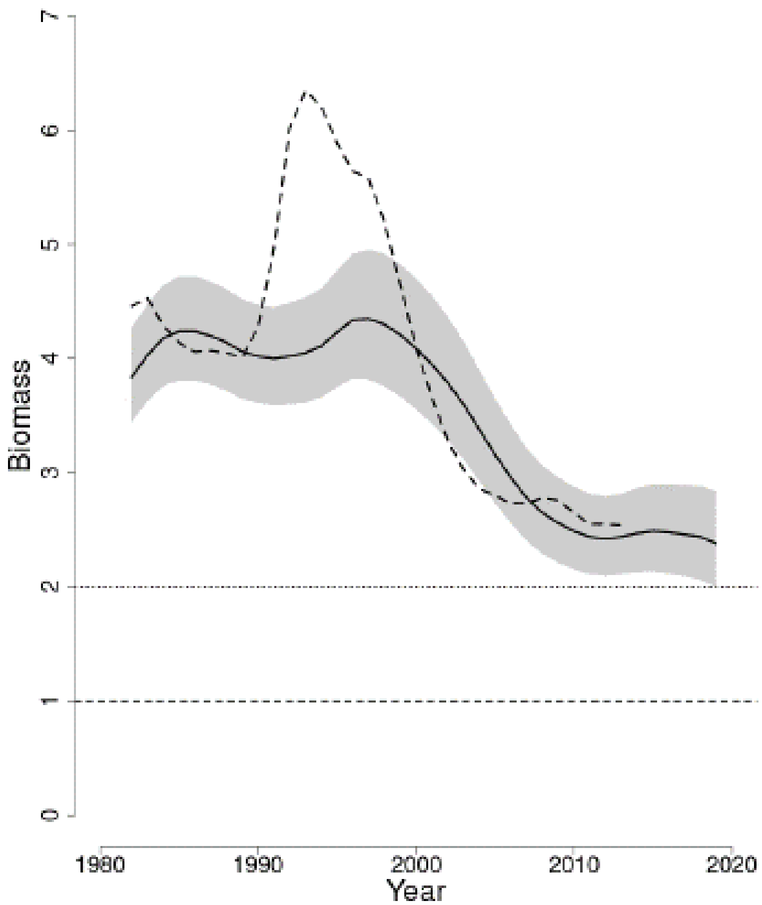

Figure 1. Trends in spawning stock biomass of Atlantic surfclam between 1982 and 2019 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ (½ $SSB_{MSY\ proxy}$; horizontal dashed line) as well as SSB_{Target} ($SSB_{MSY\ proxy}$; horizontal dotted line) based on the 2020 assessment. Units of SSB are the ratio of annual biomass to the biomass threshold ($SSB/SSB_{Threshold}$). The approximate 90% lognormal confidence intervals are shown (Hennen 2020).

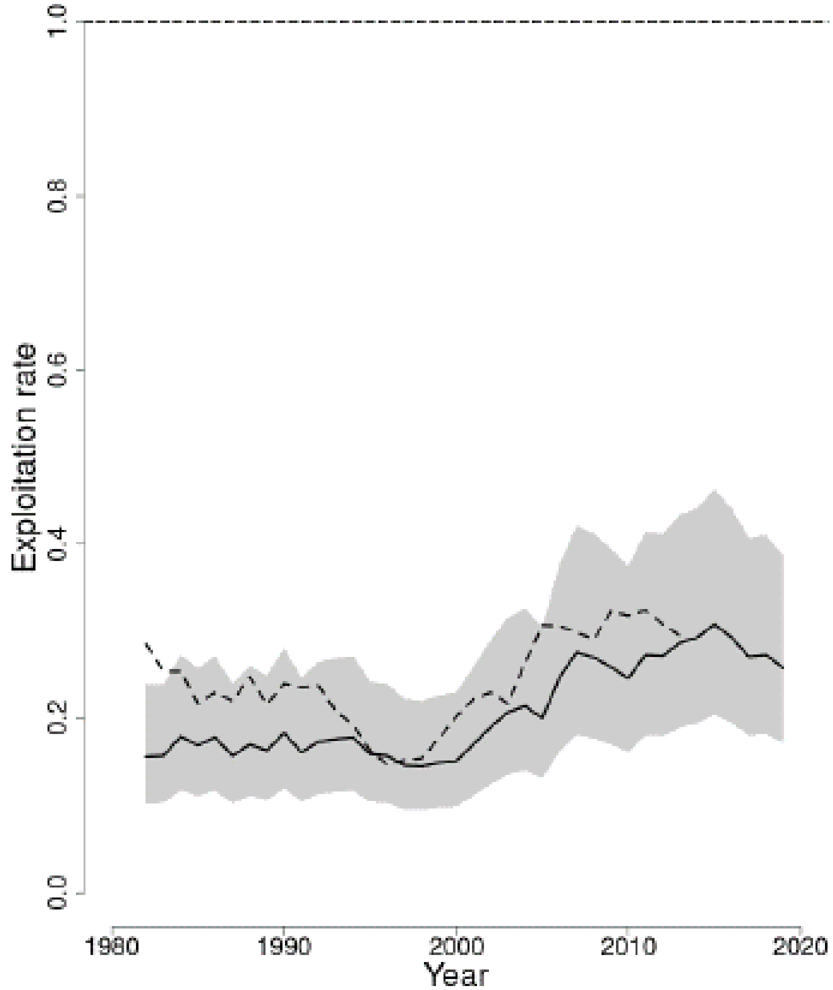

Figure 2. Trends in the fully selected fishing mortality (F_{Full}) of Atlantic surf-clam between 1982 and 2019 from the current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ ($F_{MSY\ proxy}$=0.141; horizontal dashed line), based on the 2020 assessment. Units of fishing mortality are the ratio of annual F to the F threshold ($F/F_{Threshold}$). The approximate 90% lognormal confidence intervals are shown (Hennen 2020).

6.1.2.2 Ocean Quahog

The ocean quahog stock assessment was peer reviewed and approved for use by management at Stock Assessment Workshop 63 (SAW 63; NEFSC 2017b). A statistical catch at length model called Stock Synthesis was used. Reports on "Stock Status," including assessment and reference point updates, SAW reports, and SARC panelist reports are available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/population-assessments/northeast-region-stock-assessment-proces.

The most current assessment of the ocean quahog stock is a management track assessment of the existing 2017 benchmark Stock Synthesis assessment (SAW 63; NEFSC 2017). Based on the previous assessment the stock was not overfished, and overfishing was not occurring. The management track assessment updates commercial fishery catch data, and commercial length composition data, as well as the analytical SS assessment model and reference points through 2019. No new survey data have been collected since the last assessment.

Based on this updated assessment, the ocean quahog stock is not overfished and overfishing is not occurring (Figures 3-4). Retrospective adjustments were not made to the model results. Spawning stock biomass (SSB) in 2019 was estimated to be 3,651 ('000 mt) which is 172.8% of the biomass target ($SSB_{MSY\ proxy}$ = 2,113; Figure 3). The 2019 fully selected fishing mortality was estimated to be 0.005 which is 25.5% of the overfishing threshold proxy ($F_{MSY\ proxy}$ = 0.019; Figure 4).

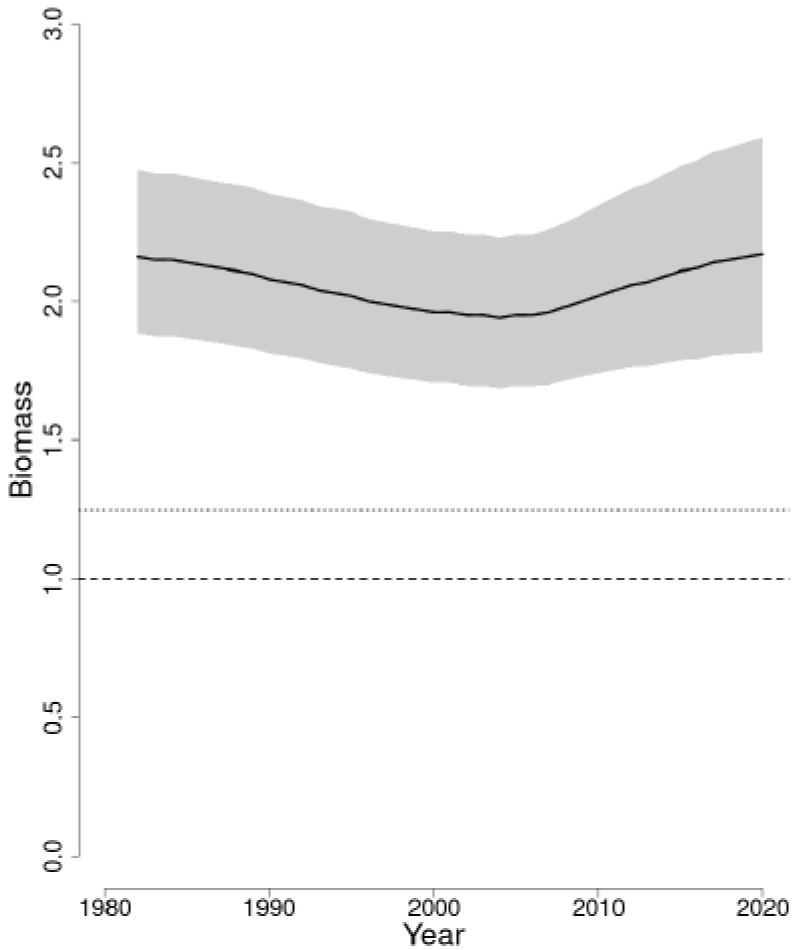

Figure 3. Trends in spawning stock biomass of ocean quahog between 1982 and 2020 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ (horizontal dashed line) as well as SSB_{Target} ($SSB_{MSY\ proxy}$; horizontal dotted line) based on the 2020 assessment. Units of SSB are the ratio of annual biomass to the biomass threshold ($SSB/SSB_{Threshold}$). The approximate 90% lognormal confidence intervals are shown (Hennen 2020).

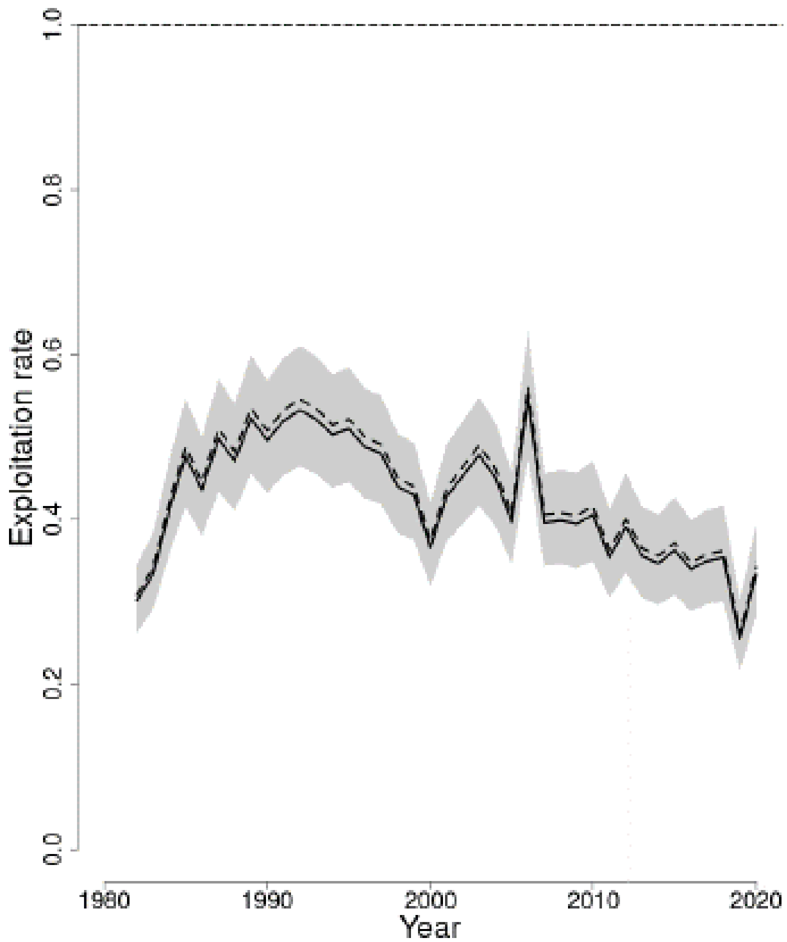

Figure 4. Trends in the fully selected fishing mortality (F_{Full}) of ocean quahog between 1982 and 2020 from the current (solid line) and previous (dashed line)assessment and the corresponding $F_{Threshold}$ ($F_{MSY\ proxy}$=0.019; horizontal dashed line), based on the 2020 assessment. Units of fishing mortality are the ratio of annual F to the F threshold ($F/F_{Threshold}$). The approximate 90% lognormal confidence intervals are shown (Hennen 2020).

6.1.3 Non-Target Species

Non-target species are those species caught incidentally while targeting other species. Non-target species may be retained or discarded.

The estimated bycatch of non-targeted species by the surfclam and ocean quahog fisheries based on observer data from 2016 was provided by Toni Chute (Personal Communication, November 15, 2017) for the stock assessments in 2017. There have been very few observer trips in recent years (particularly in the most recent years due to COVID-19 related-issues); however, the pattern of observed non-targets species are expected to be similar.

There were 15 observed ocean quahog trips (out of a total of 957 trips, so 1.6% of trips were observed) and 28 observed surfclam trips (out of a total of 2,414, so 1.2% of trips were observed) in 2016. All species or species categories caught in the dredge, brought on board, and noted and weighed by observers during normal dredging operations are listed in Tables 2 and 3. For the 2016 observed hauls, the protocol for the observers was to stand along the conveyor belt after the catch had passed over the shaker table and move non-target species from the belt into baskets for weight. Bycatch types that were not informative (such as "invertebrate, unclassified") or inanimate (shell, debris) are not shown. The dominant bycatch species include sea scallops, skates, monkfish, stargazers, crabs, and snails. The surfclam fishery also discards ocean quahog, and the ocean quahog fishery discards surfclam.

Table 4 shows estimates of total fisheries bycatch/discard in 2016 based on the observer data. The weight of each species caught during observed hauls (including the target species) was totaled, then the amount of each non-targeted species was divided by the amount of target species caught, converted to meat weights, to determine a discard/kept (d/k) ratio for that species. Non-targeted species that were kept in small amounts (usually scallops, monkfish, and flatfish) were treated as discard for the purpose of estimating total bycatch. The d/k ratio for each bycatch species was then multiplied by the total landings of the target species in 2016 in meat weights to estimate bycatch. For example, if the catch from observed surfclam trips totaled 100 tons of surfclam meats and 1 ton of scallops, the calculated d/k ratio for scallops based on observer data would be 0.01 or 1/100. If the surfclam fishery for that year landed 1,000 tons of surfclam meats, then 1,000 tons multiplied by the d/k ratio of 0.01 for scallops estimates that about 10 tons of scallops were caught and discarded by the surfclam fishery. Only the amount of bycatch was estimated - no assumptions were made about discard mortality or incidental mortality. Bycatch species that were estimated to be less than 100 pounds in total over the year are not shown.

It is important to note that specific bycatch types were highly variable. A few hauls where a significant weight of a certain bycatch species was caught influence the annual estimates. Using mean catch per trip of all the bycatch species overestimates total bycatch by assuming all the species are caught in every trip. Tables 5 and 6 list the amounts and types of bycatch reported from individual trips to show variability between trips.

Lastly, there were small quantities of ocean quahog caught in observed surfclam trips and vice versa. In all, ocean quahog contributed with 0.65% of the total catch on observed surfclam trips and surfclam contributed with 0.48% of the total catch on observed ocean quahog trips.

Table 2. Total weights of species caught during all observed ocean quahog hauls in 2016, and their percentage of both total catch and un-targeted catch.

Ocean quahog fishery			
Number of observed trips	15		
Number of observed hauls	370		
Species caught	**Weight (lbs)**	**% of total catch**	**% of un-targeted catch**
Ocean quahog (round weight)	2,629,292	98.53	
Surfclam (round weight)	12,827	0.48	32.77
Sea scallop	11,612	0.44	29.67
Little skate	6,816	0.26	17.42
Monkfish	3,121	0.12	7.98
Mussel, unclassified	829	0.03	2.12
Winter skate	741	0.03	1.89
Spiny dogfish	656	0.02	1.68
Snail, unclassified	617	0.02	1.58
Striped sea robin	228	0.01	0.58
Summer flounder	189	0.01	0.48
Horseshoe crab	176	0.01	0.45
Cancer crab, unclassified	171	0.01	0.44
Rock crab	167	0.01	0.43
Jonah crab	163	0.01	0.42
Worm, unclassified	161	0.01	0.41
Skate, unclassified	131	0.005	0.34
Crab, unclassified	110	0.004	0.28
Whelk, true, unclassified	79	0.003	0.20
Northern stargazer	45	0.002	0.11
Sponge, unclassified	36	0.001	0.09
Barndoor skate	35	0.001	0.09
Clearnose skate	30	0.001	0.08
Northern sea robin	30	0.001	0.08
Sea star, unclassified	28	0.001	0.07
Smooth dogfish	22	0.001	0.06
American lobster	20	0.001	0.05
Black sea bass	20	0.001	0.05
Skate, little or winter	19	0.001	0.05
Fourspot flounder	12	0.0005	0.03
Windowpane flounder	8	0.0003	0.02
Moon snail	6	0.0002	0.02
Ocean pout	6	0.0002	0.01
Red hake	5	0.0002	0.01
American plaice	4	0.0001	0.01
Bluefish	3	0.0001	0.01
Whelk, unclassified	3	0.0001	0.01
Spotted hake	2	0.0001	0.01
Hermit crab, unclassified	2	0.0001	0.01
Silver hake	2	0.0001	0.004
Yellowtail flounder	1	0.00004	0.003
Winter flounder	1	0.00003	0.002
Scup	1	0.00003	0.002
Chain dogfish	1	0.00003	0.002
Sea raven	1	0.00002	0.001
Stony coral, unclassified	0.4	0.00001	0.001
Eel, unclassified	0.1	0.000004	0.0003
Sea cucumber, unclassified	0.1	0.000004	0.0003

Table 3. Total weights of species caught during all observed surfclam hauls in 2016, and their percentage of both total catch and un-targeted catch.

Surfclam fishery			
Number of observed trips	28		
Number of observed hauls	815		
Species caught	**Weight (lbs)**	**% of total catch**	**% of un-targeted catch**
Surfclam (round weight)	1,845,643	97.50	
Moon snail, unclassified	12,527	0.66	26.51
Ocean quahog (round weight)	12,267	0.65	25.96
Mussel, unclassified	12,007	0.63	25.41
Winter skate	2,737	0.14	5.79
Little skate	2,393	0.13	5.06
Horseshoe crab	1,307	0.07	2.77
Northern stargazer	1,131	0.06	2.39
Rock crab	651	0.03	1.38
Hermit crab, unclassified	618	0.03	1.31
Northern sea robin	351	0.02	0.74
Monkfish	323	0.02	0.68
Sea scallop	294	0.02	0.62
Spiny dogfish	168	0.01	0.36
Snail, unclassified	142	0.01	0.30
Elasmobranch eggs, unclassified	71	0.004	0.15
Summer flounder	60	0.003	0.13
Winter flounder	32	0.002	0.07
Jonah crab	27	0.001	0.06
Striped sea robin	27	0.001	0.06
American lobster	25	0.001	0.05
Channeled whelk	21	0.001	0.04
Windowpane flounder	12	0.001	0.03
Haddock	12	0.001	0.02
Longhorn sculpin	11	0.001	0.02
Sea raven	8	0.0004	0.02
Skate, little or winter	8	0.0004	0.02
Whelk, true, unclassified	5	0.0003	0.01
Ocean pout	4	0.0002	0.01
Lady crab	3	0.0002	0.01
Sea urchin, unclassified	2	0.0001	0.004
Worm, unclassified	2	0.0001	0.004
Anemone, unclassified	1	0.0001	0.003
Sea star, unclassified	1	0.0001	0.003
Stony coral, unclassified	1	0.00004	0.001
Sponge, unclassified	1	0.00003	0.001
Witch flounder	0.4	0.00002	0.001
Sand dollar	0.4	0.00002	0.001

Table 4. Estimated total fishery bycatch in pounds for 2016 by species.

	Ocean quahog fishery	Surfclam fishery
2016 landings (lbs meats)	21,036,293	39,428,066
Estimated total bycatch by species		
American lobster	1,340	2,844
American plaice	251	
Anemone, unclassified		146
Barndoor skate	2,291	
Black sea bass	1,333	
Bluefish	198	
Cancer crab, unclassified	18,550	
Channeled whelk		2,351
Clearnose skate	2,007	
Elasmobranch eggs, unclassified		7,994
Fourspot flounder	799	
Haddock		1,288
Hermit crab, unclassified	132	69,239
Horseshoe crab	11,638	146,371
Jonah crab	10,760	3,034
Lady crab		336
Little skate	449,930	267,919
Longhorn sculpin		1,209
Monkfish	206,046	36,176
Moon snail	422	1,402,531
Mussel, unclassified	54,751	1,344,344
Northern sea robin	1,947	39,344
Northern stargazer	2,971	126,576
Ocean pout	370	448
Ocean quahog (round weight)		1,373,410
Red hake	323	
Rock crab	11,011	72,911
Sea raven	33	896
Sea scallop	766,527	32,929
Sea star, unclassified	1,875	134
Sea urchin		235
Silver hake	106	
Skate unclassified	9,902	896
Smooth dogfish	1,459	
Snail, unclassified	40,743	15,899
Spiny dogfish	43,324	18,821
Sponge, unclassified	2,390	67
Spotted hake	158	
Striped sea robin	15,071	2,978
Summer flounder	12,457	6,673
Surfclam (round weight)	846,732	
Whelk unclassified	5,360	537
Windowpane flounder	508	1,366
Winter flounder	59	3,594
Winter skate	48,882	306,446
Worm, unclassified	10,621	190

Table 5. Observed bycatch by trip, in pounds, surfclam observed trips.

Trip	surfclams (round weight)	all OQ	all snails	all scallops	all teleosts	all elasmobranchs	all other inverts
1	112,615		73		16	193	1
2	69,173				498	164	587
3	108,103		2,973		6	2	13
4	41,987		479	35	5	16	226
5	70,072	614	81	85	94	349	34
6	72,063	5			2	39	60
7	85,307		1,687		9	286	11,945
8	112,862		1,699		363	1,226	7
9	43,973				169	3	29
10	33,276			2	239	6	216
11	8,236	7	5	113	8	1	4
12	21,839				12		14
13	20,323	819	47				3
14	53,223		115		24	69	111
15	36,368				29	22	10
16	38,925	1,213	14	2	34	9	99
17	134,701				9	211	1
18	40,048		1		134	85	97
19	15,781	1,785		31	8		6
20	43,503	2,195	9		5	98	147
21	53,223	4		26	99	68	44
22	141,126		1,634		24	51	27
23	169,700		790			15	
24	55,900		124		6	716	30
25	27,363				3	183	12
26	21,091		21			29	4
27	94,932				4	486	
28	119,930		1,953		2	74	4

Table 6. Observed bycatch by trip, in pounds, ocean quahog observed trips.

trip	ocean quahogs (round weight)	all SC	all snails	all scallops	all teleosts	all elasmos	all other inverts
1	158,148		4	2,081	147	425	25
2	338,278			509	180	456	
3	53,535			1,367	44	82	53
4	272,884			2,169	1,536	1,901	3
5	110,072			116	67	291	310
6	123,579			60	213	169	108
7	182,071	9,392		1,220	136	386	159
8	149,225			182	40	172	15
9	197,666			372	111	439	133
10	214,583			698	248	259	4
11	117,521		79	819	178	857	349
12	102,755		5	188	91	234	18
13	225,707			1,285	199	1,329	661
14	119,578			285	168	26	5
15	263,690	3,434		260	320	1,426	22

Status of Non-Target Species

Based on NOAA Fisheries Status of Stock 2021 Report (1st Quarter 2021 Update; https://www.fisheries.noaa.gov/national/sustainable-fisheries/status-stocks-2021#more-information the sea scallop stock was not overfished, and overfishing was not occurring and little skate and winter skate are not overfished and are not subject to overfishing, nor is monkfish overfished or subject to overfishing. In addition, moon snails have not been assessed; therefore, their overfished and overfishing status is unknown.

6.2 Physical Environment and Essential Fish Habitat (EFH)

The physical, chemical, biological, and geological components of benthic and pelagic environments are important aspects of habitat for marine species and have implications for reproduction, growth, and survival of marine species. The following sections briefly describe key aspects of physical habitats which may be impacted by the alternatives considered in this document. This information is largely drawn from Stevenson et al. (2004), unless otherwise noted.

6.2.1 Physical Environment

Surfclam and ocean quahog inhabit the northeast U.S. shelf ecosystem, which includes the area from the Gulf of Maine south to Cape Hatteras, extending seaward from the coast to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream. The northeast shelf ecosystem includes the Gulf of Maine, Georges Bank, the Mid-Atlantic Bight, and the continental slope.

The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types.

Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and strong currents.

The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, North Carolina.

The continental slope begins at the continental shelf break and continues eastward with increasing depth until it becomes the continental rise. It is homogenous, with exceptions at the shelf break, some of the canyons, the Hudson Shelf Valley, and in areas of glacially rafted hard bottom. The continental shelf in this region was shaped largely by sea level fluctuations caused by past ice ages. The shelf's basic morphology and sediments derive from the retreat of the last ice sheet and the subsequent rise in sea level. Currents and waves have since modified this basic structure.

Shelf and slope waters of the Mid-Atlantic Bight have a slow southwestward flow that is occasionally interrupted by warm core rings or meanders from the Gulf Stream. On average, shelf water moves parallel to bathymetry isobars at speeds of 5 - 10 cm/s at the surface and 2 cm/s or less at the bottom. Storm events can cause much more energetic variations in flow. Tidal currents on the inner shelf have a higher flow rate of 20 cm/s that increases to 100 cm/s near inlets.

The shelf slopes gently from shore out to between 100 and 200 km offshore where it transforms to the slope (100 - 200 m water depth) at the shelf break. Numerous canyons incise the slope, and some cut up onto the shelf itself. The primary morphological features of the shelf include shelf valleys and channels, shoal massifs, scarps, and sand ridges and swales. Most of these structures are relic except for some sand ridges and smaller sand-formed features. Shelf valleys and slope canyons were formed by rivers of glacier outwash that deposited sediments on the outer shelf edge as they entered the ocean. Most valleys cut about 10 m into the shelf; however, the Hudson Shelf Valley is about 35 m deep. The valleys were partially filled as the glacier melted and retreated across the shelf. The glacier also left behind a lengthy scarp near the shelf break from Chesapeake Bay north to the eastern end of Long Island. Shoal retreat massifs were produced by extensive deposition at a cape or estuary mouth. Massifs were also formed as estuaries retreated across the shelf.

Some sand ridges are more modern in origin than the shelf's glaciated morphology. Their formation is not well understood; however, they appear to develop from the sediments that erode from the shore face. They maintain their shape, so it is assumed that they are in equilibrium with modern current and storm regimes. They are usually grouped, with heights of about 10 m, lengths of 10 - 50 km and spacing of 2 km. Ridges are usually oriented at a slight angle towards shore, running in length from northeast to southwest. The seaward face usually has the steepest slope. Sand ridges are often covered with smaller similar forms such as sand waves, megaripples, and ripples. Swales occur between sand ridges. Since ridges are higher than the adjacent swales, they are exposed to more energy from water currents and experience more sediment mobility than swales. Ridges tend to contain less fine sand, silt, and clay while relatively sheltered swales contain more of the finer particles. Swales have greater benthic macrofaunal density, species richness and biomass, due in part to the increased abundance of detrital food and the less physically rigorous conditions.

Sand waves are usually found in patches of 5 - 10 with heights of about 2 m, lengths of 50 - 100 m and 1 - 2 km between patches. Sand waves are primarily found on the inner shelf, and often observed on sides of sand ridges. They may remain intact over several seasons. Megaripples occur on sand waves or separately on the inner or central shelf. During the winter storm season, they may cover as much as 15% of the inner shelf. They tend to form in large patches and usually have lengths of 3 - 5 m with heights of 0.5 - 1 m. Megaripples tend to survive for less than a season. They can form during a storm and reshape the upper 50 - 100 cm of the sediments within a few hours. Ripples are also found everywhere on the shelf and appear or disappear within hours or days, depending upon storms and currents. Ripples usually have lengths of about 1 - 150 cm and heights of a few centimeters.

Sediments are uniformly distributed over the shelf in this region. A sheet of sand and gravel varying in thickness from 0 - 10 m covers most of the shelf. The mean bottom flow from the constant southwesterly current is not fast enough to move sand, so sediment transport must be episodic. Net sediment movement is in the same southwesterly direction as the current. The sands are mostly medium to coarse grains, with finer sand in the Hudson Shelf Valley and on the outer shelf. Mud is rare over most of the shelf but is common in the Hudson Shelf Valley.

Occasionally relic estuarine mud deposits are re-exposed in the swales between sand ridges. Fine sediment content increases rapidly at the shelf break, which is sometimes called the "mud line," and sediments are 70 - 100% fine on the slope. On the slope, silty sand, silt, and clay predominate (Stevenson et al. 2004).

Greene et al. (2010) identified and described Ecological Marine Units (EMUs) in New England and the Mid-Atlantic based on sediment type, seabed form (a combination of slope and relative depth), and benthic organisms. According to this classification scheme, the sediment composition off New England and the Mid-Atlantic is about 68% sand, 26% gravel, and 6% silt/mud. The seafloor is classified as about 52% flat, 26% depression, 19% slope, and 3% steep (Table 7).

Artificial reefs are another significant Mid-Atlantic habitat. These localized areas of hard structure were formed by shipwrecks, lost cargoes, disposed solid materials, shoreline jetties and groynes, submerged pipelines, cables, and other materials (Steimle and Zetlin 2000). While some of these materials were deposited specifically for use as fish habitat, most have an alternative primary purpose; however, they have all become an integral part of the coastal and shelf ecosystem. In general, reefs are important for attachment sites, shelter, and food for many species, and fish predators such as tunas may be attracted by prey aggregations or may be behaviorally attracted to the reef structure.

Like all the world's oceans, the western North Atlantic is experiencing changes to the physical environment as a result of global climate change. These changes include warming temperatures; sea level rise; ocean acidification; changes in stream flow, ocean circulation, and sediment deposition; and increased frequency, intensity, and duration of extreme climate events. These changes in physical habitat can impact the metabolic rate and other biological processes of marine species. As such, these changes have implications for the distribution and productivity of many marine species. Several studies demonstrate that the distribution and productivity of several species in the Mid-Atlantic have changed over time, likely because of changes in physical habitat conditions such as temperature (e.g., Weinberg 2005, Lucey and Nye 2010, Nye et al. 2011, Pinsky et al. 2013, Gaichas et al. 2015).

Table 7. Composition of EMUs off New England and the Mid-Atlantic (Greene et al. 2010). EMUs which account for less than 1% of the surface area of these regions are not shown.

Ecological Marine Unit	Percent Coverage
High Flat Sand	13%
Moderate Flat Sand	10%
High Flat Gravel	8%
Side Slope Sand	6%
Somewhat Deep Flat Sand	5%
Low Slope Sand	5%
Moderate Depression Sand	4%
Very Shallow Flat Sand	4%
Side Slope Silt/Mud	4%
Moderate Flat Gravel	4%
Deeper Depression Sand	4%
Shallow Depression Sand	3%
Very Shallow Depression Sand	3%
Deeper Depression Gravel	3%
Shallow Flat Sand	3%
Steep Sand	3%
Side Slope Gravel	3%
High Flat Silt/Mud	2%
Shallow Depression Gravel	2%
Low Slope Gravel	2%
Moderate Depression Gravel	2%
Somewhat Deep Depression Sand	2%
Deeper Flat Sand	1%
Shallow Flat Gravel	1%
Deep Depression Gravel	1%
Deepest Depression Sand	1%
Very Shallow Depression Gravel	1%

6.2.2 Essential Fish Habitat (EFH)

Information on surfclam and ocean quahog habitat requirements can be found in the documents titled, "Essential Fish Habitat Source Document: Atlantic Surfclam, *Spisula solidissima*, Life History and Habitat Characteristics." (Cargnelli et al. 1999a) and "Essential Fish Habitat Source Document: Ocean Quahog, *Arctica islandica*, Life History and Habitat Characteristics" (Cargnelli et al. 1999b). Electronic versions of these source documents are available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/habitat-conservation/essential-fish-habitat-efh-northeast/. The current designations of EFH by life history stage for surfclam and ocean quahog are provided here:

Atlantic surfclam juveniles and adults: EFH habitat is defined as throughout the substrate, to a depth of three feet below the water/sediment interface, within federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of all the ranked ten-minute squares for the area where surfclam were caught in the NEFSC surfclam and ocean quahog dredge surveys. Surfclam generally occur from the beach zone to a [water] depth of about 200 feet, but beyond about 125 feet abundance is low.

Ocean quahog juveniles and adults: EFH habitat is defined as throughout the substrate, to a depth of three feet below the water/sediment interface, within federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90% of all the ranked ten-minute squares for the area where ocean quahog were caught in the NEFSC surfclam and ocean quahog dredge surveys. Distribution in the western Atlantic ranges in [water] depths from 30 feet to about 800 feet. Ocean quahog are rarely found where bottom water temperatures exceed 60 °F, and occur progressively further offshore between Cape Cod and Cape Hatteras.

There are other federally-managed species with life stages that occupy essential benthic habitats that may be susceptible to adverse impacts from hydraulic clam dredges; descriptions of these are given in the NOAA Fisheries EFH Mapper, which is available at: https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper.

6.2.3 Fishery Impact Considerations

Any actions implemented in the FMP that affect species with overlapping EFH were considered in the EFH assessment for Amendment 13 to the FMP (MAFMC 2003). Surfclam and ocean quahog are primarily landed by hydraulic clam dredges. Amendment 13 included alternatives to minimize the adverse impacts of fishing gear on EFH (as required pursuant to Section 303(a)(7) of the MSA). As stated in section 2.2 of Amendment 13, the prime habitat of surfclam and ocean quahog consists of sandy substrates with no vegetation or benthic 'structures' that could be damaged by the passing of a hydraulic dredge. In these 'high energy' environments, it is thought that the recovery time following passage of a clam dredge is relatively short. Because of the potential that the fisheries adversely impact EFH for a number of managed species, eight action alternatives (including closed area alternatives) for minimizing those impacts were considered by the Council in Amendment 13.

A panel of experts who participated in a 2001 workshop to evaluate the potential habitat impacts of fishing gears used in the Northeast region concluded that there are potentially large, localized impacts of hydraulic clam dredges on the biological and physical structure of sandy benthic habitats (Northeast Region Essential Fish Habitat Steering Committee 2002). The Council concluded in Amendment 13 that there may be some adverse effects of clam dredging on EFH, but concurred with the workshop panel that the effects are short-term and minimal because the fisheries occurs in a relatively small area (compared to the area impacted by scallop dredges or bottom trawls) and primarily in high energy sand habitats. The panel concluded that biological communities would recover within months to years (depending on what species was affected) and physical structure within days in high energy environments to months in low energy environments. The preamble to the EFH Final Rule (January 17, 2002; 67 FR (Federal Register) 2343) defines temporary impacts as those that are limited in duration and that allow the particular environment to recover without measurable impact.

Additionally, at the time that workshop was held, the overall area impacted by the clam fisheries was relatively small (approximately 100 square nautical miles), compared to the large area of high energy sand on the continental shelf. The closed area alternatives that were considered in Amendment 13 were analyzed for their biological, economic, and social impacts, but given the results of the gear effects analysis in that document (summarized above), the Council concluded that none of them were necessary or practicable. Since 2003, when Amendment 13 was implemented, the area open to surfclam and ocean quahog harvesting has expanded to include a large area on Georges Bank that had previously been closed since 1990 due to the presence of the toxin that causes paralytic shellfish poisoning (PSP) in the tissues of surfclam and ocean quahog (NMFS 2012 and 2013). As such, a portion of the fishing effort now operates on Georges Bank and the gear is now being used on more complex, hard-bottom habitats (e.g., Nantucket Sholas) than was the case in 2003. The habitat impact analysis conducted by the NMFS concluded that the adverse impacts of renewed clam dredging on Georges Shoal would be minimal and/or temporary as long as dredging was confined to the shallower, more dynamic sandy bottom habitats which were the only areas where it was believed that the gear could be efficiently operated.

A portion of the following discussion is excerpted from the NEFMC's Omnibus EFH Amendment 2 (OHA2) which implemented measures designed to minimize to the extent practicable the adverse effects of fishing on essential fish habitat.[2] The OHA2 employed a spatial explicit model (SASI = Swept Area Seabed Impact) to estimate habitat vulnerability incorporating gear-specific susceptibility (S) and recovery (R) scores for a number of geological and biological habitat features in various subtracts.

Hydraulic clam dredges have been used in the surfclam fishery for over five decades and in the ocean quahog fishery since its inception in the early 1970s. These dredges are highly sophisticated and are designed to: 1) be extremely efficient (80 to 95% capture rate); 2) produce a very low bycatch of other species; and 3) retain very few undersized clams (Northeast Region Essential Fish Habitat Steering Committee 2002).

The typical dredge is 12 feet wide and about 22 feet long and uses pressurized water jets to wash clams out of the seafloor. Towing speed at the start of the tow is 2.5 knots and declines as the dredge accumulates clams. The dredge is retrieved once the vessel speed drops below 1.5 knots, which can be only a few minutes in very dense beds. However, a typical tow lasts about 15 minutes. The water jets penetrate the sediment in front of the dredge to a depth of about 8 – 10 inches, depending on the type of sediment and the water pressure. The water pressure that is required to fluidize the sediment varies from 50 pounds per square inch (psi) in coarse sand to 110 psi in finer sediments. The objective is to use as little water as possible since too much pressure will blow sediment into the clams and reduce product quality. The "knife" (or "cutting bar") on the leading bottom edge of the dredge opening is 5.5 inches deep for surfclam and 3.5 inches for ocean quahog. The knife "picks up" clams that have been separated from the sediment and guides them into the body of the dredge ("the cage"). If the knife size is not appropriate, clams can be cut and broken, resulting in significant mortality of clams left on the bottom. The downward pressure created by the runners on the dredge is about 1 psi (Northeast Region Essential Fish Habitat Steering Committee 2002).

In the SASI model, susceptibility and recovery were only evaluated for hydraulic clam dredges for sand and granule-pebble substrates because at the time it was believed that this gear could not be operated in mud or in rocky habitats (Northeast Region Essential Fish Habitat Steering Committee 2002, Wallace and Hoff 2005). In the absence of much published information on the degree to which benthic habitat features are susceptible to this gear, professional judgment relied on the presumption that these dredges have a more severe immediate impact on surface and sub-surface habitat features than other fishing gears used in the Northeast region.

In the SASI model analysis, hydraulic dredges were given higher vulnerability scores than otter trawls and scallop dredges in sand and small gravel (granule-pebble) substrates, and much

[2] Available at: https://www.nefmc.org/library/omnibus-habitat-amendment-2

higher vulnerability scores than the fixed gears. Across all gears, geological and biological features were generally most susceptible to impacts from hydraulic dredges as compared to other gear types (average scores for all features in a particular substrate and energy environment ranged from 2.5-2.8 out of 3). Average otter trawl and scallop dredge S scores (susceptibility score) ranged from 1.0 to 2.0. Higher S scores reflect a higher proportion of features with >25% encountered estimated to have a reduction in functional habitat value. For trawls and scallop dredges, there was a larger proportion of high S scores (S = 2 or 3) for geological features, especially in mud and cobble, than for biological features; for hydraulic dredges, however, there was very little difference between feature classes.

Geological feature recovery values were slightly higher (i.e., longer recovery) for hydraulic dredges than for the other two mobile gears (i.e., otter trawl and scallop dredges) fished in similar habitats (sand and granule-pebble). Average recovery values were more similar for biological features across the three mobile gear types, although in a few cases estimated recovery times were longer for hydraulic dredge gear. This was due to differences in gear effects associated with hydraulic dredges as compared to scallop dredges or otter trawls.

Based on the results of the SASI model, the OHA2 implemented mobile bottom-tending gear throughout various habitat management areas (HMAs) selected by the NEFMC (Figures 5 and 6). In addition, the OHA2 included indefinite exemptions for hydraulic clam dredges in many of the HMAs and a temporary exemption for the Great South Channel HMA for a year after implementation of OHA2 to allow time for the NEFMC to consider creating access areas within this HMA. (A temporary exemption in the Georges Shoal HMA was also approved by the Council, but this proposed HMA was subsequently disapproved by NOAA). The approved HMAs included: (a) establishing new HMAs in Eastern Maine and on Fippennies Ledge where mobile bottom-tending gear is prohibited, (b) maintaining the Cashes Ledge Groundfish Closure Area with current restrictions and exemptions, (c) modifying both the Cashes Ledge and Jeffreys Ledge Habitat Closure Areas, which are closed to mobile bottom-tending gear, (d) prohibiting all fishing gear except lobster pots in the Ammen Rock Area, (e) maintaining the Western Gulf of Maine (WGOM) Habitat Closure Area, which is closed to mobile bottom-tending gear, (f) aligning the boundaries of the WGOM Groundfish Closure Area to match the WGOM Habitat Closure Area, (g) exempting shrimp trawling from the northwest corner of the WGOM areas, (h) identifying the existing Gulf of Maine Roller Gear restriction as a habitat protection measure, and (i) prohibiting the use of mobile bottom-tending gear in the Great South Channel HMA, subject to the outcome of subsequent clam dredge exemption actions by the Council and NOAA.[3]

As indicated above, the surfclam and ocean quahog fisheries were granted a one year exemption (which expired on April 8, 2019) for the Great South Channel HMA following implementation of OHA2. In subsequent actions, the NEFMC considered possible clam dredge exemptions in several areas within the Great South Channel HMA that are currently fished and may be suitable for a hydraulic clam dredging exemption that balances achieving optimum yield for the surfclam and ocean quahog fisheries with the requirement to minimize adverse fishing effects on habitat to the extent practicable and is consistent with the underlying objectives of OHA2. The Clam Dredge Framework Action has been submitted to NMFS and was approved by NOAA on May 19, 2020, and became effective on June 18, 2020. It

[3] Source: NMFS Approves "Majority" of Council's Habitat Amendment

established exemptions for clam and mussel dredges in two year-round access areas within the HMA and seasonal access in a third area (Figure 6).[4]

[4] For additional information see: https://www.nefmc.org/library/clam-dredge-framework

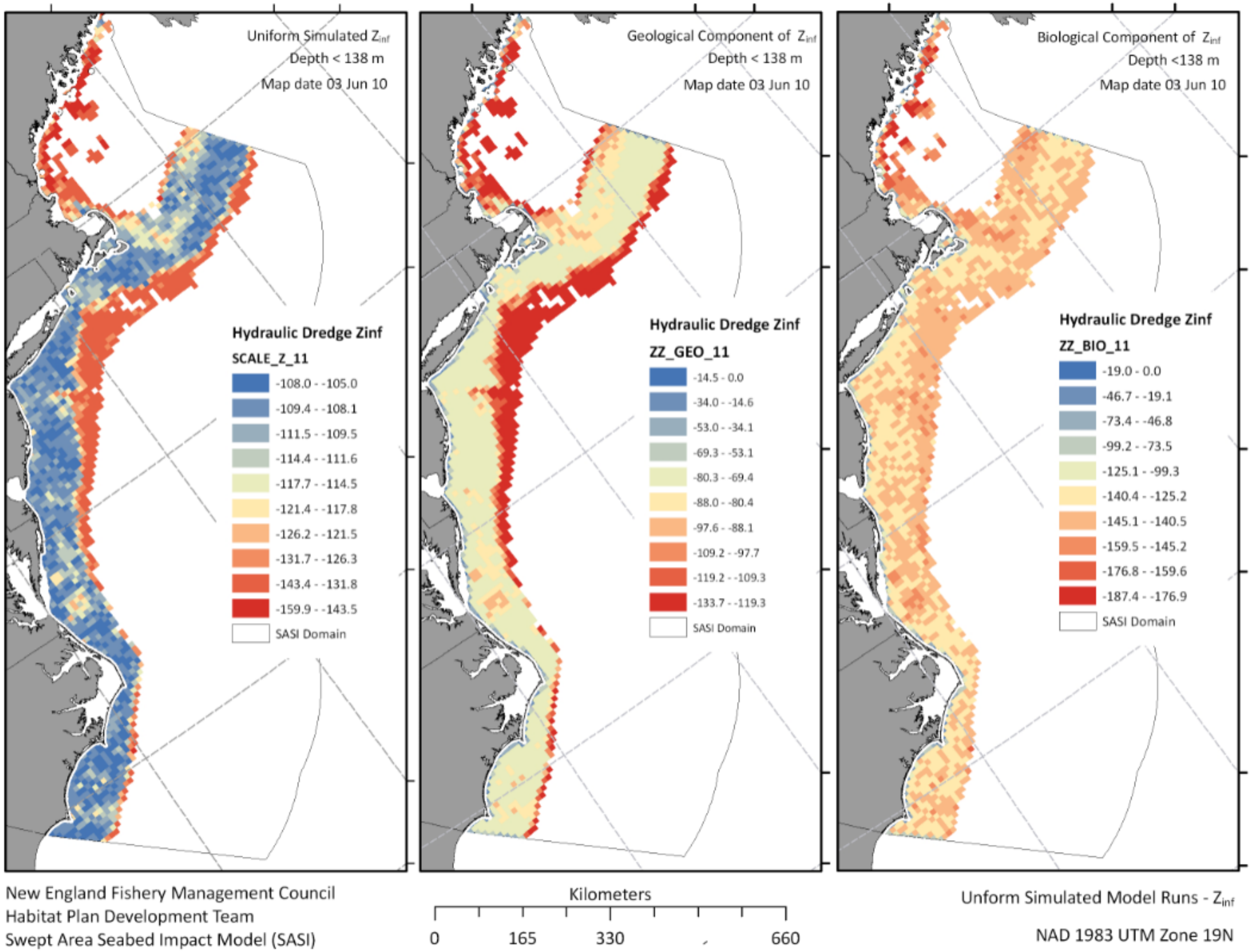

Figure 5. Simulation outputs (Z∞) for hydraulic dredge gear (left panel shows combined vulnerability of geological (mid-panel) and biological features (right-panel); blue = low vulnerability, red = high vulnerability).
Source: https://www.nefmc.org/library/omnibus-habitat-amendment-2

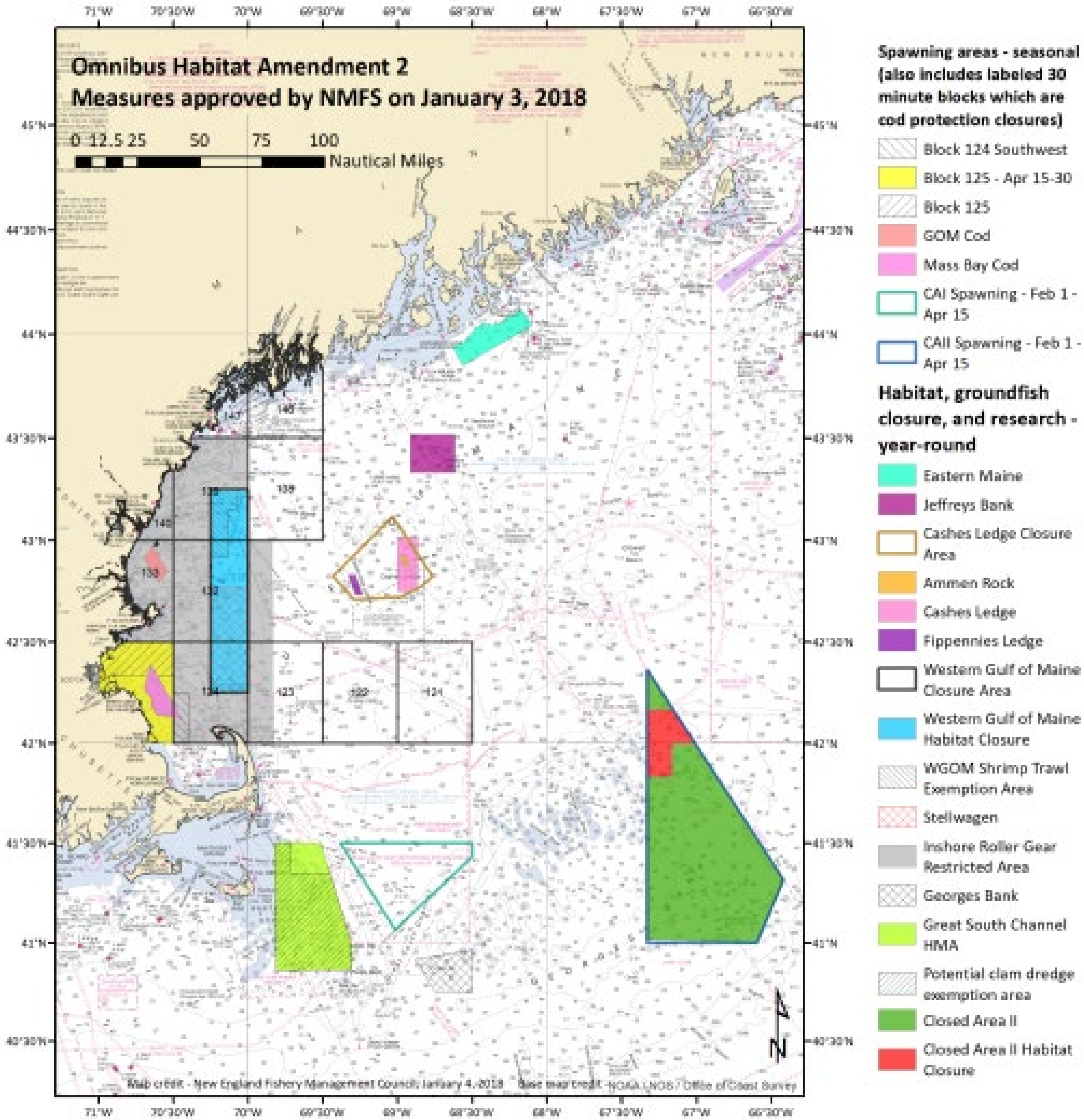

Figure 6. OHA2 approved regulations.

Source: NMFS Approves "Majority" of Council's Habitat Amendment

6.3 ESA and MMPA Protected Species

Numerous protected species inhabit the affected environment of the Atlantic Surfclam and Ocean Quahog FMP (Table 8). These species are under NMFS jurisdiction and are afforded protection under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972. More detailed description of the species listed in Table 8, including their environment, ecological relationships and life history information including recent stock status, are available at: https://www.fisheries.noaa.gov/region/new-england-mid-atlantic#species and http://www.nmfs.noaa.gov/pr/sars/region.htm.

Cusk is a NMFS "candidate species" under the ESA. Candidate species are those petitioned species for which NMFS has determined that listing may be warranted under the ESA and those species for which NMFS has initiated an ESA status review through an announcement in the Federal Register. If a species is proposed for listing the conference provisions under Section 7 of the ESA apply (50 CFR §402.10); however, candidate species receive no substantive or procedural protection under the ESA. As a result, cusk will not be discussed further in this and the following sections; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed action. Additional information on cusk can be found at:
https://fisheries.noaa.gov/species/cusk.

6.3.1 Species and Critical Habitat Not Likely to be Affected by the Proposed Action

The commercial fisheries for surfclam and ocean quahog are prosecuted with hydraulic clam dredges, a type of bottom tending mobile gear. Based on available information, it has been determined that this action is not likely to affect protected species (ESA-listed and/or MMPA protected; see Table 8). This determination was made because either the occurrence of the species is not known to overlap with the surfclam and ocean quahog commercial fisheries and/or there have never been documented interactions between the species and the primary gear type (i.e., clam dredge) used to prosecute the fisheries (Palmer 2017; NMFS 2021; NMFS NEFSC observer/sea sampling database (unpublished data); see; http://www.nmfs.noaa.gov/pr/sars/region.htm; and, https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries).

As provided in Table 8 and Figure 7, North Atlantic right whale critical habitat also occurs in the affected environment of the surfclam/ocean quahog FMP. This action is not likely to adversely affect North Atlantic right whale critical habitat. This determination has been made because the surfclam and ocean quahog fisheries will not affect the essential physical and biological features of North Atlantic right whale critical habitat and, and therefore, will not result in the destruction or adverse modification of this species critical habitat (NMFS 2015a,b). Support for this determination is provided in the discussion below.

Critical habitat is habitat that contains physical and biological features essential to the conservation of the species. For right whales, it contains the features essential for successful foraging, calving, and calf survival (NMFS 2015a). Although comprised of two areas, only the area in the Gulf of

Maine and Georges Bank region (Unit 1) overlaps with the affected environment of the proposed action.

The boundaries of Unit 1 were defined by the distribution, aggregation, and retention of *Calanus finmarchicus*, the primary and preferred copepod prey of North Atlantic right whales, (NMFS 2015a,b). The essential physical features include prevailing currents, bathymetric features (such as basins, banks, and channels), oceanic fronts, density gradients, and flow velocities. The essential biological features include aggregations of copepods, preferably late stage *C. finmarchicus*, in the Gulf of Maine and Georges Bank region, as well as aggregations of diapausing (overwintering) populations in the deep basins of the region. NMFS (2015a,b) identified activities that may destroy or adversely modify these essential features; navigational dredging (termed "dredging") and commercial fisheries were amongst the activities analyzed and determined to not likely impact the identified foraging area physical or biological features.

"Dredging" as defined in NMFS's assessment (NMFS 2015a; 81 FR 4838, January 27, 2016) should not be confused with dredging using commercial fishing dredges, such as those used in the surfclam/ocean quahog FMP. In the assessment, dredging is in reference to the removal of material from the bottom of water bodies to deepen, widen or maintain navigation corridors, anchorages, or berthing areas, as well as sand mining (NMFS 2015a). Dredges typically used for navigational deepening or sand mining operations include hopper and cutterhead dredges. Although dredge size varies by location, hydraulic hopper dredges have draghead widths from a few feet to 12 feet; cutterhead diameters typically range from 16-20 inches (maximum 36 inches). These dredges disturb the sediment surface (down to 12 or more inches) creating turbidity plumes that last up to a few hours. In contrast, the surfclam/ocean quahog fishery uses hydraulic dredges to capture shellfish by injecting pressurized water into the sediment to a depth of 8-10 inches, creating a trench up to 30 cm deep and as wide as the dredge (approximately 12 feet) (Northeast Region Essential Fish Habitat Steering Committee 2002; see section 5.2.1 and Appendix C).

Navigational/sand mine dredging has not been found to limit the recovery of North Atlantic right whale (NMFS 2017a) or their critical habitat (NMFS 2015a). There is no evidence to suggest that this conclusion does not also hold true for dredging associated with commercial fishing operations. In terms of the surfclam/ocean quahog fishery, the scale and scope of hydraulic clam or mussel dredges is smaller than that associated with navigational/sand mining dredges. Turbidity created from such fishing dredges will be temporary in nature and will not impact the long-term viability of copepod aggregations. Fishing dredges, such as hydraulic clam, may also temporarily disturb localized copepod concentrations; however, these localized patches are continually replaced and/or shifting due to the dynamic oceanographic features of the Gulf of Maine (e.g., strong current, sharp frontal gradients, high mixing rates) that have a large effect on the distribution, abundance, and concentration of zooplankton populations in within the Gulf of Maine (NMFS 2015b). As provided above, one of the essential biological features of Unit 1 include aggregations of diapausing *C. finmarchicus* populations in the deep basins (i.e., Jordan, Wilkinson, and Georges Basins) of the Gulf of Maine/Georges Bank Region. These basins provide refugia for diapausing populations of *C. finmarchicus* and serve as source populations for the annual recruitment of copepods into the Gulf of Maine population (Davis 1987; Meise and O'Reiley 1996; Lynch et al. 1998; Johnson et al. 2006). In late winter, diapausing *C. finmarchicus* emerge from their dormant state and migrate to the surface layer where they are transported/advected to other areas within the Gulf of Maine by prevailing circulation patterns (Davis 1987; Baumgartner et al. 2007; Lynch et al. 1998; Johnson et al. 2006). Depending on where copepods are transported, concentrated patches of copepods within the Gulf of Maine and GB region will be variable, both spatially and seasonally. Due to the dynamic physical oceanographic features of the Gulf of Maine and GB, copepods will continuously be advected from the deep ocean basins to areas throughout the Gulf of Maine and GB region. As hydraulic clam dredges do not operate in the deep basins of the Gulf of Maine /GB, these fishing gears will not affect or disrupt diapausing *C. finmarchicus* populations that are essential for populating the Gulf of Maine and George's Bank with right whales' preferred prey source. Based on this, although operation of the surfclam/ocean quahog FMP within regions of the Gulf of Maine or GB have the potential to cause temporary and localized disturbances of aggregations of copepods, it will not result in the permanent removal of the forage base necessary for right whale recovery. In addition, operation of hydraulic clam will not have any potential to affect the essential physical oceanographic features (i.e., currents, temperature, bathymetry) of Unit 1.

Taking into consideration the above, the operation of the surfclam/ocean quahog fisheries will not affect the essential physical and biological features of North Atlantic right whale critical habitat and, therefore, will not result in the destruction or adverse modification of this species critical habitat (NMFS 2015a,b). Based on this, the proposed action does not meet the adverse modification threshold and is not expected to impact right whale recovery.

Table 8. Species Protected Under the ESA and/or MMPA that may occur in the affected environment of the Atlantic surfclam and ocean quahog fisheries. Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks.

Species	Status	Potentially impacted by this action?
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	*Endangered*	No
Humpback whale, West Indies DPS (Megaptera novaeangliae)	Protected (MMPA)	No
Fin whale (Balaenoptera physalus)	*Endangered*	No
Sei whale (Balaenoptera borealis)	*Endangered*	No
Blue whale (Balaenoptera musculus)	*Endangered*	No
Sperm whale (Physeter macrocephalus	*Endangered*	No
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	No
Pilot whale (Globicephala spp.)[1]	*Protected (MMPA)*	No
Risso's dolphin (*Grampus griseus*)	Protected (MMPA)	No
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected (MMPA)	No
Short Beaked Common dolphin (*Delphinus delphis*)[2]	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus)[3]	*Protected (MMPA)*	No
Harbor porpoise (*Phocoena phocoena*)	Protected (MMPA)	No
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	No
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	No
Green sea turtle, North Atlantic DPS (*Chelonia mydas*)	Threatened	No
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic Ocean DPS	Threatened	No
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered	No
Giant manta ray (*Manta birostris)*	Threatened	No
Atlantic salmon (*Salmo salar*)	Endangered	No
Atlantic sturgeon *(Acipenser oxyrinchus)*		
Gulf of Maine DPS	Threatened	No
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	No
Cusk (*Brosme brosme)*	Candidate	No
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected (MMPA)	No
Gray seal (*Halichoerus grypus*)	Protected (MMPA)	No
Harp seal (*Phoca groenlandicus*)	Protected (MMPA)	No
Hooded seal (*Cystophora cristata*)	Protected (MMPA)	No
Critical Habitat		
North Atlantic Right Whale	ESA (Protected)	No

[1] Due to the difficulties in discriminating short finned (*G. melas melas*) and long finned (*G. macrorhynchus*) pilot whales at sea, they are often just referred to as *Globicephala spp*.
[2] Called "common dolphin" before 2008.
[3] Includes the Western N. Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal Stocks.

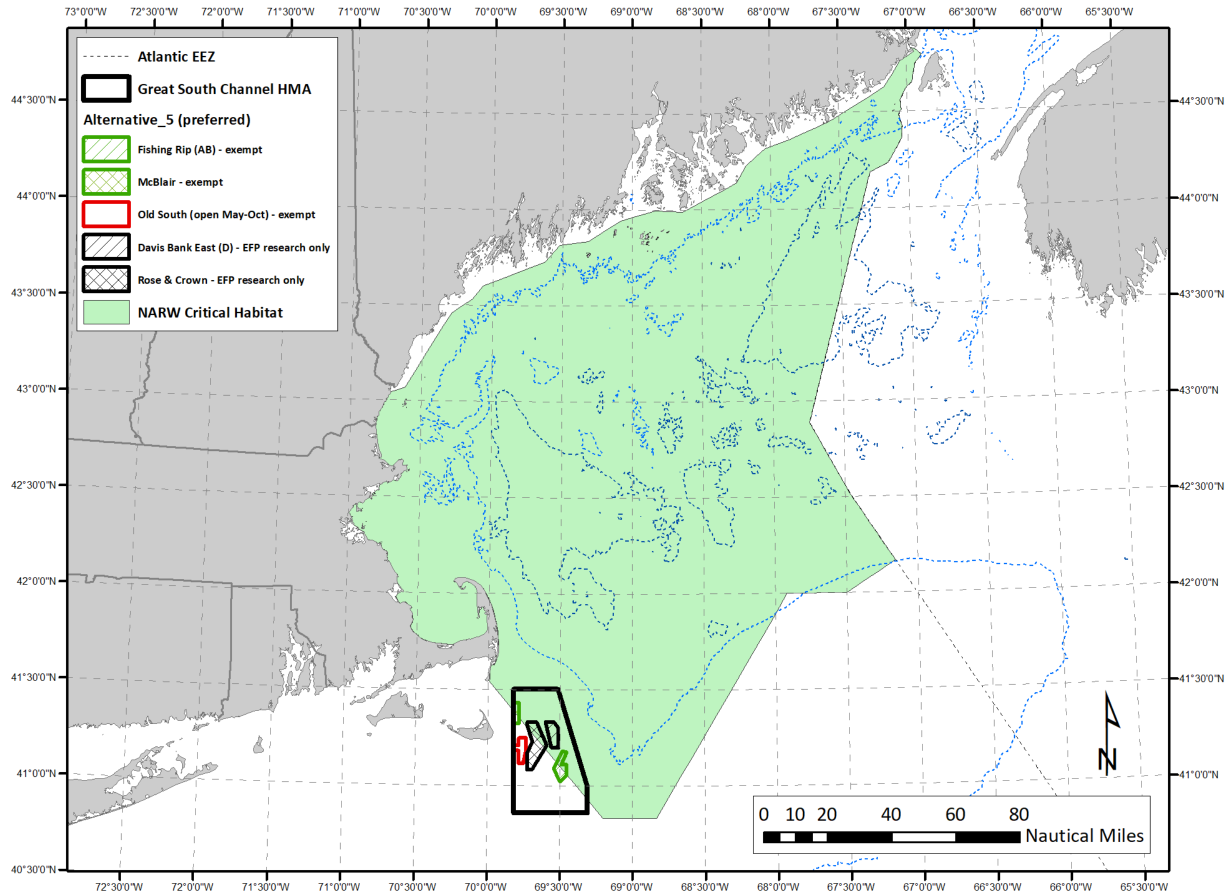

Figure 7. North Atlantic Right Whale Critical Habitat in the Gulf of Maine, GSC HMA. Additional areas of critical habitat are designated along the coasts of South Carolina, Georgia, and Florida, but are not shown here.

6.4 Human Communities

When Amendment 13 to the FMP was developed, the Council hired Dr. Bonnie McCay and her associates at Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. The researchers did an extensive job characterizing the three main fisheries (non-Maine ocean quahog, Maine ocean quahog, and surfclam). The McCay team characterizations of the ports and communities are based on government census and labor statistics and on observations and interviews carried out during the late 1990s and in the fall of 2001. The description of the fishing gear, areas fished at that time, etc. are fully described in Amendment 13. Communities from Maine to Virginia are involved in the harvesting and processing of surfclam and ocean quahog (MAFMC 2003). For surfclam and ocean quahog, there used to be occasional landings in Ocean City, MD, but with fuel prices and trucking issues industry has indicated they are not occurring anymore. Cape May and Wildwood, NJ are also no longer significant. Most of the fleet is currently fishing out of Pt. Pleasant and Atlantic City, NJ, Oceanview, NY, and New Bedford and Fairhaven, MA. Hyannis, MA (surfclam only) landings have been recently reduced over the last few months. Cape Charles, VA is a revived port of landings targeting surfclams off the Virginia coast. Trucking costs and the distance needed to travel to harvest clams has put greater economy on scale and location. The small scale Maine fishery is entirely for ocean quahog, which are sold as shellstock for the half-shell market (MAFMC 2022b). The other fisheries are industrialized ones for surfclam and ocean quahog, which are hand shucked or steam-shucked and processed into fried, canned, and frozen products (MAFMC 2022a,b).

Additional information on "Community Profiles for the Northeast U.S. Fisheries" can be found at: https://www.nefsc.noaa.gov/read/socialsci/communitySnapshots.php. In addition, Fishery Performance Reports prepared by industry advisors, provide additonal information on the social and economic environments from the industry members perspectives and are available at: http://www.mafmc.org. Recent trends in the fisheries are presented below and in Fishery Information Documents also available on the Council website.

6.4.1 Fishery Descriptions

6.4.1.1 Atlantic Surfclam

The total number of vessels participating in the surfclam fishery has remained relatively stable in the recent decade (Table 9). In 2021, about 1.6 million bushels of surfclam were landed, slighlty lower than 2019 at 1.9 million bushels (Table 1). The average ex-vessel price of surfclams reported by processors was $14.90 in 2021, slightly higher than the $14.48 per bushel seen in 2020. The total ex-vessel value of the 2021 federal harvest was approximately $24 million, which is higher than $23 million in 2020. Industry has described several factors that have affected their industry, including COVID-19 impacts. Trips harvesting surfclam have increased in length as catch rates have declined.

As indicated above, surfclam on Georges Bank were not fished from 1990 to 2008 due to the risk of PSP. There was light fishing on Georges Bank in years 2009-2011 under an exempted fishing permit and landings per unit of effort (LPUE) in that area was substantially higher (5-7 times higher) than in other traditional fishing grounds. NMFS reopened a portion of Georges Bank to the harvest of surfclam and ocean quahog beginning January 1, 2013 (77 FR 75057, December 19, 2012) under its authority in 50 CFR §648.76. Subsequently, NMFS reopened an additional portion of Georges Bank beginning August 16, 2013 (78 FR 49967). Harvesting vessels must adhere to the recently adopted testing protocol developed by the National Shellfish Sanitation Program.

6.4.1.2 Ocean Quahog

The total number of vessels targeting ocean quahog outside of Maine has remained about the same in recent years; with 20 vessels in 2021 (Table 9). The 30 or so vessels that reported landings during 2004 and 2005 has consolidated over time into fewer vessels.

The Maine ocean quahog fleet numbers started to decline when fuel prices soared in mid-2008, and a decline in the availability of smaller clams consistent with the market demand (i.e., half-shell market), and totaled 3 vessels in 2021 (Table 9).The average ex-vessel price of non-Maine ocean quahog reported by processors in 2021 was $7.79 per bushel, slightly lower than the 2020 price ($7.81 per bushel). In 2021, about 2.3 million bushels of non-Maine ocean quahog were landed, an increase from 2.0 million bushels in 2020. The total ex-vessel value of the 2021 federal harvest outside of Maine was approximately $18 million, higher than the $16 million in 2020.

In 2021, the Maine ocean quahog fleet harvested a total of 17,387 Maine bushels, an 86% decrease from the 124,839 bushels harvested in 2006, but a slight increase from the prior year (2019; 16,621 bushels). Average prices for Maine ocean quahog had declined substantially over time but have recently show an increasing trend. In 2003, there were very few trips that sold for less than $37.00 per Maine bushel, and the mean price was $40.66. Prices have since been lower. In 2021, the mean price was $39.44 per Maine bushel. The value of the 2021 harvest reported by the purchasing dealers totaled $0.69 million.

6.4.2 Description of the Areas Fished

A detailed description of the areas fished by the fisheries for surfclam and ocean quahog was presented in the document titled "Review of the Atlantic Surfclam and Ocean Quahog Individual Transferable Quota Program. Prepared for Mid-Atlantic Fishery Management Council" (Northern Economics, Inc. 2019). The commercial fishery for surfclam in federal waters is prosecuted with large vessels and hydraulic dredges. The distribution of the fishery as catch and LPUE is shown in Figures 8 and 9. Landings, fishing effort, and LPUE (bu per hour fished) shifted north after 2000 as fishery productivity in the south declined; most of the landings are presently coming from areas off of New Jersey, Southern New England, and Georges Bank. The commercial fishery for ocean quahog in federal waters is prosecuted with large vessels and hydraulic dredges, and is very different from the small Maine quahog fishery, which is prosecuted with small vessels (35-45 ft) and non-hydraulic "dry" dredges. The Maine fishery is located in eastern Maine (not shown in Figures 8 and 9).

6.4.3 Port and Community Description

Communities from Maine to Virginia are involved in the harvesting and processing of surfclam and ocean quahog. For surfclam and ocean quahog, there used to be occasional landings in Ocean City, MD, but with fuel prices and trucking issues industry has indicated they are not occurring anymore. Cape May and Wildwood, NJ are also no longer significant. Most of the fleet is currently fishing out of Pt. Pleasant and Atlantic City, NJ, Oceanview, NY, and New Bedford and Fairhaven, MA. Hyannis, MA (surfclam only) landings have been recently reduced over the last few months. Cape Charles, VA is a revived port of landings targeting surclams off the Virginia coast. The small scale Maine fishery is entirely for ocean quahog, which are sold as shellstock for the half-shell market. The other fisheries are industrialized ones for surfclam and ocean quahog, which are hand shucked or steam-shucked and processed into fried, canned, and frozen products.

Additional information on "Community Profiles for the Northeast U.S. Fisheries" can be found at: https://www.nefsc.noaa.gov/read/socialsci/communitySnapshots.php and in Northern Economics, Inc. (2019).

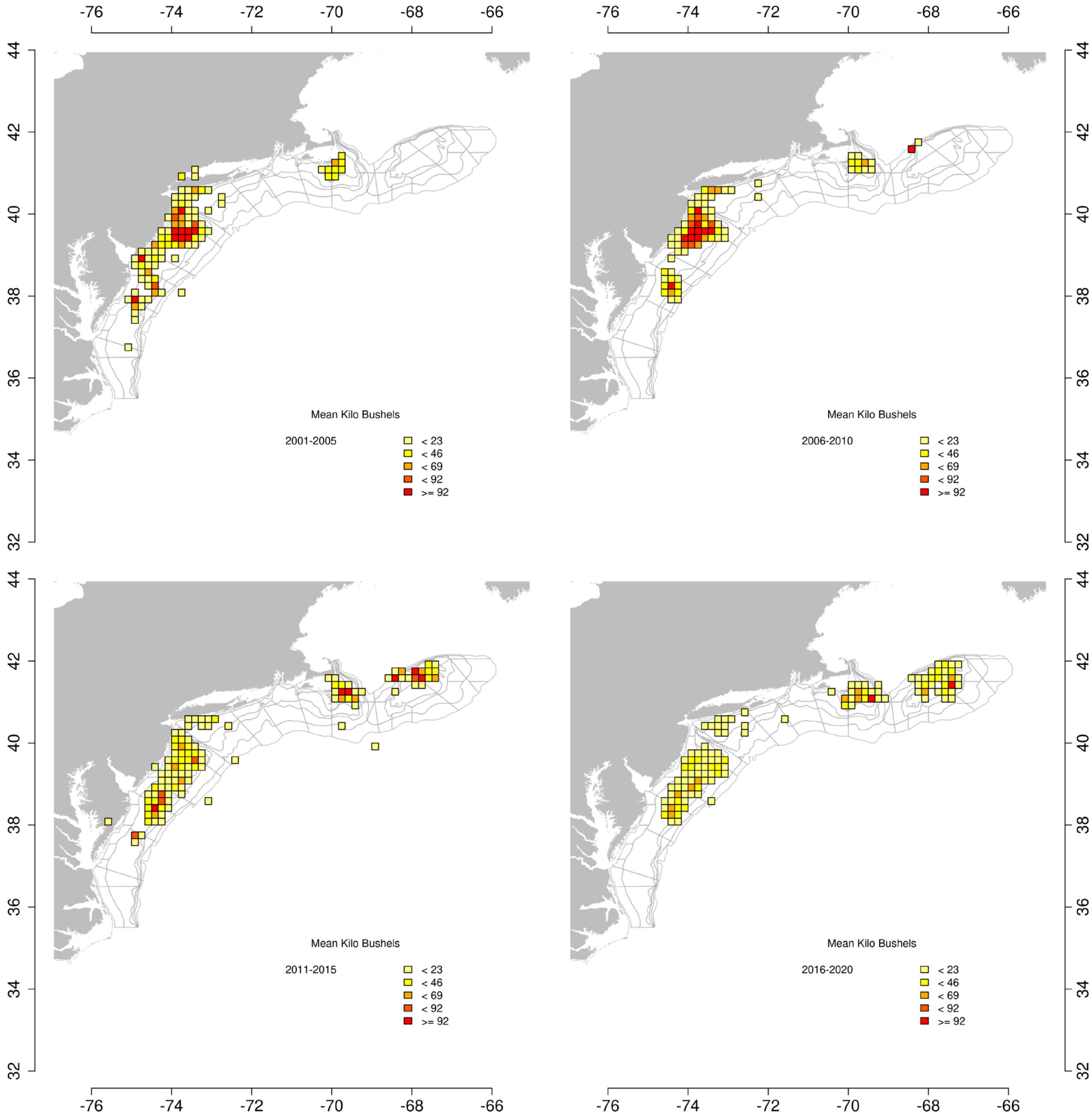

Figure 8. Average surfclam landings by ten-minute squares over time, 2001-2020, and preliminary 2021. Only squares where more the 5 kilo bushels were caught are shown (Hennen 2022).

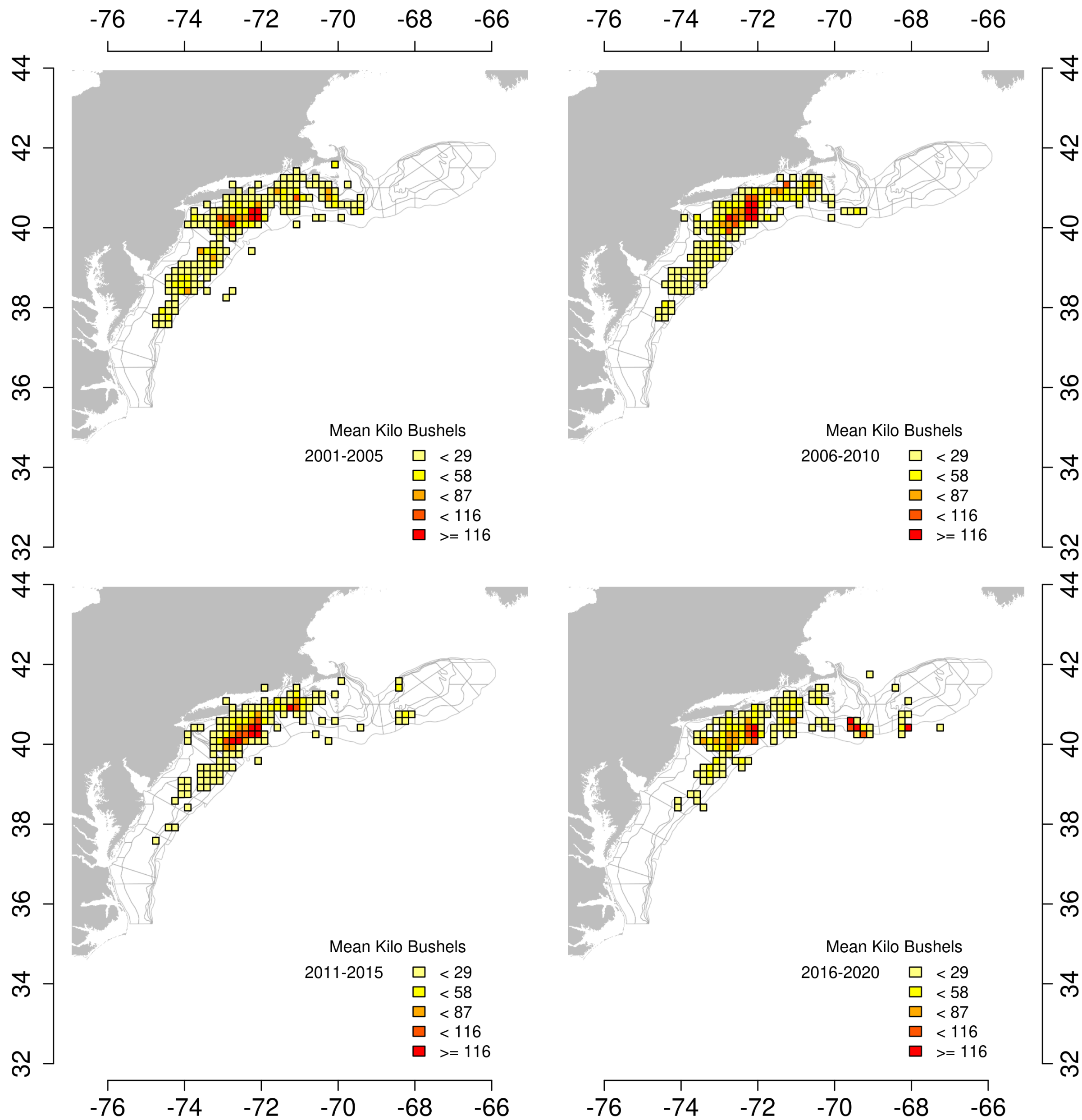

Figure 9. Average ocean quahog landings by ten-minute squares over time, 2001-2020, and preliminary 2021. Only squares where more the 5 kilo bushels were caught are shown (Hennen 2022).

6.4.4 Vessels and Dealers

Vessels

Initially, 154 vessels received ITQ allocation in 1990; however, in the last decade there have been fewer than 50 vessels participating in the fisheries each year. The total number of vessels participating in the surfclam fishery has been relatively stable from 2004 through 2021, ranging from 29 vessels in 2006 to 43 vessels in 2020 (Table 9).[5] The total number of vessels participating in the ocean quahog fisheries outside the state of Maine has experienced a downward trend. The 30 or so vessels that reported ocean quahog landings during 2004 and 2005 was reduced and coast-wide harvests consolidated on to 20 vessels in 2021. The Maine ocean quahog fleet numbers started to decline with fuel prices soaring in mid-2008 and totaled 3 in 2021 (Table 9).

While it is not possible to accurately project future vessel consolidation patterns, it is possible that under additional vertical integration the number of vessels participating in the fisheries could decrease further. Vertically integrated companies could choose to retire older less efficient vessels (for larger, newer, more efficient ones). In addition, there could be further departure of the few independent harvesters still participating in the fisheries. In recent years, a handful of independent vessels (less than 5) reported landings of surfclam and ocean quahog.

Dealers

In 2021, there were 8 companies reporting purchases of surfclam and/or ocean quahog in 5 states outside of Maine. Employment data for these specific firms are not available. In 2021, these companies bought approximately $24 million worth of surfclam and $18 million worth of ocean quahog.

[5] The reported number of vessels participating in the surfclam and/or ocean quahog fisheries in this document are derived from clam logbook data unless otherwise noted.

Table 9. Surfclam and ocean quahog active vessels composition, 2004-2021.

Vessel-type	Harvested Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Non-Maine Vessels	Both surfclam & quahog	14	12	9	9	8	8	12	12	13	7	7	6	8	14	8	7	8	10
	Only surfclam	21	24	20	24	24	28	22	24	29	33	31	31	30	26	31	36	35	31
	Only quahog	15	12	9	8	10	7	9	7	6	9	9	10	9	8	14	8	7	10
	Total	50	48	38	41	42	43	43	43	48	49	47	47	47	48	53	48	50	51
Maine Vessels	Only quahog	34	32	25	24	22	19	15	13	12	11	9	8	8	8	8	8	6	3

7.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

This Environmental Assessment (EA) analyzes the expected impacts of each alternative on each VEC. When considering impacts on each VEC, the alternatives are compared to the current condition of the VEC. The alternatives are also compared to each other. The No Action alternative describe what would happen if no action were taken. For all options considered in this document, the “no action” alternative would have the same outcomes as *status quo* management, therefore, these alternatives are at times described as “no action/*status quo*.”

Environmental impacts are described both in terms of their direction (negative, positive, or no impact) and their magnitude (slight, moderate, or high). Table 10 summarizes the guidelines used for each VEC to determine the magnitude and direction of the impacts described in this section.

The recent conditions of the VECs include the biological conditions of the target stocks, non-target stocks, and protected species over the most recent five years (sections 6.1 and 6.3). They also include the fishing practices and levels of effort and landings in the surfclam and ocean quahog fisheries over the most recent five years, as well as the economic characteristics of the fisheries over the most recent three to five years (depending on the dataset; section 6.4). The recent conditions of the VECs also include recent levels of habitat availability and quality (section 6.2). The current condition of each VEC is described in Table 11.

This EA analyzes the impacts of the alternatives described fully under section 5.0. For ease reference, those alternatives are listed here.

Species Separation Alternatives

- **Alternative 1**: No Action/*Status Quo* – No changes to species separation requirements
- **Alternative 2**: Allow Combined Trip Declaration and Require Onboard Sorting
- **Alternative 3**: Allow Combined Trip Declaration, Mixing of Clam Species within Cages (on a Declared Combined Trip), and Require Manual Port Monitoring of Declared Combined Trips
- **Alternative 4**: Allow Combined Trip Declaration, Mixing of Clam Species within Cages (on a Declared Combined Trip), and Require Electronic Monitoring of Declared Combined Trips)

The alternatives are not compared to a theoretical condition where the fisheries are not operating. These fisheries have occurred for many decades and are expected to continue into the foreseeable future. The nature and extent of the management programs for these fisheries have been examined in detail in EAs and Environmental Impact Statements (EISs) prepared for previously implemented management actions under the Atlantic Surfclam and Ocean Quahog FMP.

When considering overall impacts on each VEC, both surfclam and ocean quahog commercial fisheries are considered. This action does not propose any modifications to other management or regulatory components (e.g., annual quota, minimum size, cage identification) and as such are not expected to affect the commercial fisheries in a manner that would change the impacts for any of the VECs considered.

In general, alternatives which may result in overfishing or an overfished status for target and non-target species may have negative biological impacts for those species, compared to the current condition of the VEC. Conversely, alternatives which may result in a decrease in fishing effort, resulting in ending overfishing or rebuilding to the biomass target, may result in positive impacts for those species by resulting in a decrease in fishing mortality (Table 10).

For the physical environment and habitat, alternatives that improve the quality or quantity of habitat or result in a decrease in fishing effort are expected to have positive impacts. Alternatives that degrade the quality or quantity, or increase disturbance of habitat are expected to have negative impacts (Table 10). In addition, alternatives that result in continued fishing effort may result in slight negative impacts. The commercial fisheries for surfclam and ocean quahog are prosecuted with clam dredges, a type of bottom tending mobile gear. The effects of clam dredges are short-term and minimal because the fisheries occur in a relatively small area (compared to the area impacted by scallop dredges or bottom trawls) and primarily in high energy sand habitats (section 6.2.3). Even in areas where habitat may be impacted by commercial gear or vessels, these areas are typically commonly fished by many vessels over many decades and are unlikely to see a measurable improvement in their condition in response to minor changes in measures or short-term changes in effort in an individual commercial fishery.

For protected species, consideration is given to both ESA-listed species and MMPA-protected species. ESA-listed species include populations of fish, marine mammals, or turtles at risk of extinction (endangered) or endangerment (threatened). For endangered or threatened species, any action that results in interactions with or take of those species or stocks is expected to have negative impacts, including actions that reduce interactions. Actions expected to result in positive impacts on ESA-listed species include only those that contain specific measures to ensure no interactions with protected species (i.e., no take). By definition, all species listed under the ESA are in poor condition and any take has the potential to negatively impact that species' recovery. Under the MMPA, the stock condition of each protected species varies, but all are in need of protection. For marine mammal stocks/species that have their PBR level reached or exceeded, negative impacts would be expected from any alternative that has the potential to interact with these species or stocks. For species that are at more sustainable levels (i.e., PBR levels have not been exceeded), actions not expected to change fishing behavior or effort such that interaction risks increase relative to what has been in the fishery previously, may have positive impacts by maintaining takes below the PBR level and approaching the Zero Mortality Rate Goal (Table 10). The impacts of each alternative on the protected resources VEC take into account impacts on ESA-listed species, impacts on marine mammal stocks in good condition (i.e., PBR level has not been exceeded), and marine mammal stocks that have exceeded or are in danger of exceeding their PBR level.

Socioeconomic impacts are considered in relation to potential changes in landings and prices, and by extension, revenues, compared the current fisheries conditions. Alternatives which could result in an increase in landings are generally considered to have positive socioeconomic impacts because they could result in increased revenues; however, if an increase in landings leads to a decrease in price or a decrease in SSB for any of the landed species, then negative socioeconomic impacts could occur. Lastly, measures that would reduce regulation burdens or enhance the way the fishery operates may positively impact fishing operations and practices.

Expected Changes in Fishing Effort Under Alternatives Considered

The expected impacts to each VEC are derived from both consideration of the current condition of the VEC and the expected changes in fishing effort under each of the alternatives. It is not possible to quantify with confidence how effort will change under each alternative; therefore, expected changes are typically described qualitatively. The alternatives presented in this document (i.e., to modify species separation requirements) are not expected to have impacts on the overall prosecution of these fisheries. They are not expected to impact fishing effort, catch and landings levels, fishery distribution, or fishing methods while the dredge gear is being deployed to catch surfclam and ocean quahog. These alternatives are however expected to impact some aspects of on vessel operations - such as trip declaration, onboard sorting, and the monitoring of catch on board or dockside.

Table 10. General definitions for impacts and qualifiers relative to resource condition (i.e., baseline) summarized in Table 1 below.

General Definitions				
VEC	**Resource Condition**	**Impact of Action**		
		Positive (+)	Negative (-)	No Impact (0)
Target and Non-target Species	Overfished status defined by the MSA	Alternatives that would maintain or are projected to result in a stock status above an overfished condition*	Alternatives that would maintain or are projected to result in a stock status below an overfished condition*	Alternatives that do not impact stock / populations
ESA-listed Protected Species (endangered or threatened)	Populations at risk of extinction (endangered) or endangerment (threatened)	Alternatives that contain specific measures to ensure no interactions with protected species (e.g., no take)	Alternatives that result in interactions/take of listed resources, including actions that reduce interactions	Alternatives that do not impact ESA listed species
MMPA Protected Species(not also ESA listed)	Stock health may vary but populations remain impacted	Alternatives that will maintain takes below PBR and approaching the Zero Mortality Rate Goal	Alternatives that result in interactions with/take of marine mammal species that could result in takes above PBR	Alternatives that do not impact MMPA Protected Species
Physical Environment / Habitat / EFH	Many habitats degraded from historical effort (see condition of the resources table for details)	Alternatives that improve the quality or quantity of habitat	Alternatives that degrade the quality, quantity or increase disturbance of habitat	Alternatives that do not impact habitat quality
Human Communities / Socioeconomic	Highly variable but generally stable in recent years (see condition of the resources table for details)	Alternatives that increase revenue and social well-being of fishermen and/or communities	Alternatives that decrease revenue and social well-being of fishermen and/or communities	Alternatives that do not impact revenue and social well-being of fishermen and/or communities
	Impact Qualifiers			
A range of impact qualifiers is used to indicate any existing uncertainty	Negligible	To such a small degree to be indistinguishable from no impact		
	Slight (sl), as in slight positive or slight negative)	To a lesser degree / minor		
	Moderately (M) positive or negative	To an average degree (i.e., more than "slight", but not "high")		
	High (H), as in high positive or high negative	To a substantial degree (not significant unless stated)		
	Significant (in the case of an EIS)	Affecting the resource condition to a great degree, see 40 CFR 1508.27.		
	Likely	Some degree of uncertainty associated with the impact		
*Actions that will substantially increase or decrease stock size, but do not change a stock status may have different impacts depending on the particular action and stock. Meaningful differences between alternatives may be illustrated by using another resource attribute aside from the MSA status, but this must be justified within the impact analysis.				

Table 11. Baseline conditions of VECs considered in this action, as summarized in section 6.0.

VEC		Baseline Condition	
		Status/Trends, Overfishing?	**Status/Trends, Overfished?**
Target stocks (section 6.1.1 and 6.1.2)	**Atlantic surfclam**	No	No
	Ocean quahog	No	No
Non-target species (principal species listed in section 6.1.3)	**Moon snail**	Unassessed	Unassessed
	Sea scallop	No	No
	Little skate	No	No
	Winter skate	No	No
	Monkfish	No	No
Habitat (section 6.2)		Commercial fishing impacts are complex and variable and typically adverse; Non-fishing activities had historically negative but site-specific effects on habitat quality.	
Protected resources (section 6.3)	**Sea turtles**	Leatherback and Kemp's ridley sea turtles are classified as endangered under the ESA; loggerhead (NW Atlantic Ocean DPS) and green (North Atlantic DPS) sea turtles are classified as threatened.	
	Fish	Atlantic salmon, shortnose sturgeon, and the New York Bight, Chesapeake, Carolina, and South Atlantic DPSs of Atlantic sturgeon are classified as endangered under the ESA; the Atlantic sturgeon Gulf of Maine DPS is listed as threatened; cusk, alewife, and blueback herring are candidate species	
	Large whales	All large whales in the Northwest Atlantic are protected under the MMPA. North Atlantic right, fin, blue, sei, and sperm whales are also listed as endangered under the ESA. Pursuant to Section 118 of the MMPA, the Large Whale Take Reduction Plan was implemented to reduce humpback, North Atlantic right, and fin whale entanglement in vertical lines associated with fixed fishing gear (sink gillnet and trap/pot) and sinking groundlines.	
	Small cetaceans	Pilot whales, dolphins, and harbor porpoise are all protected under the MMPA. Pursuant to Section 118 of the MMPA, the Harbor Porpoise Take Reduction Plan and Bottlenose Take Reduction Plan was implemented to reduce bycatch of harbor porpoise and bottlenose dolphin stocks, respectively, in gillnet gear.	
	Pinnipeds	Gray, harbor, hooded, and harp seals are protected under the MMPA.	
Human communities (section 6.4)		Surfclam and ocean quahog stocks support substantial industrial fisheries and related support services. 2021 estimated ex-vessel revenues were $24 and $18 million for surfclam and ocean quahog, respectively. Most of the fleet is currently fishing out of Pt. Pleasant and Atlantic City, NJ, Oceanview, NY, and New Bedford and Fairhaven, MA. Hyannis, MA (surfclam only) landings have been recently reduced over the last few months. Cape Charles, VA is a revived port of landings targeting surclams off the Virginia coast. The small scale Maine fishery is entirely for ocean quahog, which are sold as shellstock for the half-shell market. The other fisheries are industrialized ones for surfclam and ocean quahog, which are hand shucked or steam-shucked and processed into fried, canned, and frozen products. In 2021, there were 63 surfclam and 31 ocean quahog allocations owners at the beginning of the fishing year. A total of 54 vessels were active in these fisheries in 2017, including a handful of independent vessels (less than 5).	

7.1 Impacts of the Alternatives on Atlantic Surfclam and Ocean Quahog and Non-Target Species

Under alternative 1 (no action/*status quo*), there would be no changes to the current species separation requirements as established in the FMP and regulations. This alterative would fail to address the emerging issue of mixed catches in these fisheries (an issue raised to the Council's attention by the fishing industry).

The no action alternative is expected to have no impact on the prosecution of the surfclam and ocean quahog fisheries, including landings levels, fishery distribution, or fishing methods and practices. The no action alternative is expected to have no impact (direct or indirect) on the target species (managed species). Alternative 1 is expected to have the same impacts (no impacts) on target species as alternatives 2-4 described below.

The no action alternative is not expected to impact non-target species caught in the surfclam and ocean quahog commercial fisheries. All of the species most commonly caught on directed clam trips have positive stock status, except for moon snails which are unassessed. As indicated above, the overall prosecution of the surfclam and ocean quahog fisheries, including landings levels, distribution of fishing effort, or fishing methods and practices are not expected to change under this alternative. Alternative 1 is expected to have the same impacts (no impacts) on non-target species as alternatives 2-4 described below.

Alternatives 2-4 propose changes to aspects of on vessel operations - such as trip declaration, onboard sorting, and/or the monitoring of catch on board or dockside. These alternatives are expected to have no impact on the overall prosecution of these fisheries, including landings levels, distribution of fishing effort, or fishing methods while the dredge gear is being deployed to catch surfclam and ocean quahog.

Alternatives 2-4 are therefore expected to have no impacts (direct or indirect) on the target species (managed species) or non-target species caught in the surfclam and ocean quahog commercial fisheries. Relative to each other, and alternative 1 (no action), alternatives 2-4 would have neutral impacts on both target species, and non-target species.

7.2 Impacts of the Alternatives on the Physical Habitat

As described in section 7.0, the commercial fisheries for surfclam and ocean quahog are prosecuted with clam dredges, a type of bottom tending mobile gear. The effects of clam dredges are short-term and minimal because the fisheries occur in a relatively small area (compared to the area impacted by scallop dredges or bottom trawls) and primarily in high energy sand habitats. As described in section 7.1, the alternatives discussed in this section are expected to have no impact on the overall prosecution of these fisheries, including landings levels, distribution of fishing effort, or fishing methods while the dredge gear is being deployed to catch surfclam and ocean quahog. They will only impact some aspects of on vessel operations - such as trip declaration, onboard sorting, and the monitoring of catch on board or dockside.

Under alternative 1 (no action/*status quo*), there would be no changes to the current species separation requirements as established in the FMP and regulations. The no action alternative is not expected to impact fishery interactions with habitat, including EFH (either directly or indirectly). Alternatives 1 is expected to have the same impacts on habitat, including EFH as alternatives 2-4 described below. Because there is no change in the level of impacts to habitat as these alternatives are not expected to impact the overall prosecution of these fisheries, we expect continued minor, adverse impacts (negative impacts) to habitat will continue to occur. Surfclam and ocean quahog clam dredges would be expected to continue to interact with the bottom habitat, as they have in the past.

Alternatives 2-4 propose changes to aspects of on vessel operations - such as trip declaration, onboard sorting, and/or the monitoring of catch on board or dockside. Alternatives 2-4 are not expected to impact fishery interactions with habitat, including EFH (either directly or indirectly). Relative to each other, and alternative 1 (no action), alternatives 2-4 would continue to have minor, negative impacts on habitat, including EFH because of the ongoing prosecution of these fisheries. Impacts across all four alternatives would be expected to be similar.

7.3 Impacts of the Alternatives on Protected Resources

Under alternative 1 (no action/s*tatus quo*), there would be no changes to the current species separation requirements as established in the FMP and regulations. As such, the no action alternative on the prosecution of the surfclam and ocean quahog fisheries, including landings levels, fishery distribution, or fishing methods and practices. Based on this information, and the fact that there have never been documented interactions between protected species (ESA-listed and/or MMPA protected) and the primary gear type (i.e., clam dredge) used to prosecute the fisheries, Alternative 1 is not expected to adversely affect any protected species provided in Table 8 (section 6.3). For these reasons, the no action alternative is expected to have no impact on ESA-listed and/or MMPA-protected resources. Relative to alternatives 2-4, alternative 1 would have neutral impacts to protected species.

In addition, as described in section 7.1, the actions considered under alternatives 2-4, propose changes to aspects of on vessel operations - such as trip declaration, onboard sorting, and/or the monitoring of catch on board or dockside. They would not result in changes to other aspects of the of these fisheries, including landings levels, distribution of fishing effort, or fishing methods while the dredge gear is being deployed to catch surfclam and ocean quahog.

Based on this information, and the fact that there have never been documented interactions between protected species (ESA-listed and/or MMPA protected) and the primary gear type (i.e., clam dredge) used to prosecute the fisheries, alternatives 2-4 are not expected to adversely affect any protected species provided in Table 8 (section 6.3). For these reasons, alternatives 2-4 are expected to have no impacts (direct or indirect) on ESA-listed and/or MMPA-protected resources. Relative to each other, and alternative 1, alternatives 2-4 would have neutral impacts on protected species.

7.4 Impacts of the Alternatives on Human Communities (Socioeconomic Impacts)

Under alternative 1 (no action/s*tatus quo*), there would be no changes to the current species separation requirements as established in the FMP and regulations. This alterative would fail to address the emerging issue of mixed catches in these fisheries (an issue raised to the Council's attention by the fishing industry).While industry has indicated they are presently avoiding fishing in areas that produce high levels of mixed catches, there is the potential that the extent of mixing and overlap of both clam species will continue to increase as water temperature continue to rise and species distributions continue to shift. These gradual changes have the potential to increase onboard costs by requiring them to undertake more effort to avoid mixed areas, increased voluntarily sorting and discarding, or modifications to other practices on board that may slow onboard operations, resulting in increased operational costs to land a similar number of clams. In addition, the failure to document and collect data on the extent of mixed catches on board vessels would continue to degrade the data collected to support the management of the surfclam and ocean quahog ITQ fisheries. Therefore, to not take any action has the potential to result in socioeconomic impacts that range from slight negative at present to negative in the long-term.

Current requirements would be modified under alternative 2 to create a new combined trip category that would allow for both species (surfclam/ocean quahog) to be landed on the same trip. Under any of the VMS trip declaration categories (i.e., Surfclam only, Quahog only, or Combined Surfclam/Quahog Trip), onboard sorting will be required to ensure tagged cages contain the clam species on the tag. The addition of another trip category would not be expected to be impactful from a VMS reporting perspective. Industry has already indicated they already do some level of voluntary sorting onboard the vessel when material travels down the conveyor belt on the deck prior to filling the cages, to remove items such as undesired clam species (current regulations already require 100% target species in each ITQ tagged cage), rocks, and debris to prevent those from going to the processor/dealer. Onboard operations may need to slow down for some fishing trips because of the need to slow the conveyor belt to allow better sorting of the clam species prior to placement in cages. As these vessels are already limited in terms of number of crew that can be carried on board, it is more likely that operations would slow versus the carriage of additional` crew to sort. As such this may slightly slow certain trips, to allow time for onboard sorting, and may result in increased operating costs for some trips. This will likely only impact some trips, not all vessel/processor groups, and it will depend on the extent to which vessels are fishing in beds with lots of surfclams and ocean quahogs co-occurring. However, alternative 2 could provide positive impacts as it would change current regulations and allow vessels to land mixed catches and allow them to operate more efficiently as requested by the industry. It also would allow for improved catch accounting needed to manage these ITQ fisheries, as both surfclam and quahog cages would need to be tagged accordingly. Alternative 2 is expected to have slight negative to slight positive impacts on the human communities when compared to current conditions, because of the potential for some operating costs increasing for some trips and vessel/processor groups and modification of current regulations that allows for mixed catches.

Under alternative 3, current requirements would be modified to create a new combined trip category that would allow for both species (surfclam/ocean quahog) to be landed on the same trip. However, on a declared combined trip (i.e., a fishing trip that is allowed to land both surfclams and ocean quahog) the mixing of both clam species within the cages would only be permitted with the implementation of a new NOAA Fisheries port sampling program to assess catch composition. This enhanced monitoring for all combined trips would occur after the vessel returns to the dock (port). The creation of a new sampling program with sample sizes adequate to assess catch composition to support the stock assessment would be a costly endeavor. This program would require tracking vessels and intercepting them on arrival to port (at all hours) and dumping and refilling all or some of the cages. This would allow for accurate ITQ catch accounting for both surfclam and ocean quahog. through a carefully designed, representative sampling system. Port samplers would need to intercept vessels at the dock to process cage contents (labor intensive) and this may impact port operations. This would also require some level of personnel to complete the sampling and record the data. This type of program may greater than $200,000 annually. While this would be a NOAA implemented program, costs could be recovered from industry for the implementation of it. Alternative 3 is expected to negative impacts on the human communities when compared to current conditions, because of the new sampling program costs to be applied to the industry as whole. However, some slight positive impacts on the human communities are also expected when compared to current conditions, because of the modification of current regulations that allows for mixed catches and improvements to the catch composition data.

Alternative 4 would modify current requirements to create a new combined trip category would allow for both species (surfclam/ocean quahog) to be landed on the same trip. On a declared combined trip (i.e., a fishing trip that is allowed to land both surfclams and ocean quahog) the mixing of both clam species within the cages would be permitted with the implementation of a new onboard EM program to assess catch composition. This would allow for accurate ITQ catch accounting for both surfclam and ocean quahog. Existing electronic recording technology may be easily adapted to be applied to this fishery and EM approaches could support large-scale, ongoing data collection on catch of both surfclam and ocean quahog. This could include the collection of length data to support the length-based stock assessment, while reducing the need for length sampling by port samplers. While there could be long-term cost advantages to utilizing EM technology, and it may enhance industry adaptability to the clam mixing issue as the climate changes, there would be some short-term costs to development and implementation of such technologies. In addition, the technology has not been fully developed so this is a longer-term solution that might take several years to implement. It should be noted that technology development costs may be funded by other groups (those costs may not be imposed on the fishing industry) and likewise there may be incentives or offsets to reduce costs to deploy these types of approaches to the industry. While there may be costs associated with implementing EM technology borne by deploying the new technology to the industry (slight negative), the long-term benefits that could be realized through implementation may be slight positive.

When comparing all four alternatives for human communities, impacts are expected to range from negative to slight positive, compared to the current conditions. The magnitude of the negative impacts is expected to be greater under alterative 1 (i.e., slight negative to negative as a result of increased fishing operation costs and the degradation of catch data needed for management of these ITQ fisheries), followed by alternative 3 (i.e., negative due to costs of setting up new sampling program to slight positive), followed by alternative 4 (i.e., slight negative over the next few years as EM technology is developed and deployed, but slight positive longer term), and then, alternative 2 (i.e., slight negative to slight positive).

7.5 Cumulative Effects Analysis

The purpose of the CEA is to consider the combined effects of many actions on the human environment over time that would be missed if each action were evaluated separately. It is not practical to analyze the cumulative effects of an action from every conceivable perspective. Rather, the intent is to focus on those effects that are truly meaningful. The following remarks address the significance of the expected cumulative impacts as they relate to the federally managed surfclam and ocean quahog fisheries.

A cumulative effects assessment makes effect determinations based on a combination of; 1) impacts from past, present, and reasonably foreseeable future actions; 2) the baseline conditions of the Valued Ecosystem Components (the combined effects from past, present, and reasonably foreseeable future actions plus the present condition of the VEC); and 3) impacts of the alternatives under consideration for this action.

7.5.1 Consideration of the Valued Ecosystem Component (VECs)

The VECS for the surfclam and ocean quahog fisheries are generally the “place” where the impacts of management actions occur and are identified in section 6.0 (Description of the Affected Environment).

- Managed species (i.e., surfclam and ocean quahog) and non-target species
- Physical habitat (including EFH)
- Protected species
- Human communities

The CEA identifies and characterizes the impacts on the VECs by the alternatives under consideration when analyzed in the context of other past, present, and reasonably foreseeable future actions.

7.5.2 Geographic Boundaries

The analysis of impacts focuses on actions related to the harvest of surfclam and ocean quahog. The Western Atlantic Ocean is the core geographic scope for each of the VECs. The core geographic scopes for the managed species are the management units for surfclam and ocean quahog (section 6.1). For non-target species, those ranges may be expanded and would depend on the range of each species in the Western Atlantic Ocean. For habitat, the core geographic scope is focused on EFH within the EEZ but includes all habitat utilized by surfclam and ocean quahog and non-target species in the Western Atlantic Ocean. The core geographic scope for protected species is their range in the Western Atlantic Ocean. For human communities, the core geographic boundaries are defined as those U.S. fishing communities in coastal states from Maine through Virginia directly involved in the harvest or processing of surfclam and ocean quahog (section 6.4).

7.5.3 Temporal Boundaries

Overall, while the effects of the historical surfclam and ocean quahog fisheries are important and considered in the analysis, the temporal scope of past and present actions for surfclam and ocean quahog and non-target species and other fisheries, the physical environment and EFH, and human communities is primarily focused on actions that occurred after FMP implementation (1977 for surfclam and ocean quahog). For protected species, the scope of past and present actions is focused on the 1980s and 1990s (when NMFS began generating stock assessments for marine mammals and sea turtles that inhabit waters of the U.S. EEZ) through the present.

The temporal scope of future actions for all VECs extends about five years (2027) into the future. The dynamic nature of resource management for these species and lack of information on projects that may occur in the future make it difficult to predict impacts beyond this timeframe with any certainty. The impacts discussed in this section are focused on the cumulative effects of the proposed action (i.e., the suite of preferred alternatives) in combination with the relevant past, present, and reasonably foreseeable future actions over these time scales.

7.5.4 Relevant Actions Other Than Those Proposed in this Document

7.5.4.1 Fishery Management Actions

7.5.4.1.1 Atlantic Surfclam and Ocean Quahog FMP Actions

Past, present, and reasonably foreseeable future actions for surfclam and ocean quahog management include the establishment of the original FMP, all subsequent amendments and frameworks, and the setting of annual specifications (ACLs and measures to constrain catch and harvest). Key actions are described below.

The FMP became effective in 1977 and included management and administrative measures to ensure effective management of the surfclam and ocean quahog resource. In 1998, Amendment 8 replaced the regulated fishing time system in the surfclam and ocean quahog fisheries with an ITQ system. These fisheries are managed under an ITQ system, and recently, NMFS implemented a data collection protocol process to collect information about quota share ownership and other forms of control of allocations that would enhance the management of these fisheries. Amendment 16 (2011) established ACLs and AMs consistent with the 2007 revisions to the Magnuson-Stevens Act. Related to this requirement, the Council annually implements or reviews catch and landings limits for each species consistent with the recommendations of the SSC, and reviews other management measures as necessary to prevent catch limits from being exceeded and to meet the objectives of the FMP. In addition, in 2016, Amendment 17 established a cost recovery program for the surfclam and ocean quahog ITQ fishery, as required by the Magnuson-Stevens Act; and the amendment also contained provisions to remove the optimum yield ranges and changed how biological reference points are incorporated into the FMP. The Council is awaiting rulemaking in 2022 on the Excessive Shares Amendment 20 to the FMP, which considered approaches to ensure that no individual, corporation, or other entity acquires an excessive share of the surfclam and ocean quahog ITQ privileges.

7.5.4.1.2 Other Fishery Management Actions

In addition to the Atlantic Surfclam and Ocean Quahog FMP, there are many other FMPs and associated fishery management actions for other species that have impacted these VECs over the temporal scale described in section 7.5.3. These include FMPs managed by the Mid-Atlantic Fishery Management Council, New England Fishery Management Council, Atlantic States Marine Fisheries Commission, and to a lesser extent, the South Atlantic Fishery Management Council. Omnibus amendments are also frequently developed to amend multiple FMPs at once. Actions associated with other FMPs and omnibus amendments have included measures to regulate fishing effort for other species, measures to protect habitat and forage species, and fishery monitoring and reporting requirements.

For example, the NEFMC's omnibus habitat amendments revised EFH and habitat area of particular concern designations for NEFMC-managed species, revised or created habitat management areas, including gear restrictions to protect vulnerable habitat from fishing gear impacts, and established habitat research areas. These actions are expected to have overall positive impacts on habitat and EFH, with expected long-term positive implications for target and non-target species, while having mixed socioeconomic impacts on various user groups.

The MAFMC's omnibus forage amendment, implemented in 2017, established a commercial possession limit for over 50 forage species which were previously unmanaged in federal waters. This action is thought to have ongoing positive impacts to target, non-target, and protected species by protecting a forage base for these populations and limiting the expansion of any existing fishing effort on forage stocks.

The convening of take reduction teams for marine mammals over the temporal scope described in section 7.5.3 has had positive impacts for marine mammals via recommendations for management measures to reduce mortality and injury to marine mammals. These actions have had indirect positive impacts on target species, non-target species, and habitat as they have improved monitoring of fishing effort and reduced the amount of gear in the water. These measures have had indirect negative impacts on human communities through reduced fishery efficiency.

In the reasonably foreseeable future, the MAFMC and NEFMC are considering modifications to observer coverage requirements through an omnibus amendment that considers measures that would allow the Councils to implement industry-funded monitoring coverage in some FMPs above levels required by the Standard Bycatch Reporting Methodology in order to assess the amount and type of catch, monitor annual catch limits, and/or provide other information for management. This action could have long-term positive impacts on target species, non-target species, and protected species through improved monitoring and scientific data on these stocks. This could potentially result in negative socioeconomic impacts to commercial fishing vessels due to increased costs.

7.5.4.1.3 Fishery Management Action Summary

The Council has taken many actions to manage the associated commercial fishery. The MSA is the statutory basis for federal fisheries management. The cumulative impacts of past, present, and reasonably foreseeable future federal fishery management actions on the VECs should generally be associated with positive long-term outcomes. Constraining fishing effort through regulatory actions can have negative short-term socioeconomic impacts. These impacts are sometimes necessary to bring about long-term sustainability of a resource, and as such should promote positive effects on human communities in the long-term.

7.5.4.2 Non-Fishing Impacts

7.5.4.2.1 Other Human Activities

Non-fishing activities that occur in the marine nearshore and offshore environments and connected watersheds can cause the loss or degradation of habitat and/or affect the species that reside in those areas. The impacts of most nearshore human-induced non-fishing activities tend to be localized in the nearshore areas and marine project areas where they occur, although effects on species could be felt throughout their populations since many marine organisms are highly mobile. For offshore projects, some impacts may be localized while others may have regional influence, especially for larger projects. The following discussion of impacts is based on past assessments of activities and assume these activities will likely continue as projects are proposed.

Examples of these activities include point source and non-point source pollution, shipping, dredging/deepening, wind energy development, oil and gas development, construction, and other activities. Specific examples include at-sea disposal areas, oil and mineral resource exploration, aquaculture, construction of offshore windfarms, and bulk transportation of petrochemicals. Episodic storm events and the restoration activities that follow can also cause impacts. The impacts from these non-fishing activities primarily stem from habitat loss due to human interaction and alternation or natural disturbances. These activities are widespread and can have localized impacts on habitat related to accretion of sediments, pollutants, habitat conversion, and shifting currents and thermoclines. For protected species, primary concerns associated with non-fishing activities include vessel strikes, dredge interactions (especially for sea turtles and sturgeon), and underwater noise. These activities have both direct and indirect impacts on protected species. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and as such may indirectly constrain the productivity of managed species, non-target species, and protected species. Decreased habitat suitability tends to reduce the tolerance of these VECs to the impacts of fishing effort. Non-fishing activities can cause target, non-target, and protected species to shift their distributions away from preferred areas and may also lead to decreased reproductive ability and success (from current changes, spawning disruptions, and behavior changes), disrupted or modified food web interactions, and increased disease. While localized impacts may be larger in scale, the overall impact on the affected species and their habitats on a population level is unknown, but likely to have impacts that mostly range from no impact to slight negative impacts, depending on the species and activity.

Non-fishing activities permitted under other Federal agencies (e.g., beach nourishment, offshore wind facilities,) require examinations of potential impacts on the VECs. The MSA imposes an obligation on other federal agencies to consult with the Secretary of Commerce on actions that may adversely affect EFH (50 CFR § 600.930). NMFS and the eight regional fishery management councils engage in this review process by making comments and recommendations on federal or state actions that may affect habitat for their managed species. Agencies need to respond to, but do not necessarily need to adopt these recommendations. Habitat conservation measure serves to potentially minimize the extent and magnitude of indirect negative impacts federally-permitted activities could have on resources under NMFS' jurisdiction. In addition to guidelines mandated by the MSA, NMFS evaluates non-fishing effects during the review process required by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for certain activities that are regulated by Federal, state, and local authority. Non-fishing activities must also meet the mandates under the ESA, specifically Section 7(a)(2),[6] which ensures that agency actions do not jeopardize the continued existence of endangered species and their critical habitat.

In recent years, offshore wind energy and oil and gas exploration have become more relevant in the Greater Atlantic region. They are expected to impact all VECs, as described below.

Impacts of Offshore Wind Energy Development on Biological Resources (Target Species, Non-target Species, Protected Species) and the Physical Environment

Construction activities may have both direct and indirect impacts on marine resources, ranging from temporary changes in distribution to injury and mortality. Impacts could occur from changes to habitat in the areas of wind turbines and cable corridors and increased vessel traffic to and from these areas. Species that reside in affected wind farms year-round may experience different impacts than species that seasonally reside in or migrate through these areas. Species that typically reside in areas where wind turbines are installed may return to the area and adapt to habitat changes after construction is complete. Inter-array and electricity export cables will generate electromagnetic fields, which can affect patterns of movement, spawning, and recruitment success for various species. Effects will depend on cable type, transmission capacity, burial depth, and proximity to other cables. Substantial structural changes in habitats associated with cables are not expected unless cables are left unburied (see below). However, the cable burial process may alter sediment composition along the corridor, thereby affecting infauna and emergent biota. Taormina et al. (2018) provide a recent review of various cable impacts, and Hutchison et al. (2020) and Taormina et al. (2020) examine the effects of electromagnetic fields in particular.

The full build out of offshore wind farms will result in broad habitat alteration. The wind turbines will alter hydrodynamics of the area, which may affect primary productivity and physically change the distribution of prey and larvae. It is not clear how these changes will affect the reproductive success of marine resources. Scour and sedimentation could have negative effects on egg masses that attach to the bottom. Benthic habitat will be altered due to the placement of scour protection at wind turbine foundations, and over cables that are not buried to target depth in the sediment, converting soft substrates into hard substrates. This could alter species composition and predator/prey relationships by increasing favorable habitat for some species and decreasing habitat for others. The placement of wind turbines will also establish new vertical structure in the water column, which could serve as reefs for bottom species, fish aggregating devices for pelagic species, and substrate for the colonization of other species, e.g., mussels. Various authors have studied

[6] Section 7(a)(2) estates, "each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat."

these types of effects (e.g., Bergström et al. 2013, Dannheim et al. 2019, Degraer et al. 2019, Langhamer 2012, Methratta and Dardick 2019, Stenberg et al. 2015).

Elevated levels of sound produced during site assessment activities, construction, and operation of offshore wind facilities will impact the soundscape.[7] Temporary, acute, noise impacts from construction activity could impact reproductive behavior and migration patterns; the long-term impact of operational noise from turbines may also affect behavior of fish and prey species, through both vibrations in the immediate area surrounding them in the water column, and through the foundation into the substrate. Depending on the sound frequency and source level, noise impacts to species may be direct or indirect (Finneran 2015, Finneran 2016, Nowacek et al. 2007, NRC 2000, NRC 2003, NRC 2005, Madsen et al. 2006, Piniak 2012, Popper et al. 2014, Richardson et al. 1995, Thomsen et al. 2006). Exposure to underwater noise can directly affect species via behavioral modification (avoidance, startle, spawning) or injury (sound exposure resulting in internal damage to hearing structures or internal organs) (Bailey et al. 2010, Bailey et al. 2014, Bergström et al. 2014, Ellison et al. 2011, Ellison et al. 2018, Forney et al. 2017, Madsen et al. 2006, Nowacek et al. 2007, NRC 2003, NRC 2005, Richardson et al. 1995, Romano et al. 2004, Slabbekoorn et al. 2010, Thomsen et al. 2006, Wright et al. 2007). Indirect effects are likely to result from changes to the acoustic environment of the species, which may affect the completion of essential life functions (e.g., migrating, breeding, communicating, resting, foraging)[8] (Forney et al. 2017, Richardson et al. 1995, Slabbekoorn et al. 2010, Thomsen et al. 2006).

Wind farm survey and construction activities and turbine/cable placement will substantially affect NMFS scientific research surveys, including stock assessment surveys for fisheries and protected species[9] and ecological monitoring surveys. Disruption of such scientific surveys could increase scientific uncertainty in survey results and may significantly affect NMFS' ability to monitor the health, status, and behavior of marine resources and protected species and their habitat use within this region. Based on existing regional Fishery Management Councils' ABC control rule processes and risk policies (e.g., 50 CFR §§ 648.20 and 21), increased assessment uncertainty could result in lower commercial quotas and recreational harvest limits that may reduce the likelihood of overharvesting and mitigate associated biological impacts on fish stocks. However, this would also result in lower associated fishing revenue and reduced recreational fishing opportunities, which could result in indirect negative impacts on fishing communities.

Impacts of Offshore Wind Energy Development on Socioeconomic Resources

One offshore wind pilot project off Virginia installed two turbines in 2020**.** Several potential offshore wind energy sites have been leased or identified for future wind energy development in federal waters from Massachusetts to North Carolina (see leasing map below – Figure 10). According to BOEM, approximately 22 gigawatts (close to 2,000 wind turbines based on current technology) of Atlantic offshore wind development via 17 projects are reasonably foreseeable along the east coast (BOEM 2020a). BOEM has recently begun a planning process for the Gulf of

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[7] See NMFS Ocean Noise Strategy Roadmap:
https://cetsound.noaa.gov/Assets/cetsound/documents/Roadmap/ONS_Roadmap_Final_Complete.pdf
[8] See NMFS Ocean Noise Strategy Roadmap:
https://cetsound.noaa.gov/Assets/cetsound/documents/Roadmap/ONS_Roadmap_Final_Complete.pdf
[9] Changes in required flight altitudes due to proposed turbine height would affect aerial survey design and protocols (BOEM 2020a).

Maine via a regional intergovernmental renewable energy task force (https://www.boem.gov/Gulf-of-Maine). It is not clear at this time where development might occur in the Gulf of Maine. Given the water depth in the region, floating turbines will likely be the primary type of wind turbine foundations to be deployed in the area. As the number of wind farms increases, so too would the level and scope of impacts to affected habitats, marine resources, and human communities.

Offshore wind energy development is being considered in parts of the outer continental shelf that overlap with the distribution of surfclam – particularly, the inner and mid-shelf of the Middle Atlantic Bight. Offshore wind energy leasing could make the surfclam fishery vulnerable to exclusion and effort displacement as development expands in the region. The large vessels with hydraulic dredges may make fishing for surfclam in and around wind farm infrastructure highly uncertain. While no offshore wind developers have expressed an intent to exclude fishing vessels from wind turbine arrays once construction is complete, it could be difficult for operators to tow bottom-tending mobile gear or transit amongst the wind turbines, depending on the spacing and orientation of the array and weather conditions.[10] If vessel operators choose to avoid fishing or transiting within wind farms, effort displacement and additional steaming time could result in negative socioeconomic impacts to affected communities, including user conflicts, decreased catch and associated revenue, safety concerns, and increased fuel costs. If vessels elect to fish within wind farms effects could be negative due to reduced catch and associated revenue, user conflicts, and increased risk of allision and collision. There could also be social and economic benefits in the form of jobs associated with construction and maintenance, and replacement of some electricity generated using fossil fuels with renewable sources (AWEA 2020).

Impacts of Oil and Gas Development on Biological and Socioeconomic Resources

For oil and gas, this timeframe could include leasing and possible surveys, depending on the direction of BOEM’s 5-year planning process in the North and Mid-Atlantic regions. (Note that there are fewer oil and gas development activities in the region than offshore wind; therefore, the non-fishing impacts focus more heavily on offshore wind.) Seismic surveys to detect and quantify mineral resources in the seabed impact marine species and the acoustic environment within which marine species live. These surveys have uncertain impacts on fish behaviors that could cumulatively lead to negative population level impacts. For protected species (sea turtle, fish, small cetacean, pinniped, large whale), the severity of these behavioral or physiological impacts is based on the species’ hearing threshold, the overlap of this threshold with the frequencies emitted by the survey, as well as the duration of time the surveys would operate, as these factors influence exposure rate (Ellison et al. 2011, Ellison et al. 2018, Finneran 2015, Finneran 2016, Madsen et al. 2006, Nelms et al. 2016, Nowacek et al. 2007, Nowacek et al. 2015, NRC 2000, NRC 2003, NRC 2005, Piniak 2012, Popper et al. 2014, Richardson et al. 1995, Thomsen et al. 2006, Weilgart 2018). If fishery resources are affected by seismic surveys, then so in turn the fishermen targeting these resources would be affected. However, such surveys could increase jobs, which may provide some positive effects on human communities (BOEM 2020b). It is important to understand that seismic surveys for mineral resources are different

[10] The United States Coast Guard has considered transit and safety issues related to the Massachusetts and Rhode Island lease areas in a recent port access route study and has recommended uniform 1 mile spacing in east-west and north-south directions between turbines to facilitate access for fishing, transit, and search and rescue operations. Future studies in other regions could result in different spacing recommendations (USCG 2020).

from surveys used to characterize submarine geology for offshore wind installations, and thus these two types of activities are expected to have different impacts on marine species.

Offshore Energy Summary

The overall impact of offshore wind energy and oil and gas exploration on the affected species and their habitats on a population is unknown, but will likely range from no impact to moderate negative, depending on the number and locations of projects that occur. The individual project phases (site assessment, construction, operation, and decommissioning) as well as different aspects of the technology (foundations, cables/pipelines, turbines) will have varying impacts on resources. Mitigation efforts, such as habitat conservation measures, time of year construction restrictions, layout modifications, and fishery compensation funds could lessen the magnitude of negative impacts as well. The overall impact on socioeconomic resources is likely slightly positive to moderate negative; potentially positive due to a potentially increase in jobs and recreational fishing opportunities, but negative due to displacement and disruption of commercial fishing effort.

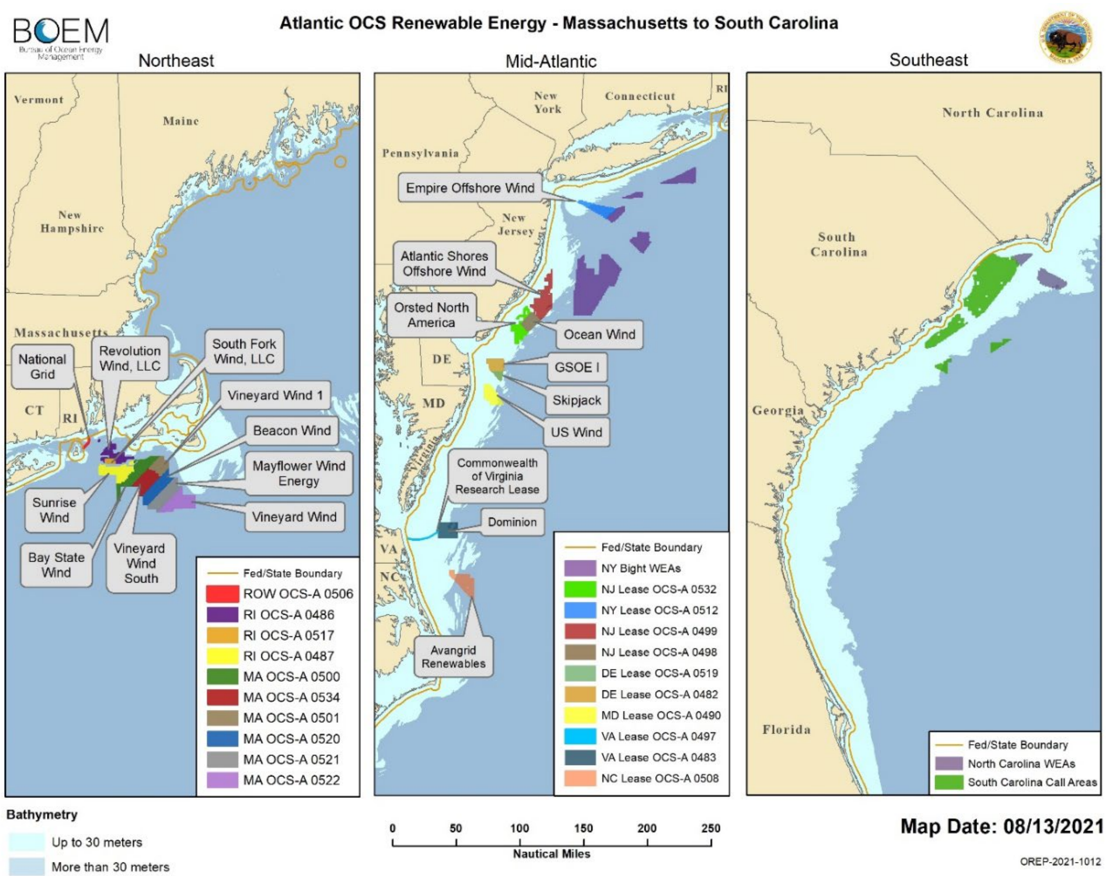

Figure 10. Map of BOEM Wind Planning areas, Wind Energy Areas, and Wind Leasing Areas on the Atlantic Outer Continental Shelf. Source:

https://www.boem.gov/sites/default/files/uploadedImages/BOEM/Renewable_Energy_Program/Mapping_and_Data/ocs_wpa.jpg

7.5.4.2.2 Global Climate Change

Global climate change affects all components of marine ecosystems, including human communities. Physical changes that are occurring and will continue to occur to these systems include sea-level rise, changes in sediment deposition; changes in ocean circulation; increased frequency, intensity and duration of extreme climate events; changing ocean chemistry; and warming ocean temperatures. The rate of physical and chemical changes in marine ecosystems have been most rapid in recent decades (Johnson et al. 2019). Emerging evidence demonstrates that these physical changes are resulting in direct and indirect ecological responses within marine ecosystems which may alter the fundamental production characteristics of marine systems (Stenseth et al. 2002). The general trend of changes can be explained by warming causing increased ocean stratification, which reduces primary production, lowering energy supply for higher trophic levels and changing metabolic rates. Different responses to warming can lead to altered food-web structures and ecosystem-level changes. Shifts in spatial distribution are generally to higher latitudes (i.e., poleward) and to deeper waters as species seek cooler waters within their normal temperature preferences. Climate change will also potentially exacerbate the stresses imposed by fishing and other non-fishing human activities and stressors. Survival of marine resources under a changing climate depends on their ability to adapt to change, but also how and to what degree those other human activities influence their natural adaptive capacity.

Results from the Northeast Fisheries Climate Vulnerability Assessment indicate that climate change could have impacts on Council-managed species that range from negative to positive, depending on the adaptability of each species to the changing environment (Hare et al. 2016).[11]

This assessment determined that surfclam have a high overall vulnerability to climate change. The exposure of surfclam to the effects of climate change was determined to be “high” due to the impacts of ocean surface temperature and ocean acidification. Exposure to these two factors occur during all life stages. All surfclam life stages use marine habitats. Surfclam spawning occurs in summer and early fall in warm water, starting earlier inshore than offshore. Surfclam eggs hatch into a trochophore larvae within 1-2 days of fertilization. Larvae cannot survive high temperatures. Juveniles and adults occur in coastal waters up to 66 m. The distributional vulnerability of surfclam was ranked as "high," as surfclam mortality is higher at higher temperatures. Surfclam was determined to have a “high” biological sensitivity to climate change as they form calcium carbonate shell and adults are sessile.

Ocean quahog had a very high overall vulnerability to climate change. Similar to surfclam, the exposure of ocean quahog to the effects of climate change was determined to be “high” due to the impacts of ocean surface temperature and ocean acidification. Exposure to these two factors occur during all life stages. All ocean quahog life stages use marine habitats. Ocean quahog is a cold-water, long-lived bivalve. Ocean quahog broadcast spawn over a protracted season and planktonic eggs mature into free-swimming trochophore, the pediveliger stage, swims, but also has a foot for burrowing. Temperatures affect growth rate. Juveniles occur in offshore sandy substrates and adults occur in dense beds over level bottom just below the surface sediments in medium to fine grain sand. Ocean quahog usually occur at depts between 25-61 m and temperature regulates the

[11] Climate vulnerability profiles for individual species are available at
https://www.st.nmfs.noaa.gov/ecosystems/climate/northeast-fish-and-shellfish-climate-vulnerability/index

cross-shelf distribution. Also similar to surfclam, the distributional vulnerability was ranked as "high" as growth slows at higher temperatures. Ocean quahog was determined to have a "very high" biological sensitivity to climate due to population growth rate, sensitivity to ocean acidification, adult mobility, slow growth, from calcium carbonate shell, and adults are sessile (Hare et al. 2016).[12]

Overall climate vulnerability results for additional Greater Atlantic species, including some of the non-target species identified in this action, are shown in Figure 11 (Hare et al. 2016). While the effects of climate change may benefit some habitats and the populations of species through increased availability of food and nutrients, reduced energetic costs, or decreased competition and predation, a shift in environmental conditions outsider the normal range can result in negative impacts for those habitats and species unable to adapt. That, in turn, may lead to higher mortality, reduced growth, smaller size, and reduced reproduction or populations. Thus, already stressed populations are expected to be less resilient and more vulnerable to climate impacts. Climate change is expected to have impacts that range from positive to negative depending on the species. However, future mitigation and adaptation strategies may mitigate some of these impacts. The science of predicting, evaluating, monitoring, and categorizing these changes continues to evolve. The social and economic impacts of climate change will depend on stakeholder and community dependence on the fisheries, and their capacity to adapt to change. Commercial and recreational fisheries may adapt in different ways, and methods of adaptation will differ among regions. In addition to added scientific uncertainty, climate change will introduce implementation uncertainty and other challenges to effective conservation and management (MAFMC 2014).

[12] Climate vulnerability profiles for individual species are available at: https://www.st.nmfs.noaa.gov/ecosystems/climate/northeast-fish-and-shellfish-climate-vulnerability/index

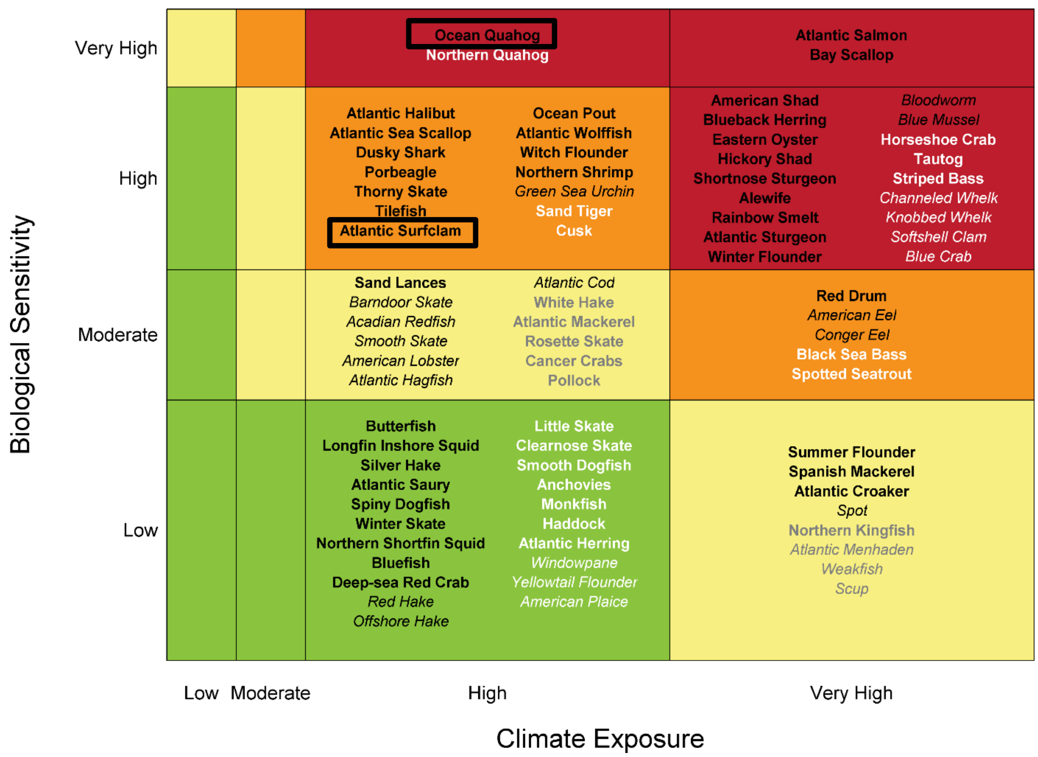

Figure 11. Overall climate vulnerability score for Greater Atlantic species, with surfclam and ocean quahog highlighted with black boxes. Overall climate vulnerability is denoted by color: low (green), moderate (yellow), high (orange), and very high (red). Certainty in score is denoted by text font and text color: very high certainty (> 95%, black, bold font), high certainty (90–95%, black, italic font), moderate certainty (66–90%, white or gray, bold font), low certainty (< 66%, white or gray, italic font) (Hare et al. 2016).

7.5.5 Baseline Condition for the Resources, Ecosystems, and Human Communities

For the purposes of this CEA, the baseline condition is considered as the present condition of the VECs plus the combined effects of the past, present, and reasonably foreseeable future actions.

Table 12 summarizes the added effects of the condition of the VECs (i.e., status/trends/stresses from affected environment and impacts) and the sum effect of the past, present, and reasonably foreseeable future actions (from previous summary table or past, present, reasonably foreseeable future action section above). The resulting CEA baseline for each VEC is exhibited in the last column of Table 12. As mentioned above, the CEA baseline is then used to assess cumulative effects of the proposed management actions.

Table 12. Summary of the current status; combined effects of Past, Present, and Reasonably foreseeable future actions; and the combined baseline condition of each VEC.

<table>
<tr><th>VEC</th><th>Status and Trends</th><th>Combined Effects of Past, Present, and Reasonably Foreseeable Future Actions</th><th>Combined CEA Baseline Conditions</th></tr>
<tr><td>Managed Resource</td><td>Atlantic surfclam and ocean quahog are not overfished nor is overfishing occurring</td><td colspan="2" rowspan="4">To be completed later once a preferred alternative has been selected.</td></tr>
<tr><td>Non-target Species</td><td>Non-targets that are managed are not overfished or overfishing. Moon snail is unassessed therefore the status is unknown (section 6.1). Highly directed fishery, with low rates of non-targets relative to target species</td></tr>
<tr><td>Habitat</td><td>Commercial fishing impacts are complex and variable and typically adverse; Non-fishing activities had historically negative but site-specific effects on habitat quality.</td></tr>
<tr><td>Protected Resources</td><td>Leatherback and Kemp's ridley sea turtles are classified as endangered under the ESA; loggerhead (Northwest Atlantic Ocean DPS) and green (North Atlantic DPS) sea turtles are classified as threatened.
All large whales in the Northwest Atlantic are protected under the MMPA. Of these large whales, North Atlantic right, fin, blue, sei, and sperm whales are also listed as endangered under the ESA.
Small cetaceans and pinnipeds: protected under MMPA
Atlantic salmon (Gulf of Maine DPS): threatened under ESA
Atlantic sturgeon: New York Bight, Chesapeake, Carolina, and South Atlantic DPSs are endangered under ESA; Gulf of Maine DPS is listed as threatened under the ESA; Giant manta ray and Oceanic whitetip sharks are threatened under the ESA.</td></tr>
</table>

Human Communities	Surfclam and ocean quahog stocks support substantial industrial fisheries and related support services. 2021 estimated ex-vessel revenues were $24 and $18 million for surfclam and ocean quahog, respectively. Most of the fleet is currently fishing out of Pt. Pleasant and Atlantic City, NJ, Oceanview, NY, and New Bedford and Fairhaven, MA. Hyannis, MA (surfclam only) landings have been recently reduced over the last few months. Cape Charles, VA is a revived port of landings targeting surclams off the Virginia coast. The small scale Maine fishery is entirely for ocean quahog, which are sold as shellstock for the half-shell market. The other fisheries are industrialized ones for surfclam and ocean quahog, which are hand shucked or steam-shucked and processed into fried, canned, and frozen products. In 2021, there were 63 surfclam and 31 ocean quahog allocations owners at the beginning of the fishing year. A total of 53 vessels were active in these fisheries in 2021, including a handful of independent vessels (less than 5).	

7.5.6 Summary of the Effects of the Proposed Actions

[To be completed later once a preferred alternative has been selected]

7.5.7 Magnitude and Significance of Cumulative Effects

[To be completed later once a preferred alternative has been selected]

7.5.7.1 Magnitude and Significance of Cumulative Effects on Managed Species and Non-Target Species

[To be completed later once a preferred alternative has been selected]

7.5.7.2 Magnitude and Significance of Cumulative Effects on Habitat

[To be completed later once a preferred alternative has been selected]

7.5.7.3 Magnitude and Significance of Cumulative Effects on Protected Species

[To be completed later once a preferred alternative has been selected]

7.5.7.4 Magnitude and Significance of Cumulative Effects on Human Communities

[To be completed later once a preferred alternative has been selected]

7.5.8 Preferred Action on all the VECs

[To be completed later once a preferred alternative has been selected]

8.0 APPLICABLE LAWS

8.1 Magnuson-Stevens Fishery Conservation and Management Act (MSA)

8.1.1 National Standards

Section 301 of the MSA requires that FMPs contain conservation and management measures that are consistent with the ten National Standards. The Council continues to meet the obligations of National Standard 1 by adopting and implementing conservation and management measures that will continue to prevent overfishing, while achieving, on a continuing basis, the optimum yield (OY) for surfclam and ocean quahog, and the U.S. fishing industry. To achieve OY, both scientific and management uncertainty are addressed when establishing catch limits. The Council developed recommendations that do not exceed the ABC recommendations of the SSC, which explicitly address scientific uncertainty. The Council considered management uncertainty and other social, economic, and ecological factors, when recommending ACTs. The Council uses the best scientific information available (National Standard 2) and manages surfclam and ocean quahog throughout their range (National Standard 3). These management measures do not discriminate among residents of different states (National Standard 4) and they do not have economic allocation as their sole purpose (National Standard 5). The measures account for variations in the fisheries (National Standard 6) and avoid unnecessary duplication (National Standard 7). They take into account the fishing communities (National Standard 8) and they promote safety at sea (National Standard 10). The proposed actions are consistent with National Standard 9, which addresses bycatch in fisheries. NOAA Fisheries has implemented many regulations that have indirectly reduced fishing gear impacts on EFH. By continuing to meet the National Standards requirements of the MSA through future FMP amendments, framework actions, and the annual specification setting process, the Council will ensure that cumulative impacts of these actions will remain positive overall for the managed species, the ports and communities that depend on these fisheries, and the Nation as a whole.

8.2 NEPA FINDING OF NO SIGNIFICANT IMPACT (FONSI)

[To be completed by NMFS]

8.3 Endangered Species Act

Sections 6.3 and 7 should be referenced for an assessment of the impacts of the proposed action on ESA-listed and MMPA protected resources. None of the actions proposed in this document are expected to alter fishing methods or activities or is expected to increase fishing effort or the spatial and/or temporal distribution of current fishing effort. Therefore, this action is not expected to affect endangered or threatened species or critical habitat in any manner not considered in previous consultations on these fisheries.

8.4 Marine Mammal Protection Act

Sections 6.3 and 7 should be referenced for an assessment of the impacts of the proposed action on marine mammals protected under the MMPA. None of the actions proposed in this document are expected to alter fishing methods or activities or is expected to increase fishing effort or the spatial and/or temporal distribution of current fishing effort. Therefore, this action is not expected to affect marine mammals in any manner not considered in previous consultations on the fisheries.

8.5 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972, as amended, provides measures for ensuring the stability of productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. It is recognized that responsible management of both coastal zones and fish stocks must involve mutually supportive goals. The Council has developed this amendment and will submit it to NMFS; NMFS must determine whether this action is consistent to the maximum extent practicable with the CZM programs for each state (Maine through Virginia).

8.6 Administrative Procedure Act

Sections 551-553 of the Federal Administrative Procedure Act establish procedural requirements applicable to informal rulemaking by federal agencies. The purpose is to ensure public access to the federal rulemaking process and to give the public notice and opportunity to comment before the agency promulgates new regulations.

The Administrative Procedure Act requires solicitation and review of public comments on actions taken in the development of an FMP and subsequent amendments and framework adjustments. Development of this amendment provided many opportunities for public review, input, and access to the rulemaking process. This action and the proposed measures were developed through a multi-stage process that was open to review by affected members of the public. The Council held a number of public meetings during the development of a white paper and the amendment development process on this issue.

- Fishery Management Act Team Meeting: November 16, 2021
- Joint Surfclam and Ocean Quahog Committee and Advisory Panel Meeting: December 6, 2021
- Council Meeting: December 15, 2021
- Fishery Management Act Team Meeting: April 26, 2022

The public will also have the opportunity to comment on this issue during public hearings. Three public hearings will be conducted in New Bedford, MA, Philadelphia, PA, and an online only webinar. This will be followed by a Council meeting in December 2022 to review comments and consider action on this issue.

If the Council submits the amendment to NOAA Fisheries, the public will have further opportunity to comment on this amendment and the proposed management measures once NMFS publishes a request for comments notice in the *Federal Register*.

8.7 Section 515 (Data Quality Act)

Utility of Information Product

This action proposes measures that ensure that no individual, corporation, or other entity acquires an excessive share of the surfclam and ocean quahog ITQ privileges. This action also revises the process for specifying multi-year management measures, and requires periodic review of the excessive shares measures, and to allow adjustments to the made under the frameworkable provisions of the FMP. In addition, this amendment revises the management objectives for the Atlantic Surfclam and Ocean Quahog FMP. This document includes a description of the alternatives considered, the preferred action and rationale for selection, and any changes to the implementing regulations of the FMP (if applicable). As such, this document enables the implementing agency (NMFS) to make a decision on implementation and this document serves as a supporting document for the proposed rule.

The action contained within this amendment was developed to be consistent with the FMP, MSA, and other applicable laws, through a multi-stage process that was open to review by affected members of the public. The public had the opportunity to review and comment on management measures during a number of public meetings (section 8.6). In addition, the public will have further opportunity to comment on this amendment once NMFS publishes a request for comments notice in the Federal Register.

Integrity of Information Product

The information product meets the standards for integrity under Other/Discussion types of documents (e.g., Confidentiality of Statistics of the MSA; NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics; 50 CFR §229.11, Confidentiality of information collected under the Marine Mammal Protection Act).

Objectivity of Information Product

The category of information product that applies here is “Natural Resource Plans.” Section 8.0 describes how this document was developed to be consistent with any applicable laws, including MSA. The analyses used to develop the alternatives (i.e., policy choices) are based upon the best scientific information available. The most up to date information was used to develop the EA which evaluates the impacts of those alternatives (section 7.0). The specialists who worked with these core data sets and other information are familiar with the most recent analytical techniques and are familiar with the available data and information relevant to the surfclam and ocean quahog fisheries.

The review process for this amendment involves MAFMC, NEFSC, GARFO, and NMFS headquarters. The NEFSC technical review is conducted by senior level scientists with specialties in fisheries ecology, population dynamics and biology, as well as economics and non-economic social sciences. The MAFMC review process involves staff technical experts and public meetings at which affected stakeholders will have the opportunity to comments on proposed management measures. Review by GARFO is conducted by those with expertise in fisheries management and policy, habitat conservation, protected resources, and compliance with the applicable laws. Final approval of the amendment and clearance of the rule is conducted by staff at NMFS Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

8.8 Paperwork Reduction Act

The Paperwork Reduction Act (PRA) concerns the collection of information. The intent of the PRA is to minimize the federal paperwork burden for individuals, small businesses, state and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government. There are no changes to the existing reporting requirements previously approved under this FMP for vessel permits, dealer reporting, or vessel logbooks. This action does not contain a collection-of-information requirement for purposes of the PRA.

8.9 Impacts of the Plan Relative to Federalism/EO 13132

This document does not contain policies with federalism implications sufficient to warrant preparation of a federalism assessment under Executive Order (EO) 13132.

8.10 Executive Order 12898 (Environmental Justice)

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations provides guidelines to ensure that potential impacts on these populations are identified and mitigated, and that these populations can participate effectively in the NEPA process (EO 12898 1994). The NOAA NAO 216-6, at Section 7.02, states that "consideration of E.O. 12898 should be specifically included in the NEPA documents for decision-making purposes." Agencies should also encourage public participation, especially by affected communities, during scoping, as part of a broader strategy to address environmental justice issues. Minority and low-income individuals or populations must not be excluded from participation in, denied the benefits of, or subjected to discrimination because of their race, color, or national origin. Although the impacts of this action may affect communities with environmental justice concerns, the proposed actions should not have disproportionately high effects on low income or minority populations. The proposed actions would apply to all participants in the affected area, regardless of minority status or income level.

8.11 Initial Regulatory Flexibility Act and Regulatory Impact Review

This section provides analysis to address the requirements of Executive Order 12866 (Regulatory Planning and Review) and the Regulatory Flexibility Act. These two mandates are addressed together as many of their requirements are duplicative. In addition, many of their requirements duplicate those of the MSA and/or NEPA; therefore, this section contains several references to previous sections of this document.

8.11.1 Basis and Purpose of the Rule and Summary of Preferred Alternatives

[To be completed later once a preferred alternative has been selected]

8.11.2 Initial Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA), first enacted in 1980, and codified at 5 U.S.C. 600-611, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a Federal regulation. Major goals of the RFA are: 1) to increase agency awareness and understanding of the impact of their regulations on small business; 2) to require that agencies communicate and explain their findings to the public; and 3) to encourage agencies to use flexibility and to provide regulatory relief to small entities.

The Regulatory Flexibility Act emphasizes predicting significant adverse impacts on small entities as a group distinct from other entities, as well as consideration of alternatives that may minimize negative impacts to small entities, while still achieving the objective of the action (section 8.10.4). When an agency publishes a proposed rule, it must either, (1) certify that the action will not have a significant adverse impact on a substantial number of small entities, and support such a certification with a factual basis demonstrating this outcome, or (2) if such a certification cannot be supported by a factual basis, prepare and make available for public review an Initial Regulatory Flexibility Analysis (IRFA) that describes the impact of the proposed rule on small entities.

[To be completed later once a preferred alternative has been selected]

8.11.2.1 Description and Number of Entities to Which the Rule Applies

[To be completed later once a preferred alternative has been selected]

8.11.2.2 Economic Impacts on Regulated Entities

[To be completed later once a preferred alternative has been selected]

8.11.3 Regulatory Impact Review

Executive Order 12866 requires a Regulatory Impact Review (RIR) in order to enhance planning and coordination with respect to new and existing regulations. This Executive Order requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant." The analysis included in this RIR further demonstrates that this action is not a "significant regulatory action" because it will not affect in a material way the economy or a sector of the economy.

Executive Order 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a significant regulatory action is one that may:

- Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or,
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The surfclam fishery was worth between $23 million and $28 million from 2019-2021 (ex-vessel revenues). The ocean quahog fishery was worth between $16 million and $19 million during the same period.

[To be completed later once a preferred alternative has been selected]

8.11.4 Analysis of Non-Preferred Alternatives

When considering the economic impacts of the alternatives under the Regulatory Flexibility Act and Executive Order 12866, consideration should also be given to those non-preferred alternatives which would result in higher net benefits or lower costs to small entities while still achieving the stated objective of the action.

[To be completed later once a preferred alternative has been selected]

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10.0 LIST OF AGENCIES AND PERSONS CONSULTED

In preparing this document, the Council consulted with NMFS, New England and South Atlantic Fishery Management Councils, Fish and Wildlife Service, and the states of Maine through North Carolina through their membership on the Mid-Atlantic and New England Fishery Management Councils. To ensure compliance with NMFS formatting requirements, the advice of NMFS GARFO personnel was sought.

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Appendix A

Co-occurrence of Atlantic surfclam and ocean quahog in the NEFSC Clam Survey and SCEMFIS Survey

NEFSC Clam Survey

Warming oceans have led to shifts in Atlantic surfclam distribution (Hoffman et al., 2018). In general, Atlantic surfclam in the southern area (S. Virginia to S. New England) have shifted to deeper water (Figure 1). This has in turn, led to more overlap in habitat between Atlantic surfclam and ocean quahog.

In the 2016 stock assessment for Atlantic surfclam (NEFSC, 2016), logistic regression models were used to detect trends in the probability of co-occurrence (surfclam and ocean quahog taken in the same tow) in NEFSC clam surveys during 1982-2011. Survey data collected after 2011 were not included because they involved different survey gear and because too few survey years were available for independent use. Only data from successful random tows were used. Poorly sampled strata with > 2 missing years were omitted (Figure 2).

Results indicated that the probability of co-occurrence increased over time for the New Jersey (NJ) and Long Island (LI) regions of the southern area. Over the period covered by this analysis (<2012), the two increasing regions, NJ and LI, accounted for approximately 80% of the total landings.

In the years following the end of this analysis, the NEFSC clam survey shifted to a different and far more efficient vessel (2012) and re-stratified (2018). Those two changes make it difficult to directly compare recent years to the previous analysis. Rather than attempt to account for the changes in selectivity and capture efficiency that result from a change in survey vessel, and the spatial biases that result from re-stratification, a separate analysis was developed for recent years.

There have not been enough survey years in the southern area using the new survey vessel to create a meaningful time series. It is, however, possible to make inference based on the magnitude of co-occurrence without reference to trends over time.

All tows from 2012 to 2018 (the last complete year of sampling) were analyzed for catch composition. Tows that caught less than 30 surfclam in five minutes were excluded as these represent densities far below what would be considered economically for commercial fishing viable (Powell, et al., 2015). A tow in which at least 5% of the total catch by number was ocean quahog was considered co-occurrence, and less than that proportion was considered a 'surfclam only' tow. Both of these values are conservative and could be reduced, which would tend to lead to higher values of co-occurrence in the results.

The three Atlantic surfclam strata with sufficient tows meeting the 30 animals per 5 five minutes criteria were 3S, 4S and 5S (Figure 3). The proportion of tows in which co-occurrence was observed ranged between about 10% in 5S to over 80% in 4S. The most productive and heavily sampled strata, 3S, showed about 50% co-occurrence (Figure4).

It is worth noting that the areas in which high co-occurrence was observed (3S and 4S) are also the areas where co-occurrence would be expected since these are the deeper Atlantic surfclam strata in which ocean quahog have traditionally been found. It is, however, equally important to note that only three of the six southern area Atlantic surfclam strata had sufficiently high densities of surfclam aggregations to warrant inclusion in this analysis. These two points reinforce the notion that Atlantic surfclam distribution is shifting into deeper water and that co-occurrence with ocean quahog is already common and likely to increase as ocean temperatures increase.

SCEMFIS Survey

In the fall of 2021, a team from SCEMFIS partnered with an industry fishing vessel, the F/V Pursuit, to document the extent of this habitat overlap between surfclam and ocean quahog. They took samples in several areas, working through surfclam and ocean quahog habitats, as well as areas of intermingling in between. The team documented what was caught, its species, size, age, and location. After analyzing the data, the team found significant habitat overlap and intermixing between surfclams and ocean quahogs, much more than was expected at the start of the survey.

Figure 5 shows the dark pink boxes oriented inshore are locations where more than 24 of every 25 clams was a surfclam. In most cases, these tows were exclusively surfclam. Note that most of these stations are in the 30-40 m range. The yellow boxes generally on the inshore half of the intervening region are stations where at least 1 ocean quahog was present for every 25 clams, but no more than 12 (a 50:50 split). The brown boxes generally on the offshore half of the intervening region are stations where at least 1 surfclam was present for every 25 clams, but no more than 12 (a 50:50 split). Both of the station types yielding mixed clams occupy a substantial region between 40 and 55 m with the surfclam-rich stations somewhat inshore of the ocean quahog-rich stations.

For more details on the survey and its methods, see https://scemfis.org/.

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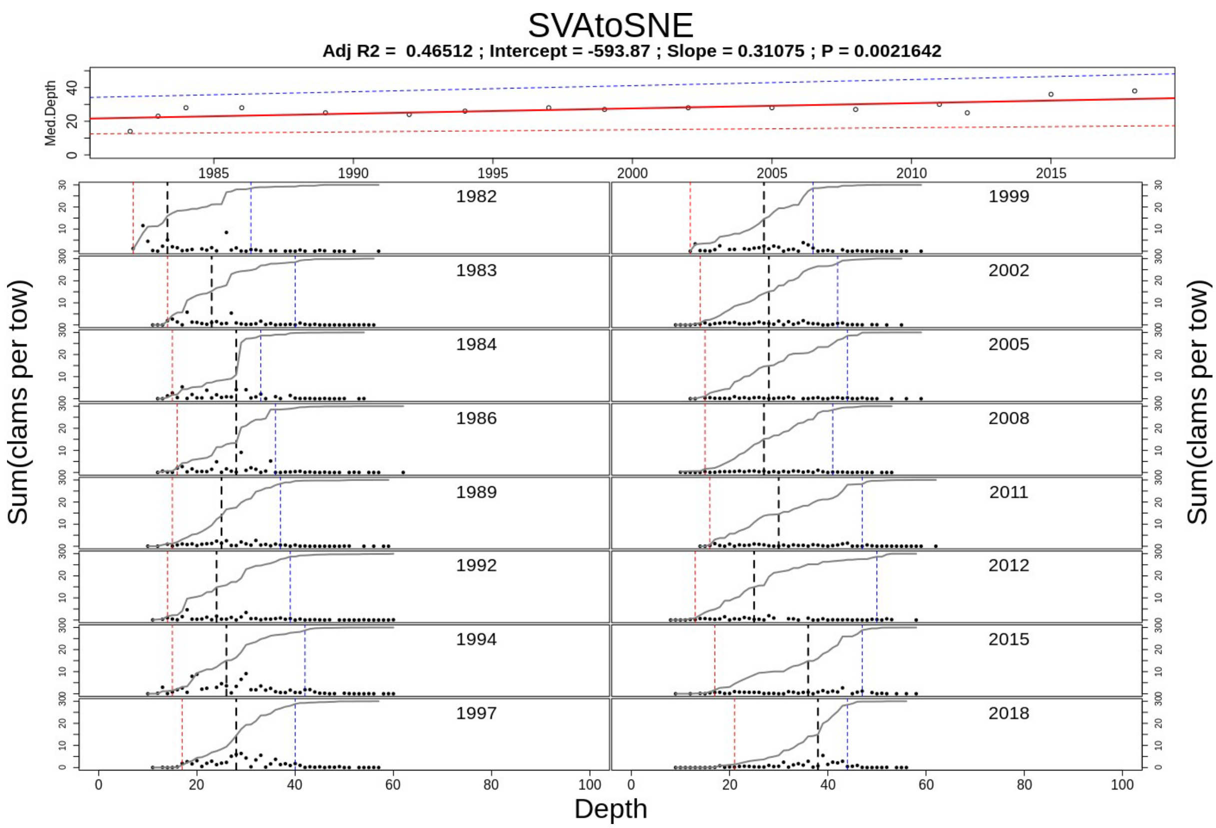

Figure 1. Total surfclam caught at depth by year in SVA to SNE. The points are clams caught aggregated by depth and the gray line is the cumulative sum of clams caught at depth. The black dashed vertical line is the depth at which half of the cumulative total clams caught in that survey were taken. If the black dashed vertical line is further to the right, it indicates that more clams were caught in deeper water in that year. The red and blue dashed vertical lines represent the 5th and 95th percentiles of the cumulative total. The top panel is a simple linear regression of median depth (the black dashed vertical lines in each annual plot) over time. A positive slope indicates that a higher proportion of the total clams in a region were caught in deeper water in recent years.

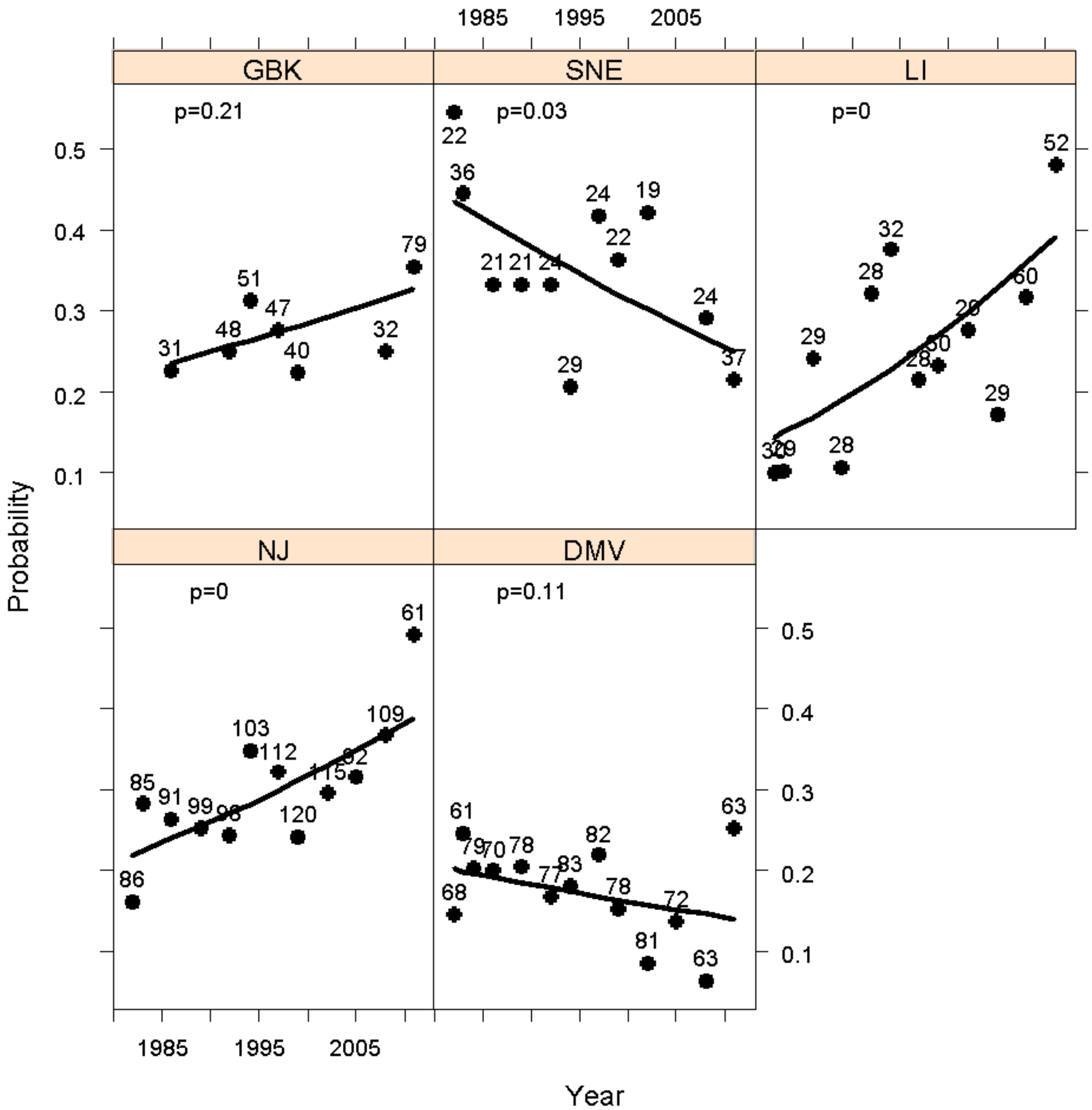

Figure 2. Trends in co-occurrence of surfclam and ocean quahog by region with p-values from a logistic regression (top of each panel) and sample sizes in each year.

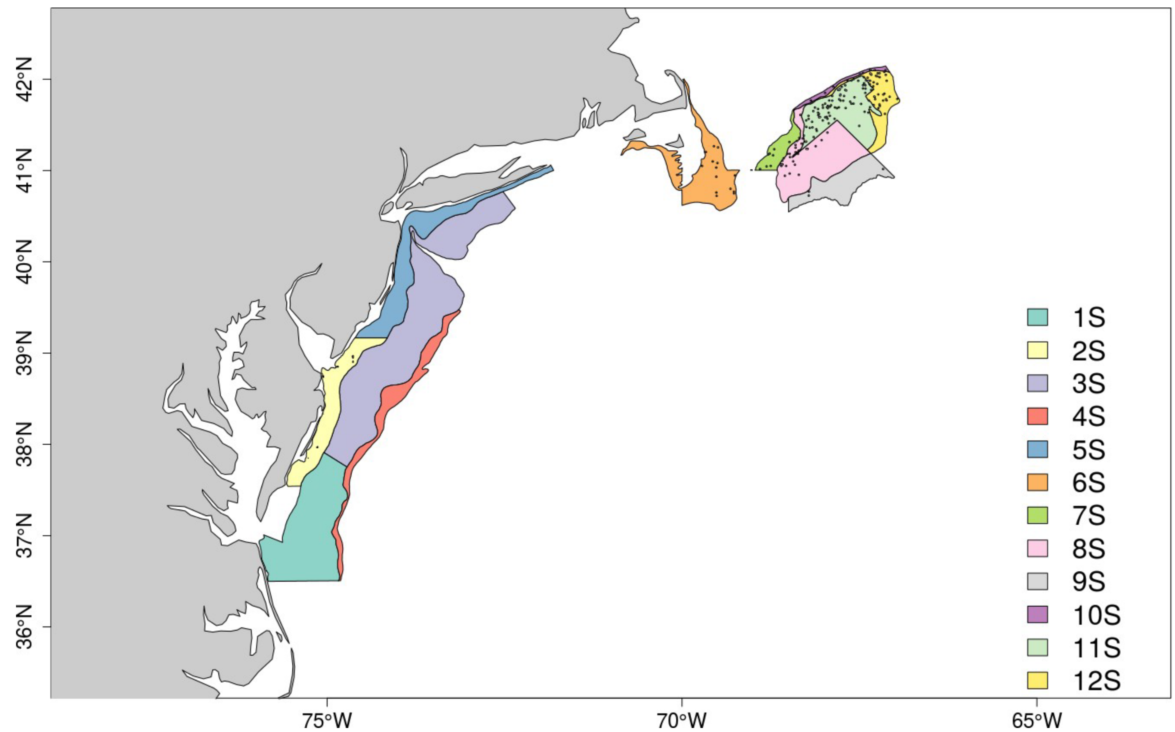

Figure 3. Atlantic surfclam strata used in the NEFSC clam survey.

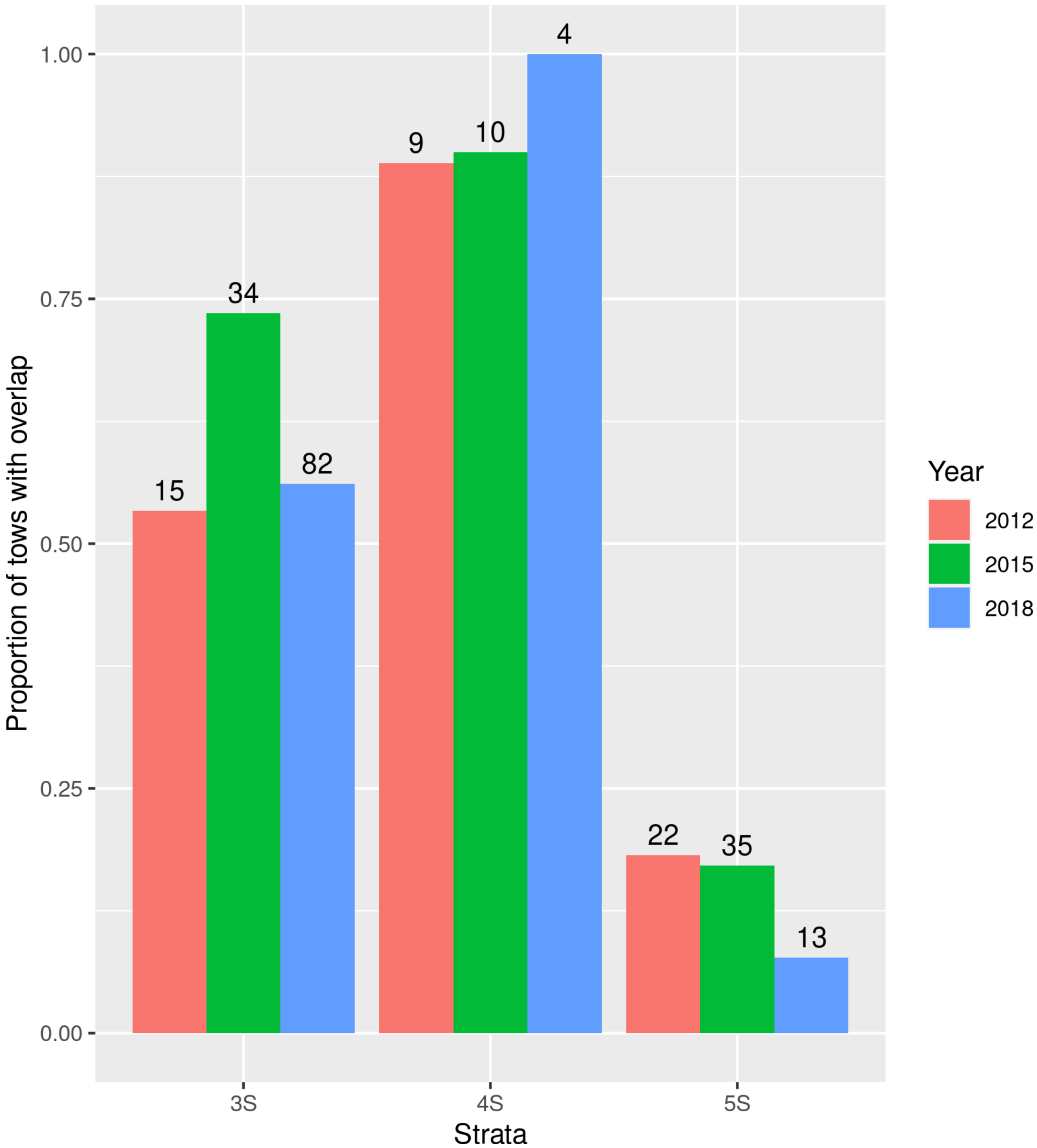

Figure 4. Proportion of all tows with 30+ total Atlantic surfclam containing at least 5% ocean quahog by number. Sample sizes are printed above each bar. Other strata in the southern area did not have sufficient tows that captured more than 30 surfclam to be included in this analysis.

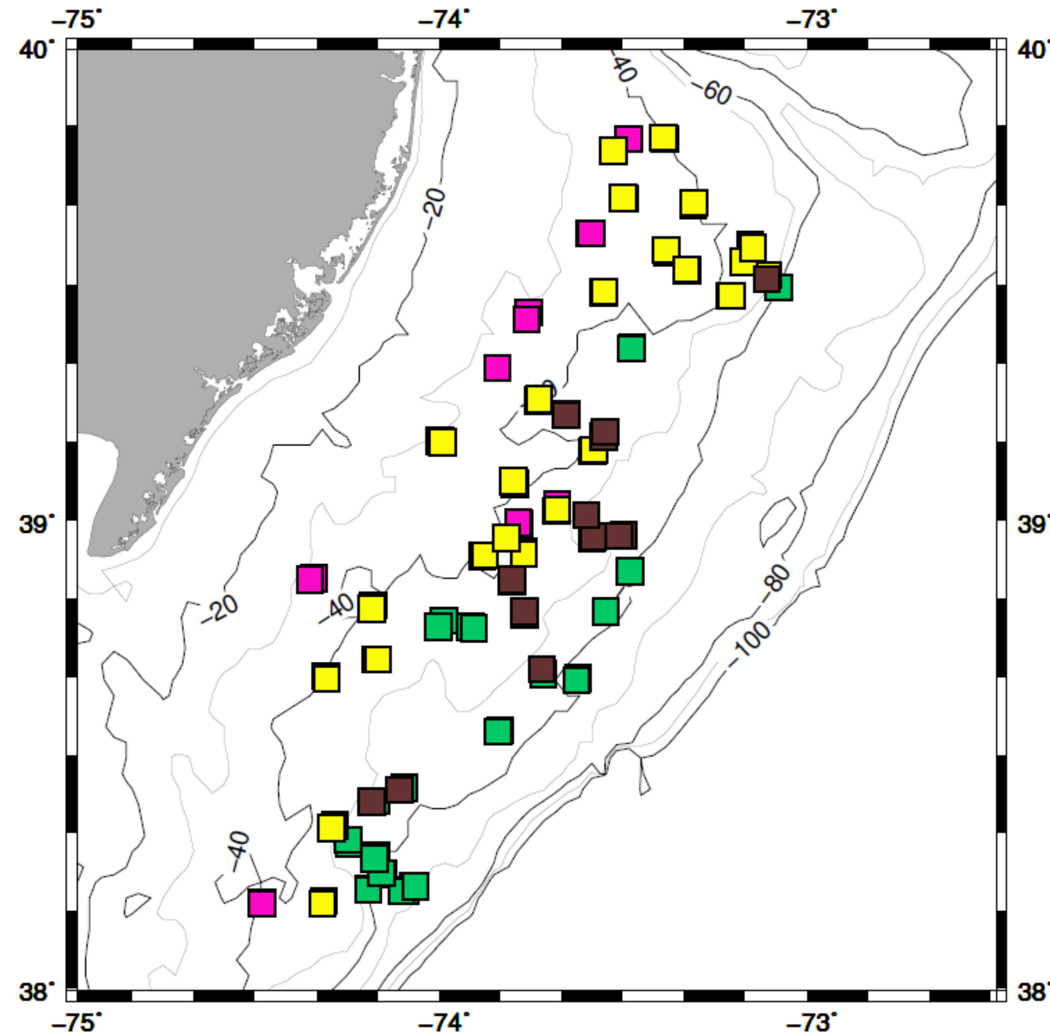

Figure 5. Locations sampled and catch characteristics. Dark pink boxes show locations where >24 of 25 clams were surfclams. Green boxes show locations where >24 of 25 clams were ocean quahogs. Yellow boxes show locations where at least 1 in 24 clams, but less than 12 in 24 were ocean quahogs. Brown boxes show locations where at least 1 in 24 clams, but less than 12 in 24 were surfclams.

Appendix B

Types of Research Permits

Undertaking scientific research on regulated fisheries may require special permits, as required by experimental fishing regulations established under the Magnuson Stevens Fishery Conservation and Management Act (Magnuson Act). There are three main permit types for exemption from Greater Atlantic Region fishery regulations, and an acknowledgement letter that may be applicable to scientific research being conducted:

--Exempted Fishing Permit (EFP),

--Temporary Possession Letter of Authorization,

--Exempted Educational Activity Authorization (EEAA), and

--Letter of Acknowledgment (LOA).

Description of Exempted Fishing Permits

From:https://www.fisheries.noaa.gov/new-england-mid-atlantic/sustainable-fisheries/scientific-Research-and-exempted-fishing-permits

"Online applications are submitted through our Fish Online portal. For help with Fish Online, please contact our Helpdesk at (978) 281-9188. We will contact you after you submit your application so you know who is processing your request."

Exempted Fishing Permit

An Exempted Fishing Permit (EFP) is a permit issued by the Greater Atlantic Regional Fisheries Office (Regional Office) that authorizes a fishing vessel to conduct fishing activities that would otherwise be prohibited under the regulations at 50 CFR part 648 or part 697. Generally, EFPs are issued for activities in support of fisheries-related research, including landing undersized fish or fish in excess of a possession limit for research purposes, seafood product development and/or market research, compensation fishing, and the collection of fish for public display. Anyone that intends to engage in an activity that would be prohibited under these regulations (with the exception of scientific research on a scientific research vessel, and exempted educational activities) is required to obtain an EFP prior to commencing the activity.

Review Timeline

An EFP application should be submitted at least 60 days before the desired effective date. If you submit your EFP application less than 60 days before needed, you may not receive it in time. Please make sure you have submitted all of the required material in your initial application. Our 60-day target for processing EFP applications does not begin until we have a complete application. Applicants should also be aware that large scale projects, projects with uncertain resource impacts, or controversial exemption requests may take longer than 60 days to process.

Application Review and Issuance

The Regional Administrator will review each application and make a preliminary determination on whether the application contains all of the required information and constitutes an activity appropriate for further consideration. If the Regional Administrator finds that any application does not warrant further consideration, both the applicant and the affected Council(s) will be notified in writing of the reasons for the decision. If the Regional Administrator determines that an application warrants further consideration, notification of receipt of the application will be published in the Federal Register with a brief description of the proposal. There will be a 15- to 45-day comment period on the notice of receipt of the EFP application.

As soon as practicable after considering comments and conducting required analyses and consultations (e.g., NEPA, EFH, ESA and MMPA), the Regional Administrator will make a determination on whether to approve or deny the EFP request.

If approved, the Regional Administrator will attach terms and conditions to the EFP, consistent with the purpose of the exempted fishing and as otherwise necessary for the conservation and management of the fishery resources and the marine environment. EFP recipients and vessel operators must sign the EFP acknowledging the terms and conditions, and are responsible for adhering to these terms and conditions. Failure to do so may result in permit revocation.

Appendix C

Table 1. Essential Fish Habitat descriptions for federally-managed species/life stages in the U.S. Northeast Shelf Ecosystem that are vulnerable to bottom tending fishing gear.

Species	Life Stage	Geographic Area of EFH	Depth (meters)	Bottom Type
American plaice	juvenile	GOM, including estuaries from Passamaquoddy Bay to Saco Bay, ME and from Massachusetts Bay to Cape Cod Bay	45 - 150	Fine grained sediments, sand, or gravel
American plaice	adult	GOM, including estuaries from Passamaquoddy Bay to Saco Bay, ME and from Massachusetts Bay to Cape Cod Bay	45 - 175	Fine grained sediments, sand, or gravel
Atlantic cod	juvenile	GOM, GB, eastern portion of continental shelf off SNE, these estuaries: Passamaquoddy Bay to Saco Bay, Massachusetts Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	25 - 75	Cobble or gravel
Atlantic cod	adult	GOM, GB, eastern portion of continental shelf off SNE, these estuaries: Passamaquoddy Bay to Saco Bay, Massachusetts Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	10 - 150	Rocks, pebbles, or gravel
Atl halibut	juvenile	GOM and GB	20 - 60	Sand, gravel, or clay
Atl halibut	adult	GOM and GB	100 - 700	Sand, gravel, or clay
Barndoor skate	juvenile/ adult	Eastern GOM, GB, SNE, Mid-Atlantic Bight to Hudson Canyon	l0-750, most < 150	Mud, gravel, and sand
Black sea bass	juvenile	GOM to Cape Hatteras, NC, including estuaries from Buzzards Bay to Long Island Sound, Gardiners Bay, Barnegat Bay to Chesapeake Bay, Tangier/ Pocomoke Sound, and James River	1 - 38	Rough bottom, shellfish/ eelgrass beds, manmade structures, offshore clam beds, and shell patches
Black sea bass	adult	GOM to Cape Hatteras, NC, including Buzzards Bay, Narragansett Bay, Gardiners Bay, Great South Bay, Barnegat Bay to Chesapeake Bay, and James River	20 - 50	Structured habitats (natural and manmade), sand and shell substrates preferred
Clearnose skate	juvenile/ adult	GOM, along continental shelf to Cape Hatteras, NC, including the estuaries from Hudson River/Raritan Bay south to the Chesapeake Bay mainstem	0 – 500, most < 111	Soft bottom and rocky or gravelly bottom
Haddock	juvenile	GB, GOM, and Mid-Atlantic south to Delaware Bay	35 - 100	Pebble and gravel
Haddock	adult	GB, eastern side of Nantucket Shoals, and throughout GOM	40 - 150	Broken ground, pebbles, smooth hard sand, and smooth areas between rocky patches
Little skate	juvenile/ adult	GB through Mid-Atlantic Bight to Cape Hatteras, NC; includes estuaries from Buzzards Bay south to mainstem Chesapeake Bay	0-137, most 73 - 91	Sandy or gravelly substrate or mud
Ocean pout	eggs	GOM, GB, SNE, and Mid-Atlantic south to Delaware Bay, including the following estuaries: Passamaquoddy Bay to Saco Bay, Massachusetts Bay and Cape Cod Bay	< 50	Generally sheltered nests in hard bottom in holes or crevices

Species	Life Stage	Geographic Area of EFH	Depth (meters)	Bottom Type
Ocean pout	juvenile	GOM, GB, SNE, Mid-Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay, Massachusetts Bay, and Cape Cod Bay	< 50	Close proximity to hard bottom nesting areas
Ocean pout	adult	GOM, GB, SNE, Mid-Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay, MA Bay, Boston Harbor, and Cape Cod Bay	< 80	Smooth bottom near rocks or algae
Pollock	adult	GOME, GB, SNE, and Mid-Atlantic south to New Jersey and the following estuaries: Passamaquoddy Bay, Damariscotta R., MA Bay, Cape Cod Bay, Long Island Sound	15 - 365	Hard bottom habitats including artificial reefs
Red hake	juvenile	GOM, GB, continental shelf off SNE, and Mid-Atlantic south to Cape Hatteras, including the following estuaries: Passamaquoddy Bay to Saco Bay, Great Bay, MA Bay to Cape Cod Bay; Buzzards Bay to CT River, Hudson River, Raritan Bay, and Chesapeake Bay	< 100	Shell fragments, including areas with an abundance of live scallops
Red hake	adult	GOM, GB, continental shelf off SNE, Mid-Atlantic south to Cape Hatteras, these estuaries: Passamaquoddy Bay to Saco Bay, Great Bay, MA Bay to Cape Cod Bay; Buzzards Bay to CT River, Hudson River, Raritan Bay, Delaware Bay, and Chesapeake Bay	10 - 130	In sand and mud, in depressions
Redfish	juvenile	GOM, southern edge of GB	25 - 400	Silt, mud, or hard bottom
Redfish	adult	GOM, southern edge of GB	50 - 350	Silt, mud, or hard bottom
Rosette skate	juvenile/ adult	Nantucket shoals and southern edge of GB to Cape Hatteras, NC	33-530, most 74-274	Soft substrate, including sand/mud bottoms
Scup	juvenile/ adult	GOM to Cape Hatteras, NC, including the following estuaries: MA Bay, Cape Cod Bay to Long Island Sound, Gardiners Bay to Delaware inland bays, and Chesapeake Bay	0-38 for juv 2 - 185 for adult	Demersal waters north of Cape Hatteras and inshore estuaries (various substrate types)
Silver hake	juvenile	GOM, GB, continental shelf off SNE, Mid-Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, ME, MA Bay to Cape Cod Bay	20 - 270	All substrate types
Summer Flounder	juvenile/ adult	GOM to Florida – estuarine and over continental shelf to shelf break	0 - 250	Demersal/estuarine waters, varied substrates. Mostly inshore in summer and offshore in winter.
Smooth skate	juvenile/ adult	Offshore banks of GOM	31 - 874, most 110 - 457	Soft mud (silt and clay), sand, broken shells, gravel, and pebbles
Thorny skate	juvenile/ adult	GOM and GB	18 - 2000, most 111-366	Sand, gravel, broken shell, pebbles, and soft mud
Tilefish	juvenile/ adult	Outer continental shelf and slope from the U.S./Canadian boundary to the Virginia/North Carolina boundary	100 - 300	Burrows in clay (some may be semi-hardened into rock)
White hake	juvenile	GOM, southern edge of GB, SNE to Mid-Atlantic and the following estuaries: Passamaquoddy Bay, ME to Great Bay, NH, Massachusetts Bay to Cape Cod Bay	5 - 225	Seagrass beds, mud, or fine grained sand

Species	Life Stage	Geographic Area of EFH	Depth (meters)	Bottom Type
Winter flounder	adult	GB, inshore areas of GOM, SNE, Mid- Atlantic south to Delaware Bay and the estuaries from Passamaquoddy Bay, ME to Chincoteague Bay, VA	1 - 100	Mud, sand, and gravel
Winter skate	juvenile/ adult	Cape Cod Bay, GB, SNE shelf through Mid-Atlantic Bight to North Carolina; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 371, most < 111	Sand and gravel or mud
Witch flounder	juvenile	GOM, outer continental shelf from GB south to Cape Hatteras	50 - 450 to 1500	Fine grained substrate
Witch flounder	adult	GOME, outer continental shelf from GB south to Chesapeake Bay	25 - 300	Fine grained substrate
Yellowtail flounder	adult	GB, GOM, SNE and Mid-Atlantic south to Delaware Bay and these estuaries: Sheepscot River and Casco Bay, ME, MA Bay to Cape Cod Bay	20 - 50	Sand or sand and mud

Appendix D

2020 Initial Surfclam Allocations

and

2020 Initial Ocean Quahog Allocations

2022 Initial Surfclam Allocations											
Alloc Nbr	**Owner**	**Street**	**City**	**ST**	**Zip**	**Telephone number**	**Ratio**	**Bushels**	**Tags**	**Tag Start**	**Tag End**
C624	International Clam Management Inc	4371 Northlake Blvd # 369	Palm Beach Gardens	FL	33410-6253	(443) 614-0377	0.133430588	453,664	14,177	1,038,095	1,052,271
C583	Singer Island Ventures Inc	4371 Northlake Blvd # 369	Palm Beach Gardens	FL	33410-6253	(443) 614-0377	0.113054118	384,384	12,012	1,070,286	1,082,297
C632	Tristate Capital Bank	301 Grant St Ste 2700	Pittsburgh	PA	15219-6414	(866) 680-8722	0.081261176	276,288	8,634	1,092,261	1,100,894
C529	Farm Credit East, ACA	240 South Rd	Enfield	CT	06082-4451	(860) 741-4380	0.076829538	261,216	8,163	1,055,411	1,063,573
C669	US DOC NOAA/NOAA Fisheries Financial Services Division	55 Great Republic Dr	Gloucester	MA	01930-2276	(978) 281-9154	0.060376471	205,280	6,415	1,015,266	1,021,680
C666	US DOC NOAA/NOAA Fisheries Financial Services Division	55 Great Republic Dr	Gloucester	MA	01930-2276	(978) 281-9154	0.035209412	119,712	3,741	1,021,681	1,025,421
C136	Stephanie Dee Inc	4371 Northlake Blvd # 369	Palm Beach Gardens	FL	33410-6253	(443) 614-0377	0.030776471	104,640	3,270	1,083,322	1,086,591
C8303	KeyBank National Association	401 Plymouth Rd Ste 600	Plymouth Meeting	PA	19462-1672	(610) 832-1736	0.028847059	98,080	3,065	1,032,485	1,035,549
C8315	MJ Clam Co, LLC	10105 Concord Rd	Seaford	DE	19973-8649	(302) 381-1115	0.027507648	93,536	2,923	1,087,158	1,090,080
C188	Blount Fine Foods Corporation	630 Currant Rd	Fall River	MA	02720-4713	(774) 888-1300	0.023209412	78,912	2,466	1,103,817	1,106,282
C009	Thomas E McNulty Sr	118 Springers Mill Rd	Cape May Court House	NJ	08210-2039	(609) 425-8983	0.022465882	76,384	2,387	1,029,002	1,031,388
C634	Tristate Capital Bank	301 Grant St Ste 2700	Pittsburgh	PA	15219-6414	(866) 680-8722	0.020517647	69,760	2,180	1,090,081	1,092,260
C546	Farm Credit East, ACA	240 South Rd	Enfield	CT	06082-4451	(860) 741-4380	0.019689952	66,944	2,092	1,052,272	1,054,363

C589	Yannis Karavia LLC	PO Box 600	Dorchester	NJ	08316-0600	(856) 785-8040	0.018992941	64,576	2,018	1,009,472	1,011,489
C8302	People's United Bank N.A.	1 Post Office Sq Ofc	Boston	MA	02109-2106	(617) 449-0351	0.016837647	57,248	1,789	1,100,895	1,102,683
C662	Farm Credit East, ACA	29 Landis Ave	Bridgeton	NJ	08302-4317	(856) 451-0933	0.014305882	48,640	1,520	1,007,647	1,009,166
C663	DPL ITQs LLC	PO Box 309	Millville	NJ	08332-0309	(856) 300-1010	0.014051765	47,776	1,493	1,003,401	1,004,893
C528	LNA Inc	PO Box 178	Portsmouth	RI	02871-0178	(401) 480-2090	0.013825882	47,008	1,469	1,036,626	1,038,094
C146	Woodrow Laurence Inc	12310 Collins Rd	Bishopville	MD	21813-1528	(443) 497-2479	0.012935	43,968	1,374	1,004,894	1,006,267
C189	Anthony W Watson	10232 Golf Course Rd	Ocean City	MD	21842-9714	(410) 726-1317	0.012919022	43,936	1,373	1,027,629	1,029,001
C540	George Torggler	921 Preserve Dr	Annapolis	MD	21409-5750	(410) 320-3042	0.012358843	42,016	1,313	1,012,365	1,013,677
C638	Vongole Ragazzi LLC	48 Gorton Rd	Millville	NJ	08332-6202	(856) 300-1020	0.011642354	39,584	1,237	1,000,622	1,001,858
C8318	The George S Carmines Trust	10 Evans Cir	Poquoson	VA	23662-1606	(757) 715-7461	0.010128	34,432	1,076	1,035,550	1,036,625
C547	Farm Credit East, ACA	240 South Rd	Enfield	CT	06082-4451	(860) 741-4380	0.00985008	33,504	1,047	1,054,364	1,055,410
C8298	US DOC NOAA/NOAA Fisheries Financial Services Division	55 Great Republic Drive	Gloucester	MA	1930	(978) 281-9154	0.009173	31,200	975	1,026,654	1,027,628
C563	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.008734118	29,696	928	1,068,997	1,069,924
C674	US DOC NOAA/NOAA Fisheries Financial Services Division	55 Great Republic Dr	Gloucester	MA	01930-2276	(978) 281-9154	0.007811765	26,560	830	1,025,422	1,026,251

C110	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.007651765	26,016	813	1,065,988	1,066,800
C133	City of Southport Inc	854 Tern Ln Apt 103	Salisbury	MD	21804-2320	(410) 726-7807	0.007242	24,608	769	1,006,656	1,007,424
C065	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.006889412	23,424	732	1,068,265	1,068,996
C166	Nantucket Shoals Inc	147 Pine St	Rochester	MA	02770-1605	(508) 763-3155	0.006861176	23,328	729	1,102,684	1,103,412
C559	Sturdy Savings Bank	PO Box 900	Cape May Court House	NJ	08210-0900	(609) 463-5240	0.006587077	22,400	700	1,001,859	1,002,558
C613	NSR Resources LLC	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.006578191	22,368	699	1,063,626	1,064,324
C655	Audubon Savings Bank	509 S White Horse Pike	Audubon	NJ	08106-1312	(856) 656-2200	0.006409412	21,792	681	1,002,720	1,003,400
C007	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.006296471	21,408	669	1,064,325	1,064,993
C8290	Wellfleet Shellfish Company, Inc.	137 Holmes Rd	Eastham	MA	02642-2183	(508) 255-5300	0.006211765	21,120	660	1,031,389	1,032,048
C046	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.006004706	20,416	638	1,067,029	1,067,666
C215	Leroy E and Dolores Truex	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.00592	20,128	629	1,082,298	1,082,926
C151	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.005628235	19,136	598	1,067,667	1,068,264
C080	TMT Allocations Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.005327059	18,112	566	1,086,592	1,087,157
C454	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.005176471	17,600	550	1,064,994	1,065,543
C201	Anthony E and John D Martin	11014 Grays Corner Rd	Berlin	MD	21811-3160	(443) 783-1955	0.004356	14,816	463	1,011,490	1,011,952

C134	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.004178824	14,208	444	1,065,544	1,065,987
C8288	JKPL ITQ, LLC	PO Box 692	Port Norris	NJ	08349-0692	(856) 785-8040	0.004103926	13,952	436	1,032,049	1,032,484
C584	Mabel Susan III Inc	12 Rabbit Run	Cape May	NJ	08204-4423	(609) 884-0867	0.003877648	13,184	412	1,011,953	1,012,364
C149	Wando River Corporation	630 Currant Rd	Fall River	MA	02720-4713	(774) 888-1300	0.003806	12,928	404	1,103,413	1,103,816
C099	Mabel Kim Inc	12 Rabbit Run	Cape May	NJ	08204-4423	(609) 884-0867	0.00379294	12,896	403	1,013,815	1,014,217
C8297	US DOC NOAA/NOAA Fisheries Financial Services Division	55 Great Republic Drive	Gloucester	MA	1930	(978) 281-9154	0.003783529	12,864	402	1,026,252	1,026,653
C515	Dolores Truex	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.003717647	12,640	395	1,082,927	1,083,321
C033	Big Diamond Inc	12 Rabbit Run	Cape May	NJ	08204-4423	(609) 884-0867	0.003651765	12,416	388	1,006,268	1,006,655
C637	F/V Maude Platt Inc	515 Sanford Rd	Westport	MA	02790-3748	(508) 678-4071	0.003482353	11,840	370	1,000,252	1,000,621
C135	T & M Clammers Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.003397647	11,552	361	1,069,925	1,070,285
C561	Roy Osmundsen	14 Whippoorwill Ln	Cape May Court House	NJ	08210-2527	(609) 846-3718	0.003303528	11,232	351	1,014,915	1,015,265
C656	Farm Credit East, ACA	2 Constitution Dr	Bedford	NH	03110-6000	(603) 472-3554	0.002870588	9,760	305	1,009,167	1,009,471
C127	Gary Osmundsen	12 Rabbit Run	Cape May	NJ	08204-4423	(609) 884-0867	0.002682352	9,120	285	1,014,630	1,014,914
C229	Kenneth W and Sharon L Bailey	PO Box 12	Heislerville	NJ	08324-0012	(856) 207-1109	0.002503529	8,512	266	1,014,218	1,014,483

C079	Lauren Kim Inc	12 Rabbit Run	Cape May	NJ	08204-4423	(609) 884-0867	0.002362353	8,032	251	1,000,001	1,000,251
C008	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.002145882	7,296	228	1,066,801	1,067,028
C661	Farm Credit East, ACA	29 Landis Ave	Bridgeton	NJ	08302-4317	(856) 451-0933	0.002089412	7,104	222	1,007,425	1,007,646
C8296	Sturdy Savings Bank	PO Box 900	Cape May Court House	NJ	08210-0900	(609) 463-5240	0.001515044	5,152	161	1,002,559	1,002,719
C075	Seafish Inc	10134 Waterview Dr	Ocean City	MD	21842-9635	(443) 497-3062	0.001374118	4,672	146	1,014,484	1,014,629
C063	T & P Vessel Inc	210 Hagen Rd	Cape May Court House	NJ	08210-1175	(609) 425-2525	0.001285	4,384	137	1,013,678	1,013,814
C011	D & L Commercial Fish Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.000489412	1,664	52	1,063,574	1,063,625

2022 Initial Ocean Quahog Allocations											
Allocation Number	**Owner**	**Street**	**City**	**State**	**Zip**	**Telephone**	**Ratio**	**Bushels**	**Tags**	**Tag Start**	**Tag End**
Q8310	Bumble Bee Clam Ownership Co. Inc.	501 W Broadway	San Diego	CA	92101-3536	(619) 501-2700	0.217896014	1,162,048	36,314	2,049,408	2,085,721
Q649	Singer Island Ventures Inc	4371 Northlake Blvd # 369	Palm Beach Gardens	FL	33410-6253	(443) 614-0377	0.144435027	770,272	24,071	2,113,341	2,137,411
Q199	Legend Inc	607 Seashore Rd	Cape May	NJ	08204-4615	(609) 884-1771	0.119084772	635,072	19,846	2,018,251	2,038,096
Q691	Tristate Capital Bank	301 Grant St Ste 2700	Pittsburgh	PA	15219-6414	(866) 680-8722	0.07296456	389,120	12,160	2,146,889	2,159,048
Q8314	MJ Clam Co, LLC	10105 Concord Rd	Seaford	DE	19973-8649	(302) 381-1115	0.056187667	299,648	9,364	2,137,525	2,146,888
Q690	Farm Credit East, ACA	29 Landis Ave	Bridgeton	NJ	08302-4317	(856) 451-0933	0.052101256	277,856	8,683	2,009,285	2,017,967
Q693	Surfside Seafood Products LLC	PO Box 600	Dorchester	NJ	08316-0600	(856) 785-2115	0.05151528	274,720	8,585	2,000,003	2,008,587
Q684	ITQ LLC	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.048939059	260,992	8,156	2,085,808	2,093,963
Q112	Wando River Corporation	630 Currant Rd	Fall River	MA	02720-4713	(774) 888-1300	0.043822	233,696	7,303	2,159,049	2,166,351
Q598	John W Kelleher Trust	PO Box 600	Dorchester	NJ	08316-0600	(856) 785-8040	0.043598466	232,512	7,266	2,038,106	2,045,371
Q685	NSR Resources LLC	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.040112342	213,920	6,685	2,095,031	2,101,715

Q629	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.033506094	178,688	5,584	2,105,535	2,111,118
Q006	Thomas E McNulty Sr	118 Springers Mill Rd	Cape May Court House	NJ	08210-2039	(443) 497-3062	0.016291018	86,880	2,715	2,046,693	2,049,407
Q115	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.010134633	54,048	1,689	2,102,774	2,104,462
Q181	Thomas E McNulty Sr	118 Springers Mill Rd	Cape May Court House	NJ	08210-2039	(609) 425-8983	0.007926495	42,272	1,321	2,045,372	2,046,692
Q672	OSM Resources LLC	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.007306	38,976	1,218	2,111,939	2,113,156
Q676	International Clam Management Inc	4371 Northlake Blvd # 369	Palm Beach Gardens	FL	33410-6253	(443) 614-0377	0.006402	34,144	1,067	2,093,964	2,095,030
Q005	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.006348397	33,856	1,058	2,101,716	2,102,773
Q049	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.00576036	30,720	960	2,104,575	2,105,534
Q128	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.004920308	26,240	820	2,111,119	2,111,938
Q109	Woodrow Laurence Inc	12310 Collins Rd	Bishopville	MD	21813-1528	(443) 497-2479	0.003912	20,864	652	2,008,588	2,009,239
Q101	T & M Clammers Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.001104069	5,888	184	2,113,157	2,113,340
Q193	Peter A Lamonica	PO Box 600	Dorchester	NJ	08316-0600	(856) 785-8040	0.000729	3,872	121	2,018,089	2,018,209

Q107	Anthony E and John D Martin	11014 Grays Corner Rd	Berlin	MD	21811-3160	(443) 783-1955	0.000725	3,872	121	2,017,968	2,018,088
Q174	Leroy E and Dolores Truex	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.000678042	3,616	113	2,137,412	2,137,524
Q084	LET Ventures Inc	PO Box 727	Manahawkin	NJ	08050-0727	(609) 978-1109	0.000672042	3,584	112	2,104,463	2,104,574
Q8319	The George S Carmines Trust	10 Evans Cir	Poquoson	VA	23662-1606	(757) 715-7461	0.000519	2,752	86	2,085,722	2,085,807
Q8282	F/V Mystic Light LLC	113 MacArthur Dr	New Bedford	MA	02740-7276	(401) 935-1623	0.000272	1,440	45	2,009,240	2,009,284
Q669	Kenneth W Bailey	PO Box 12	Heislerville	NJ	08324-0012	(856) 207-1109	0.000246	1,312	41	2,018,210	2,018,250
Q056	Seafish Inc	10134 Waterview Dr	Ocean City	MD	21842-9635	(443) 497-3062	0.0000543	288	9	2,038,097	2,038,105
Q143	Shellfish Inc	PO Box 86	West Sayville	NY	11796-0086	(631) 589-5770	0.0000121	64	2	2,000,001	2,000,002