U.S. Atlantic Surfclam and Ocean Quahog MSC Fishery Re-Assessment Report

Announcement Client Draft Report (ACDR)

Authors

Dr. Joseph DeAlteris, Principal 1, 3, and Team Lead

Dr. Holly Rolls, Principal 2

Mr. Brian Ahlers, Project Manager

Client Group

Bumble Bee Foods

Sea Watch International

Atlantic Capes Fisheries, Inc.

Surfside Foods, LLC

LaMonica Fine Foods

August 13, 2021

SCSglobal SERVICES

Setting the standard for sustainability™

2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA

+1.510.452.8000 main | +1.510.452.8001 fax

www.SCSglobalServices.com

1 Table of Contents

List of Tables

List of Figures

2 Glossary

ABC	Acceptable Biological Catch
ACE	Annual Catch Entitlements
ASAP	Age Structured Assessment Program
B	Biomass
BMSY	Biomass calculated for Maximum Sustainable Yield
Bu	Bushels, one bushel of surfclams is equivalent to 17 pounds of meat; one bushel of ocean quahogs is equivalent to 12 pounds of meat
CAB	Conformity Assessment Body
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DFO	Fisheries and Oceans Canada
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ETP	Endangered, Threatened or Protected species
F	Fishing Mortality
FAO	Food and Agriculture Organization of the United Nations
FCM	Fisheries Certification Methodology
FG	Fixed Gear
FLIM	Limit Reference Point for Fishing Mortality
FMP	Fishery Management Plan
FREF	Fishing Mortality Reference Point
GAO	Government Accounting Office
GARM	Groundfish Assessment Review Meeting
GB	Georges Bank
GOM	Gulf of Maine
GOMAC	Gulf of Maine Advisory Committee
GN	Gillnet
GARFO	Greater Atlantic Regional Fisheries Office
HAPC	Habitat Areas of Particular Concern
HMA	Habitat Management Area
HL	Handline
IFMP	Integrated Fisheries Management Plan
IFQ	Individual Fishing Quota
ITQ	Individual Transferable Quota
Kg	kilogram
Lb.	Pound, equivalent to roughly 2.2 kg
LL	Longline
LMOT	Large Mesh Otter Trawl

LOA	Length Over-All
LOF	List of Fisheries
LPUE	Landings per unit of fishing effort
M	Million (lbs.)
MA	Mid Atlantic
MAFMC	Mid-Atlantic Fishery Management Council
MAB	Mid Atlantic Bight
MG	Mobile Gear
MOU	Memorandum of Understanding
MSC	Marine Stewardship Council
MSE	Management Strategy Evaluation
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSP	Maximum Spawning Potential
MSFCMA	Magnusen-Stevens Fishery Conservation and Management Act (also MSA)
mt	metric ton, 1000 kg or 2204.62 pounds
NE	New England
NEFOP	North East Fisheries Observer Program
NEFSC	Northeast Fisheries Science Centre
NES LME	Northeast U.S. Continental Shelf Large Marine Ecosystem
NAFO	Northwest Atlantic Fisheries Organization
NEMSFMP	Northeast Multispecies Fisheries Management Plan
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
nm	nautical mile
NMFS	National Marine Fisheries Service
OFL	Over-Fishing Level
OTB	Otter Trawl, Bottom
OY	Optimum Yield
P1, P2, P3	MSC's Principles
PA	Precautionary Approach
PBR	Potential Biological Removal
PI	Performance Indicator
PRI	Point of Recruitment Impairment
RAP	Regional Advisory Process
RV	Research Vessel
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SASI	Swept Area Seabed Impact
SCS	SCS Global Services
SFF	Sustainable Fisheries Framework
SI	Scoring Issue

SSB	Spawning Stock Biomass
SSBMSY	Spawning Stock Biomass for Maximum Sustainable Yield
SSR	Special Science Response
t and mt	metric ton
TAC	Total Allowable Catch
TMGC	Trans-boundary Management Guidance Committee
TRAC	Trans-boundary Resources Assessment Committee
USR	Upper Stock Reference Point
VEC	Valued Ecosystem Component
VPA	Virtual Population Analysis
VME	Vulnerable Marine Ecosystems
VMS	Vessel Monitoring System
VTR	Vessel Trip Report (VTR)
WWF	World Wildlife Fund

3 Executive Summary

This report presents the Marine Stewardship Council (MSC) Re-assessment of the US Atlantic Surfclams (*Spisula solidissima*) and Ocean quahogs (*Arctica islandica*) hydraulic dredge fishery, harvested by fishing gear in the US Atlantic waters, considered to be two Units of Assessment (UoA). Within the report, the Unit of Assessment will be referred to US Atlantic Surfclam and Ocean Quahog fishery. The assessment was conducted, and the findings were prepared by SCS Global Services (SCS), an MSC-accredited, independent, third-party conformity assessment body, in accordance with the MSC Principles and Criteria for sustainable fishing. The assessment complies with the MSC Certification Requirements V2.2 (released March 25, 2020). The fishery was assessed against the Default Assessment Tree, version 2.01.

Table 1. Unit of Certification(s) and Unit of Assessment(s)

Stock/Species (FCP V2.2 7.5.2.a)	Method of Capture (FCP V2.2 7.5.2.b)	Fishing fleet (FCP V2.2 7.5.2.c)
Surfclams (*Spisula solidissima*)/ U.S. Atlantic Surfclam	Hydraulic clam dredge	Vessels with U.S. federal surfclam permits fishing in U.S. federal waters and landing surfclams under an ITQ allocation to processors defined as part of the client group. The client group includes: Bumble Bee Foods, Sea Watch International, Atlantic Capes Fisheries, Inc., Surfside Foods, LLC, LaMonica Fine Foods
Ocean quahogs (*Arctica islandica*)/ U.S. Atlantic Ocean Quahog		

3.1 Fishery Operations Overview

Historical Overview of Fleet Capacity and Management

The surfclam fishery expanded rapidly during the 1940s and 50s with the introduction of the hydraulic clam dredge and the discovery of dense beds of clams off the New Jersey coast (Yancey and Welch 1968). During the 1960s the boats became larger and shifted from being primarily owned and operated by individuals to being nearly all company-owned and operated (Yancey and Welch 1968). Under the effort control regime that was in place in the 1970s and 80s, the number of vessels participating in the surfclam fishery decreased from 162 in 1979, to a low of 113 in 1983, before rising to 133 in 1987 (Christel 2004). The surfclam fleet became overcapitalized and required strict limits on fishing time during the 1980s, following a resource die-off caused by hypoxic water conditions (Weinberg, Murawski, and Serchuk 1997).

The ocean quahog fishery began in Rhode Island around 1943 to supply a war food program. After World War II, ocean quahog meats were used as inexpensive substitutes for hard and soft-shell clam meats, but were considered an inferior product because the meat was darker and had a strong flavor. Ocean quahogs

also competed with the more desirable surfclam. The ocean quahog catch reached 1.5 million pounds of meats in 1946 and subsequently declined. By 1975 demand was increasing again and six vessels landed 1.3 million pounds of meats, all in Rhode Island. (MAFMC 1977)

In 1976 the fishery expanded to New Jersey and resulted in a five-fold increase in total ocean quahog landings, from a total of 1.255 million pounds in 1975 to 5.545 million pounds in 1976, with New Jersey responsible for 4 million pounds and Rhode Island the remainder. Harvesting and processing of ocean quahogs increased during the late 1970s as the result of declining availability and increasing cost of surfclams and to technological advances that overcame the flavor and meat color problems associated with ocean quahogs. (MAFMC 1977)

The MAFMC developed the original Surfclam and Ocean Quahog Fishery Management Plan in 1977, recognizing that surfclam populations were declining. The Council recognized that significant cutbacks in the allowable harvest levels of surfclams would likely transfer significant fishing effort to the ocean quahog resource. For that reason, the Council decided to include both species in a join management plan. The initial Surfclam and Ocean Quahog FMP included quarterly quotas and limited the fleet to four days per week fishing for surfclams. The National Marine Fisheries Service Regional Administrator was given the authority to reduce or increase the allowable fishing days per week depending on the rate at which the quarterly surfclam quota was being landed. An annual quota of 3 million bushels of ocean quahogs was established, with authority given to the Regional Administrator to limit the number of fishing days per week if the pace of harvest indicated that the ocean quahog quota would be exceeded before the end of the year (MAFMC 1977).

Throughout the 1980s, allowable fishing time for surfclams was continually reduced, with boats eventually allowed to fish only a few days per calendar quarter. This situation was considered intolerable and the Council eventually replaced the effort controls with an individual transferable quota (ITQ) system that was adopted by the Council in 1988 and approved by NOAA in 1990. (MAFMC 1988)

The allocation formula is explained below under “Access Rights” and had the effect of separating quota ownership from boat ownership. Boat owners were able to eliminate excess boats and consolidate quota onto fewer boats. Consolidation of allocation ownership and the rationalization of the fleet were both anticipated and accepted in the development of the ITQ program in Amendment 8 to the Surfclam and Ocean Quahog FMP (Christel 2004). The number of boats fishing surfclams declined by 50% within a few years under the ITQ program (Weinberg, Murawski, and Serchuk 1997).

Both ocean quahogs and surfclam were included in the ITQ program. Over the years from 1990 to the present, the surfclam and ocean quahog fisheries have experienced an evolution in fleet ownership, quota ownership, and vertical integration. In 1990, the fleet included a mix of company-owned boats and individual owner-operators. After the ITQ program went into effect, some individuals sold their boats and kept their quota to lease out. Other individuals expanded their fleets. Some vertically integrated companies acquired additional boats and quota, but some eventually sold off their boats and quota. Boat ownership is relatively concentrated at present, but most of the larger fleets are owned by families that

have been in the fishery for generations. Some boat-owning families have also bought processing plants (D.H. Wallace, personal communication).

Quota ownership for both surfclams and ocean quahogs is public information and can be found at: http://www.greateratlantic.fisheries.noaa.gov/sustainable/species/clam/index.html. Forty entities are listed as owners of ocean quahog quota and 67 entities are listed as surfclam quota owners. An entity can be an individual, a corporation, partnership, or trust that has legal standing in the eyes of the law. In some cases, the same or related individuals control multiple quota owner entities. Lenders may be listed as quota owners because it may be necessary for them to be listed as the quota owner in order to secure loans to the operating owner (Christel 2004). For the 2016 initial quota allocations, 35 of the 40 ocean quahog quota-owning entities own less than 5% each of the total ocean quahog quota, although that figure may be misleading because multiple entities may be owned by the same or related individuals. Twenty three of the ocean quahog quota-owning entities own less than 1% each of the total ocean quahog quota. Sixty two of the 67 surfclam quota-owning entities hold less than 5% each of the overall surfclam quota and 46 own less than 1% each. The largest single-entity ocean quahog ownership share is 22%, without considering any possible relationships between entities. For surfclams, the largest share held by a single entity is 13%, not considering any possible inter-related entities. A 2002 analysis of surfclam and ocean quahog quota ownership by the Government Accounting Office (GAO) concluded that "one entity controlled quota in 12 different names, accounting for 27% of the 2002 total surfclam quota allocated." When one person controls multiple quota-holding entities, the effect is additional concentration of ownership compared to outward appearances. The same report concluded that, for ocean quahogs, "one entity controlled quota held in two different names, representing 22 percent of the 2002 total ocean quahog quota allocated." (Christel 2004)

Christel (2004) concluded that "the current concentration of allocation ownership may not differ substantially from the concentration of fishing time among vessel owners in the fishing time-based system under the surfclam moratorium that existed prior to the implementation of the ITQ system," but the passage of time frustrated such an assessment. The ITQ system, when initially implemented, simply vested vessel owners with a portion of the overall quota based largely on reported landings. It maintained a relative status quo in the fisheries. For that reason, the MAFMC declined to impose limitations on the amount of allocation that could be held by one entity and instead relied on the operation of the Sherman and Clayton Antitrust laws to prevent the acquisition of an amount of allocation that could allow for the "fixing" the price of surfclams or ocean quahogs (Christel 2004).

Since 2004, when NOAA Fisheries committed to implementing the recommendations of the Government Accounting Office (GAO) IFQ report, the subject of "excessive shares" in the surfclam and ocean quahog fisheries has been further analyzed by the MAFMC, including a contracted report by the consulting firm "CompassLexecon," with expertise in anti-trust law and economics (Mitchell, Peterson and Willig 2011). The initiation of an excessive shares amendment to the FMP was included in the Council's 2015 Strategic Plan Proposed Deliverables (MAFMC 2015c).

The surfclam fishery today exists primarily in a small area of federal waters off of the New Jersey coast and on Georges Bank. At times there have also been relatively small surfclam fisheries in the state waters of New Jersey, New York, and Massachusetts. Atlantic surfclams in these different jurisdictions are not biologically distinguishable, but due to habitat differences that affect growing conditions they may produce different meat yields per bushel of clams. Clam beds with higher meat yields are favored by processing plants and thus by fishermen. Commercial concentrations have been found and harvested off New Jersey, the Delmarva Peninsula, and on Georges Bank (MAFMC 2012, 2014b). Other than Massachusetts state waters, these areas have management regimes that include annual quotas and harvest limits for individual vessels. Surfclam fisheries in New Jersey, New York, and Massachusetts state waters are managed by state authorities, while surfclams in the EEZ are managed at the federal level under the Surfclam and Ocean Quahog Fishery Management Plan (FMP). Some vessels are licensed to participate in both the federal and state fisheries but very little fishing is done in state waters. Vessels are not allowed to fish in both state and federal waters on the same trip. Federally permitted vessels must carry a vessel monitoring system (VMS) that can verify their fishing area. This assessment only addresses the federal waters fishery inside the EEZ, but outside the 3 miles allocated to state fisheries. This EEZ fishery is managed by the NMFS and MAFMC.

Over the next several years the Council, with considerable participation by industry stakeholders, continued to develop an FMP amendment to establish an “excessive shares” limitation on the ownership/control of ITQ’s by individual and related entities. The Council considered a wide range of excessive shares cap alternatives, including options that would place limits on quota share ownership and options that would limit annual allocations based on both owned quota share and possession of cage tags (i.e., through leasing). The Council ultimately selected an alternative which would implement a quota share ownership cap of 35% for surfclams and 40% for quahogs and an annual allocation cap (on the possession of cage tags so as to include leasing) of 65% for surfclams and 70% for ocean quahogs. The Council’s preferred alternative represents a compromise on the part of the fishing industry and will allow for some additional efficiencies in the fisheries (through further consolidation). This option will allow a reasonable number of entities to exist if fully consolidated and, according to the Council, will bring the FMP in to compliance with NS4.

At its meeting in December 2019 the Council formally adopted this proposed amendment as just described. In September 2020 the Council staff submitted the final amendment to NOAA Fisheries for its review, and for consideration by the Regional Administrator as the approving authority on behalf of the Secretary of Commerce. That review remains in process at the present time. Additional information and background documents related to the excessive shares amendment are available at www.mafmc.org/actions/scoq-excessive-shares-amendment.

Fishing ports from Maine to Virginia are involved in harvesting and processing of Atlantic surfclams and ocean quahogs. Ports in New Jersey and Massachusetts handle the most volume and value, particularly Atlantic City and Point Pleasant, New Jersey, and New Bedford, Massachusetts. Some landings are also made in Ocean City, Maryland (MAFMC 2015). Maine mahogany quahogs are landed in eastern Maine, but the Maine Mahogany Quahog fishery operates under an allocation to the state of Maine that is

deducted from the overall federal ocean quahog quota. The 'Maine mahogany quahog' is not a separate species, but are distinguishable by their smaller size and are harvested via a separate and distinct fishery targeting small quahogs for the local fresh, half shell market and using dry dredges, and is not included in the assessment. The processing sector of the fishery operates for both surfclams and ocean quahogs as some of the facilities purchase and/or process both species. In 2013, there were 7 companies purchasing both species from the commercial fisheries outside of Maine (MAFMC 2014b).

Surfclams on Georges Bank were not fished from 1990 to 2008 due to the risk of paralytic shellfish poisoning (PSP). During 2009-2011 some fishing was allowed on Georges Bank under an exempted fishing permit and landings per unit effort LPUE in that area were substantially higher (5-7 times higher) than in other traditional fishing grounds. In 2013 NMFS allowed increased access to Georges Bank for more boats. The Greater Atlantic Regional Fisheries Office reopened a portion of Georges Bank to the harvest of surfclams and ocean quahogs beginning January 1, 2013 (77 FR 75057, December 19, 2012) under its authority in 50 CFR 648.76. Harvesting vessels have to adhere to the recently adopted testing protocol that is part of the National Shellfish Sanitation Program. It is anticipated that allowing clam vessels to fish in the reopened area would significantly reduce the fishing pressure in the southern portion of the surfclam range while providing an economic benefit to the industry because of the higher LPUE from Georges Bank (MAFMC 2014b). Ocean quahogs are harvested over a larger spatial area. The fishing year for surfclams and ocean quahogs is 12 months, beginning January 1 of each year (MAFMC 2003). Harvesting surfclams and ocean quahogs in federal waters requires heavy equipment. There are no recreational fisheries or traditional users for either Atlantic surfclams or ocean quahogs (MAFMC 2012) in federal waters.

Management of the fisheries at the federal level is governed by the Surfclam and Ocean Quahog Fishery Management Plan (FMP), first implemented in 1977 (MAFMC 1977). The management unit of the FMP is all Atlantic surfclams (Spisula solidissima) and ocean quahogs (Arctica islandica) in the Atlantic EEZ. The ocean quahogs managed under this federal FMP include a small-scale fishery in eastern Maine that harvests small ocean quahogs (Maine Mahogany Quahog) in federal waters designated in the FMP as the Maine Mahogany Quahog Zone. The fishery operates under an allocation of ocean quahogs that is made to the state of Maine and is deducted from the overall ocean quahog quota. The Maine Mahogany Quahog fishery is not a part of this assessment.

The total number of vessels participating in fisheries for surfclams and quahogs in federal waters is shown in Table 2.

Table 2. Federal Surfclam and Ocean Quahog fleet profile, 2010 through 2019 (taken from Atlantic surfclam information document, July 2020, MAFMC)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Harvesting BOTH surfclam & ocean quahog	12	12	13	7	7	6	8	14	8	7
Harvesting only surfclam	22	24	29	33	31	31	30	26	31	36
Total Vessels	34	36	42	40	38	37	38	40	39	43

Source: NMFS clam vessel logbooks.

The total number of non-Maine vessels fell from 56 in 1996 to 43 in 2010, but has increased since then, averaging 42 vessels over the period from 2010 through 2019.

Fishing Practices

The length of hydraulic dredge boats working in federal waters ranges from 60-feet to 165-feet. The larger boats are primarily ocean quahog boats. Surfclam boats are typically 80-110-feet in length. Crew size ranges from 3 to 6 on both types of vessels.

Figure 1. Modern surfclam and ocean quahog dredge vessel. (R. B. Allen photo)

Surfclams and ocean quahog are extracted from the sediment using hydraulic dredges dragged slowly across the seabed generally in water depths less than 60m, being limited by their ability to maintain sufficient water pressure in the length of hose required to feed the nozzles on the dredge with high-pressure water necessary to allow the dredge to move through the sediment. Surfclams and ocean quahogs are buried in the sediment. The hydraulic dredge is like a large sled with a row of nozzles across the front. Water is pumped from the vessel to the nozzles through a long hose. The nozzles shoot water into the sediment, softening and liquifying the sediment so that the blade of the dredge, extending down about six inches, can travel through the sediment and separate the clams from the sediment and direct the clams into the rear part of the dredge, generally a cage made of steel rods or a chain bag on older boats and dredges. Surfclams are found from the surf zone to depths of about 50 m and ocean quahogs from about 8 m out to the extent of their range, which is beyond the depth capability of the survey vessels and gear. (http://www.greateratlantic.fisheries.noaa.gov/sustainable/species/clam/index.html). Ropes (1988) reported that ocean quahogs are common in depths of 35 to 75 m. Murawski and Serchuk (1979) reported that larger quahogs were found in the 20.1-40.0 m survey depth strata, with progressively fewer large quahogs in deeper water.

Hydraulic dredges have been used in the surfclam fishery for over fifty years and in the ocean quahog fishery since its inception in the early 1970s (MAFMC 2003). A typical dredge is 12 feet wide and 22 feet long. Large vessels greater than 95 feet in length tow dredges up to 15 feet wide. The dredges are highly efficient, catching 80-95% of clams of suitable size in their path (Wallace & Hoff 2005, Meyer et al 1981,

Thorarinsdottir et al 2010). The 56th Stock Assessment Workshop Assessment Report considers commercial gear to have "relatively well understood selectivity" (NEFSC 2013; Figure 2). This size-selectivity is considered one manner in which the resource is protected from the effects of fishing for surfclams in particular as they reproduce at small sizes and are sexually mature for several years before becoming available to the fishing gear (NEFSC 2013a). As for surfclam, the dredges are designed to select large ocean quahogs with the highest meat weight and to minimize the capture of small ocean quahogs, along with other unwanted invertebrates, fish and trash (Murawski and Serchuk, 1989a; Thorarinsdottir, G. G. et al. 2010).

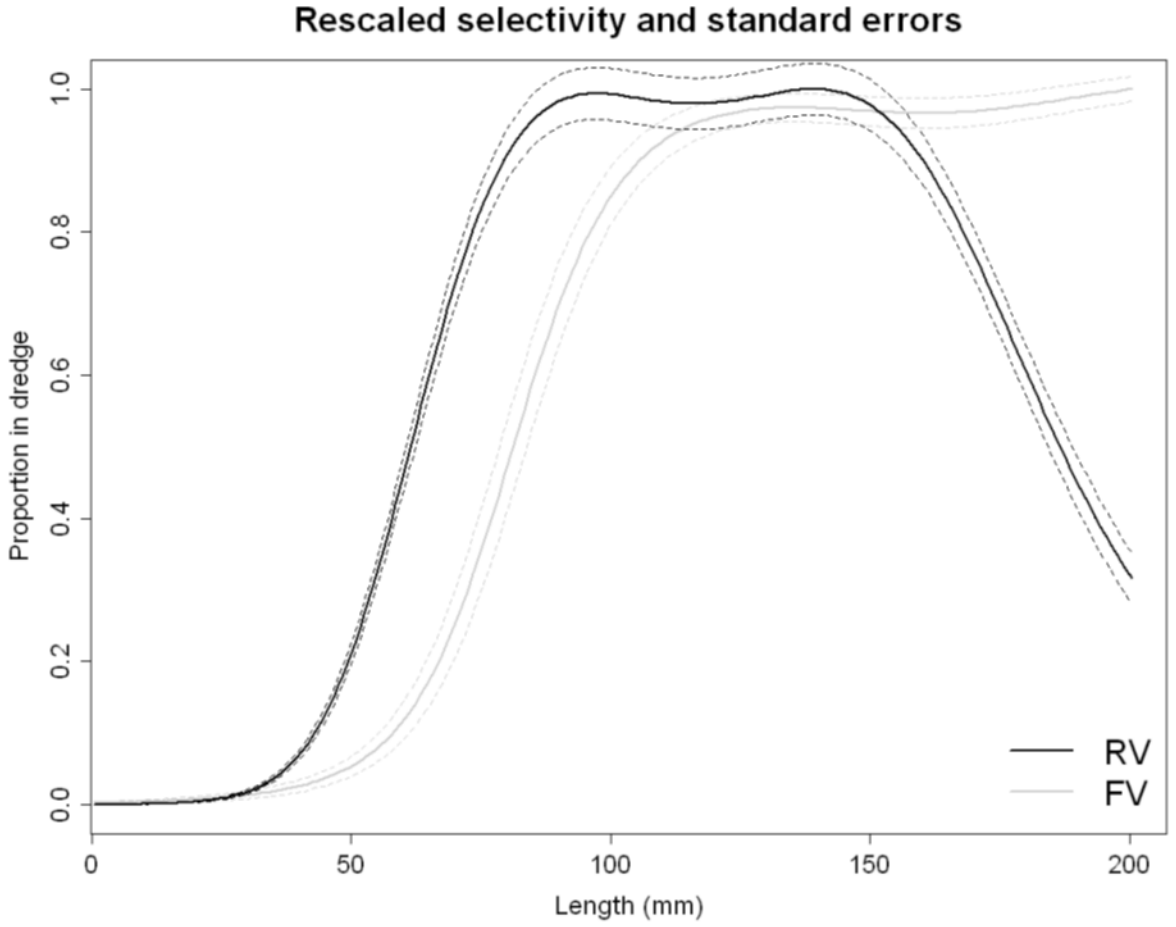

Figure 2. Rescaled selectivity fits for both survey and commercial dredges for surfclam with +/- 2 standard errors. FV= Fishing Vessel and RV= Research Vessel. The dredges used by research vessels versus fishing vessels have meaningfully different selectivity for larger clams, resulting in a 'dome shaped' selectivity curve for research vessels, and a logistic curve for fishing vessels (Source: Figure A54 in NEFSC 2013)

The Fishery Management Plan (FMP) (§ 648.72) provides for a minimum size for the surfclam fishery of 4.75in (~120mm), but this has been suspended annually in recent years. There is no federal minimum size for ocean quahogs. There is therefore no 'undersized' or 'sublegal' clams in the fishery, and there is no discarding at sea (NEFSC 2013, Chute et al. 2013). In practice, clam dredges are optimized to harvest

clams of marketable size, as dictated by processors. Murawski and Serchuk (1989a) describe a discard mortality of 50% for surfclams and 10% for ocean quahogs; however, so long as there is no minimum size and no discarding in the fishery, discard mortality is not relevant. NEFSC stock assessment reports estimate incidental mortality of non-landed surfclams and ocean quahogs in the path of clam dredge, including all sizes, at 5% and 12% respectively (NEFSC 2013, Chute et al 2013).

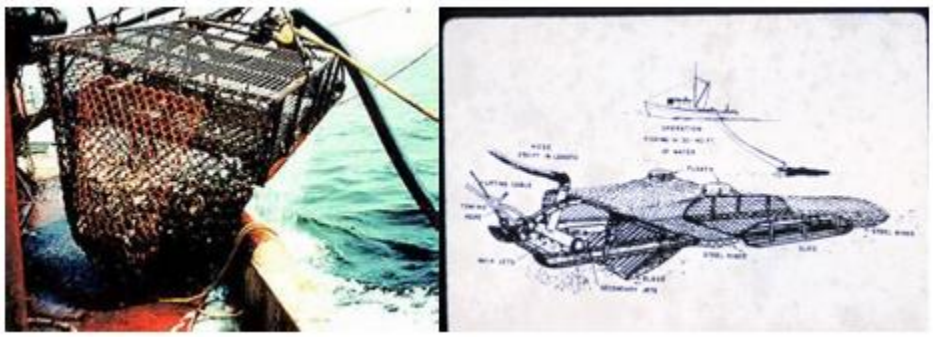

Figure 3. Hydraulic clam dredge with chain bag. (Source: FAO)

Assessment Overview

The team selected to undertake the assessment includes three team members that collectively meet the requirements for MSC assessment teams. These are:

Dr. Joseph DeAlteris, Team Leader, Principal 2 and Principal 3

Dr. Holly Rolls, Principle 2 Expert

Summary of Findings

To be completed in the Client and Peer Review Draft Report

4 Report Details

4.1 Authorship and peer review details

Audit Team

Dr. Joseph DeAlteris – Professor Emeritus of Fisheries Science at the University of Rhode Island – Lead and Principle 1 & Principle 3 Expert

Dr. DeAlteris has an international reputation as an expert in the field of stock assessment and ecosystem impacts of fishing. He brings intimate knowledge of vertebrate and invertebrate fisheries and has considerable experience in MSC fishery evaluations. Dr. DeAlteris has worked with SCS on the full assessment of the Atlantic deep-sea red crab, the Louisiana blue crab, and the US Pacific halibut. He also has conducted an MSC assessment of Indian Ocean tuna fisheries. He has conducted numerous MSC annual audits and peer reviews of assessment reports for finfish and shellfish and crustacean fisheries in the US and elsewhere. Dr. DeAlteris' knowledge of the management of US fisheries across several jurisdictions and his extensive population modelling and ecosystem knowledge make him an excellent addition to an MSC assessment team.

The proposed team leader meets the MSC Team leader qualifications in that:

- ✓ Completed training meeting requirements in Table 1 of GCRV2.4, as evidenced by the certificate of passing auditor training for the ISO course 19011
- ✓ Relevant degree and/or equivalent experience in the fisheries sector related to tasks under responsibility of a team leader (Ph.D. in Marine Sciences).
- ✓ Completed of the latest MSC training modules applicable to this assessment (V2.1 Team Leader MSC modules)within the past five years (March, 2019)
- ✓ Has undertaken many MSC fishery assessments or surveillance site visits in the last 5 years, including: (Assessment of U.S. Northeastern Longfin Inshore Squid Small Mesh Bottom Trawl Fishery, Surveillance Year 1 U.S. Northeastern Longfin Inshore Squid Small Mesh Bottom Trawl Fishery, Assessment of US Atlantic surfclam and Ocean quahog, and Surveillance Year 1 and 2 for US Atlantic surfclam and Ocean quahog)
- ✓ Has demonstrated experience in applying different types of interviewing and facilitation techniques, as verified by the auditor witness checklist created by an SCS staff member.
- ✓ Is competent in the MSC Standard and current Certification Requirements, auditing techniques, and communication and stakeholder facilitation techniques, as verified by his completion of ISO 19011 auditor training.
- ✓ Has affirmed he/she holds no conflict of interest

Holly Rolls, Ph.D. – Technical Specialist, SCS Global Services – Principle 2 Expert

Dr. Holly Rolls has over 15 years of experience in fisheries research and sustainability, with a background focused on the prioritization and effective management of marine habitats. Dr. Rolls earned her Ph.D. in Marine Resource Assessment from the University of South Florida's College of Marine Science (2014). Her doctoral work focused on quantifying the suitability of coastal fish habitats as nursery grounds for ecologically and economically important species. Dr. Rolls has worked extensively across private and public sectors and has led numerous coastal sustainability initiatives with diverse stakeholders, including fishers, government, private industry, and NGOs. She has substantial field experience and has conducted fisheries monitoring (dependent and independent) of coastal and offshore environments.

Dr. Rolls is an ISO 9001 lead auditor and MSC Team Leader (V2.0). In her role at SCS, she is currently leading, coordinating and/or participating as a team member on MSC pre-assessments, surveillance audits, and full assessments of fisheries worldwide, including multiple U.S. fisheries.

Dr. Rolls's experience satisfies the MSC requirements for a Team Member as described in PC2 (FCP v2.2):

- ✓ With relevant degree (Ph.D. in Marine Science) over 15 years of research experience in fisheries.
- ✓ Has passed the MSC compulsory training modules for Team Members within the last 5 years (2021).
- ✓ Affirms she has no conflict of interest in conducting this assessment.

Peer Reviewers

Peer reviewer information to be completed at the Public Comment Draft Report Stage.

1.2 Version details

Table 3. Fisheries program documents versions

Document	Version number
MSC Fisheries Certification Process	**Version 2.2**
MSC Fisheries Standard	**Version 2.01**
MSC General Certification Requirements	**Version 2.3**
MSC Reporting Template	**Version 1.2**

5 Unit(s) of Assessment and Certification and results overview

5.1 Unit(s) of Assessment (UoA) and Unit(s) of Certification

5.1.1 Unit(s) of Assessment

The Units of Assessment includes the 1) US Atlantic Surfclams (*Spisula solidissima*) and 2) Ocean quahogs (*Arctica islandica*) both caught via vessels operating with hydraulic dredge gear with a carrying capacity which ranges from approximately 40 cages for smaller boats, to about 160 cages for the largest vessels, with most vessels in about the middle of that range. A cage holds 32 bushels of clam shellstock. The number of vessels involved is indicated in the Table 2 on page 14. Vessels supply product to members of the fishery client group, are licensed by the United States, use hydraulic dredge gear, and fish within the EEZ in the US and MAFMC management area. The fishery operates as needed based on market demand, and does not have a particular seasonality.

This fishery has been found to meet scope requirements (FCP v2.2 7.4) for MSC fishery assessments as it

Table 4. Unit(s) of Assessment (UoA)

UoA 1	Description
Species	**Surfclams (*Spisula solidissima*)**
Stock	**U.S. Atlantic Surfclam**
Fishing gear type(s) and, if relevant, vessel type(s)	**Hydraulic clam dredge**
Client group	**Bumble Bee Foods** 280 10th Ave, San Diego, CA 92101 Leslie Hushka, Senior Vice President, Global Corporate Responsibility, leslie.hushka@bumblebee.com, 619-851-4938 **Sea Watch International, Ltd.** 8978 Glebe Park Drive Easton, MD 21601 Thomas T. Alspach, General Counsel, talspach@goeaston.net, 410-822-9100 **Atlantic Capes Fisheries, Inc.**

	985 Ocean Drive, NJ 08204 Barry Cohen, President, BCohen@atlanticcapes.com **Surfside Foods, LLC** 2838 High Street Port Norris, NJ 08349 Victor Broyan, CFO Peter LaMonica, plamonica@surfsidefoods.com **LaMonica Fine Foods** P.O. Box 309 Millville, NJ 08332 Michael A. Lavecchia, Vice President mlavecchia@lamonicafinefoods.com
Fishers in the UoC for the chosen stock	Vessels with U.S. federal surfclam permits fishing in U.S. federal waters and landing surfclams under an ITQ allocation to processors not defined as part of the fishery client group.
Other eligible fishers	All holders of U.S. Atlantic Surfclam ITQ landed at processors that are not specified as part of the fishery client group
Geographical area	Federal waters (3 nm –200 nm) off the U.S. Atlantic off the U.S. Northeast
UoA 2	**Description**
Species	Ocean quahogs (*Arctica islandica*)
Stock	U.S. Atlantic Ocean Quahog
Fishing gear type(s) and, if relevant, vessel type(s)	Hydraulic clam dredge
Client group	**Bumble Bee Foods** 280 10th Ave, San Diego, CA 92101 Leslie Hushka, Senior Vice President, Global Corporate Responsibility, leslie.hushka@bumblebee.com, 619-851-4938 **Sea Watch International, Ltd.** 8978 Glebe Park Drive Easton, MD 21601 Thomas T. Alspach, General Counsel, talspach@goeaston.net, 410-822-9100 **Atlantic Capes Fisheries, Inc.**

	985 Ocean Drive, NJ 08204 Barry Cohen, President, BCohen@atlanticcapes.com **Surfside Foods, LLC** 2838 High Street Port Norris, NJ 08349 Victor Broyan, CFO Peter LaMonica, plamonica@surfsidefoods.com **LaMoncia Fine Foods** P.O. Box 309 Millville, NJ 08332 Michael A. Lavecchia, Vice President mlavecchia@lamonicafinefoods.com
Fishers in the UoC for the chosen stock	Vessels with U.S. federal surfclam permits fishing in U.S. federal waters and landing surfclams under an ITQ allocation to processors defined as part of the client group.
Other eligible fishers	Vessels with U.S. federal surfclam permits fishing in U.S. federal waters and landing surfclams under an ITQ allocation to processors not defined as part of the fishery client group.
Geographical area	Federal waters (3m – 200nm) off the U.S. Atlantic off the U.S. Northeast

Unit(s) of Certification (UoC)

The UoC is identical as the UoA (Table 4).

Table 5. Unit(s) of Certification (UoC)

UoC 1	Description
Species	**Surfclams (*Spisula solidissima*)**
Stock	**U.S. Atlantic Surfclam**
Fishing gear type(s) and, if relevant, vessel type(s)	**Hydraulic clam dredge**
Client group	**Bumble Bee Foods** 280 10th Ave, San Diego, CA 92101 Leslie Hushka, Senior Vice President, Global Corporate Responsibility, leslie.hushka@bumblebee.com, 619-851-4938 **Sea Watch International, Ltd.** 8978 Glebe Park Drive Easton, MD 21601 Thomas T. Alspach, General Counsel, talspach@goeaston.net, 410-822-9100 **Atlantic Capes Fisheries, Inc.** 985 Ocean Drive, NJ 08204 Barry Cohen, President, BCohen@atlanticcapes.com **Surfside Foods, LLC** 2838 High Street Port Norris, NJ 08349 Victor Broyan, CFO Peter LaMonica, plamonica@surfsidefoods.com **LaMonica Fine Foods** P.O. Box 309 Millville, NJ 08332 Michael A. Lavecchia, Vice President mlavecchia@lamonicafinefoods.com
Fishers in the UoC for the chosen stock	Vessels with U.S. federal surfclam permits fishing in U.S. federal waters and landing surfclams under an ITQ allocation to processors defined as part of the fishery client group.

Other eligible fishers	All holders of U.S. Atlantic Surfclam ITQ landed at specified processors of the fishery client group. Please see certificate sharing mechanism in Section 12.4
Geographical area	Federal waters (3 nm –200 nm) off the U.S. Atlantic off the U.S. Northeast
UoC 2	**Description**
Species	**Ocean quahogs (*Arctica islandica*)**
Stock	**U.S. Atlantic Ocean Quahog**
Fishing gear type(s) and, if relevant, vessel type(s)	**Hydraulic clam dredge**
Client group	**Bumble Bee Foods** 280 10th Ave, San Diego, CA 92101 Leslie Hushka, Senior Vice President, Global Corporate Responsibility, leslie.hushka@bumblebee.com, 619-851-4938 **Sea Watch International, Ltd.** 8978 Glebe Park Drive Easton, MD 21601 Thomas T. Alspach, General Counsel, talspach@goeaston.net, 410-822-9100 **Atlantic Capes Fisheries, Inc.** 985 Ocean Drive, NJ 08204 Barry Cohen, President, BCohen@atlanticcapes.com **Surfside Foods, LLC** 2838 High Street Port Norris, NJ 08349 Victor Broyan, CFO Peter LaMonica, plamonica@surfsidefoods.com **LaMoncia Fine Foods** P.O. Box 309 Millville, NJ 08332 Michael A. Lavecchia, Vice President mlavecchia@lamonicafinefoods.com
Fishers in the UoC for the chosen stock	Vessels with U.S. federal surfclam permits fishing in U.S. federal waters and landing Ocean Quahog under an ITQ allocation to processors defined as part of the client group.

Other eligible fishers	All holders of U.S. Atlantic Surfclam ITQ landed at specified processors of the fishery client group. Please see certificate sharing mechanism in Section 12.4
Geographical area	Federal waters (3m – 200nm) off the U.S. Atlantic off the U.S. Northeast

5.1.2 Scope of Assessment in Relation to Enhanced Fisheries or Introduced Fisheries

There is no evidence of enhancement or of introduced species in this fishery.

5.2 Assessment results overview

5.2.1 Determination, formal conclusion and agreement

The determination of the fishery is drafted at the final report and completed at the PCR.

5.2.2 Principle level scores

To be drafted at Client and Peer Review Draft Report stage.

Table 6. Principle level scores

Principle	Score – Surfclam Fishery	Score – Quohog Fishery
Principle 1 – Target species	≥80	≥80
Principle 2 – Ecosystem impacts	≥80	≥80
Principle 3 – Management system	≥80	≥80

5.2.3 Summary of conditions

To be drafted at Client and Peer Review Draft Report stage.

Table 7. Summary of conditions

5.2.4 Recommendations

To be drafted at Client and Peer Review Draft Report stage.

6. Traceability and eligibility

6.1 Eligibility date

Traceability within the fishery

Description of Tracking, Tracing and Segregation Systems

The following traceability evaluation is for the UoC/UoA covering describe UoC: US Atlantic Surfclams (*Spisula solidissima*) and Ocean quahogs (*Arctica islandica*) both caught via vessels operating with hydraulic dredge gear

Below we've listed the main stages of the supply chain within the US Atlantic Surfclams (Spisula solidissima) and Ocean quahogs (Arctica islandica) fishery and the relevant tracking, tracing and segregation systems at each step:

1. **Capture of product:** For traceability purposes the location of the capture of product is ensured and recorded in two ways. First, every vessel is subject to the satellite based VMS program that records where any vessel is fishing and maintains that record electronically with NOAA. Second, each vessel captain is required to complete a Vessel Trip Report that is filed electronically with NOAA, and which, among other things, identifies the time, duration and lat/lon of the vessel harvesting activities. This information can be utilized if, for example, the FDA needs to go back retrospectively to identify an area from which potentially tainted product might have been harvested.
2. **On-board processing:** There is no onboard processing with regard to harvested surfclams or ocean quahogs. The resource is retained on board in cages that hold 32 bushels of shellstock and is transported to the dock in that fashion.
3. **Product unloading:** At the dock the unloaded clam cages may be accepted only if each cage has a federal cage tag attached to it. The tags are numbered and the sequence of the tags on cages accepted at the dock is recorded on the VTR as well, and that VTR is transmitted to NOAA and recorded/preserved. The dock also creates a Bill of Lading for each load that will accompany the load through transportation to the processor. The Bill of Lading, among other things, records the number of cages accepted at the dock and the sequential cage tag numbers so that these can be matched up if later needed with the vessel and trip from which the shellstock originated.
4. **Product transport:** The dock preserves a copy of the bill of lading, and the B/L then accompanies the load that is transported to a processor. The processor cannot accept a load unless all cages are tagged and the load is accompanied by a copy of the B/L created at the dock. With this information the processor (or the FDA, for example) can trace the load back to the vessel from which it originated, and with the VTR can identify the fishing ground location from which the product was harvested.
5. **Product storage:** Until processed, clam cages are stored at the plant in coolers again with their tags until shellstock is removed for processing. By law, the tags must be preserved at the plant for a period of time, and the plant, as a "dealer", must file its own report with NOAA identifying the cage tags in sequence that it has retained.

6. **Product sale and first change of ownership:** The first change of ownership occurs when the product is sold by the harvester to the processing plant. Through this change of ownership, however, the procedure outlined above ensures that, even after change of ownership to the processor, the particular load of shellstock can be traced back to its harvesting vessel and from there back to the specific fishing grounds where it originated.

Table 8. Traceability within the fishery

Factor	Description
Will the fishery use gears that are not part of the Unit of Certification (UoC)? If Yes, please describe: ▪ If this may occur on the same trip, on the same vessels, or during the same season; ▪ How any risks are mitigated.	The fishery never uses gear that is not part of the UoC. All harvesters of surfclams and quahogs in the EEZ utilize the hydraulic clam dredge. No different or other gear is used for the harvests. N/A
Will vessels in the UoC also fish outside the UoC geographic area? If Yes, please describe: ▪ If this may occur on the same trip; ▪ How any risks are mitigated.	No vessels currently harvesting surfclams and quahogs in the UoC also fish for species outside the UoC geographic area. Although it is conceivable that such vessels could at some point harvest in state waters, none of the current harvesting fleet anticipates such state harvests. N/A
Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate? This refers to both at-sea activities and on-land activities. ▪ Transport ▪ Storage ▪ Processing ▪ Landing ▪ Auction If Yes, please describe how any risks are mitigated.	No fishery client members currently "handle" both certified and non-certified products during any at sea or on land activities covered by the fishery certificate. The only "handling" of non-certified product would occur by way of bycatch inadvertently harvested at sea. As noted regarding the bycatch information submitted in connection with this application, this issue is de minimus for this fishery, with regular harvests of 98% to 99% of the target species. To the extent non-certified bycatch is harvested, it is generally discarded at sea or, in rare instances, at the plant when identified on a sorting table/conveyor belt. The ony exception to this discarding would be the two bags of scallops per trip that, by regulation, may be retained for personal use – although this again occurs infrequently

	because there is no significant scallop bycatch harvested, as per the documented records. In any event, traceability of the harvests that are taken from the UoC is assured and strictly governed by the regulations of the National Shellfish Sanitation Program. You can find the National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish 2019 Revision here: https://www.fda.gov/media/143238/download. The Model Ordinance represents the requirements which are minimally necessary for the sanitary control of molluscan shellfish and are enforced by all state shellfish regulators and the FDA and are followed by all of us in the SC/ OQ industry. These traceability standards are very robust due to their intended purpose is as a food safety control measure. The relevant traceability requirements can be found: Harvesting - Section II. Model Ordinance / Chapter VIII. Control of Shellfish Harvesting / @.01 Control of Shellstock Growing Areas (pg. 74), .02 Shellstock Harvesting and Handling (pg. 81), .03 Shellstock Harvesting in Federal Waters (pg. 83) Transportation - Section II. Model Ordinance / Chapter IX. Transportation / .05 Transportation Records (pg. 85) Dealers - Section II. Model Ordinance / Chapter X. General Requirements for Dealers / .05 Shellstock Identification (pg. 92), .06 Shucked Shellfish Labeling (pg. 94), .08 Shipping Documents and Records (pg. 96), .09 Restricted Shellfish from Federal Waters (pg. 97) _____ After shellfish is shipped to a retail establishment the FDA Food Code found here: https://www.fda.gov/media/110822/download applies. Retail - Food Code / Chapter 3 Food / 3-202.17 Shucked Shellfish, Packaging and Identification (pg. 64), 3-202.18 Shellstock Identification (pg. 64)

Does transshipment occur within the fishery? If Yes, please describe: ▪ If transshipment takes place at-sea, in port, or both; ▪ If the transshipment vessel may handle product from outside the UoC; ▪ How any risks are mitigated.	No, transhipment is not utilized by those harvesting clams and ocean quahogs from the UoC.
Are there any other risks of mixing or substitution between certified and non-certified fish? If Yes, please describe how any risks are mitigated.	Other than the de minimus harvesting of bycatch at sea described above, there are no other risks of mixing/substitution of which we are aware.

6.3 Eligibility to enter further chains of custody

To be drafted at Client and Peer Review Draft Report stage.

6.4 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to Enter Further Chains of Custody

There are no IPI stocks in this fishery.

7 Scoring

7.1 Summary of Performance Indicator level scores

Table 9. Summary of Performance Indicator Scores and Associated Weights Used to Calculate Principle Scores.

Principle	Component	Wt.	Performance Indicator (PI)		Wt.	Score UoA 1	Score UoA 1
One	Outcome	0.333	1.1.1	Stock status	1.0	>80	>80
	Management	0.667	1.2.1	Harvest strategy	0.25	>80	>80
			1.2.2	Harvest control rules & tools	0.25	>80	>80
			1.2.3	Information & monitoring	0.25	>80	>80
			1.2.4	Assessment of stock status	0.25	>80	>80
Two	Primary species	0.2	2.1.1	Outcome	0.333	>80	>80
			2.1.2	Management strategy	0.333	>80	>80
			2.1.3	Information/Monitoring	0.333	>80	>80
	Secondary species	0.2	2.2.1	Outcome	0.333	>80	>80
			2.2.2	Management strategy	0.333	>80	>80
			2.2.3	Information/Monitoring	0.333	>80	>80
	ETP species	0.2	2.3.1	Outcome	0.333	>80	>80
			2.3.2	Management strategy	0.333	>80	>80
			2.3.3	Information strategy	0.333	>80	>80
	Habitats	0.2	2.4.1	Outcome	0.333	>80	>80
			2.4.2	Management strategy	0.333	>80	>80
			2.4.3	Information	0.333	>80	>80
	Ecosystem	0.2	2.5.1	Outcome	0.333	>80	>80
			2.5.2	Management	0.333	>80	>80
			2.5.3	Information	0.333	>80	>80
Three	Governance and policy	0.5	3.1.1	Legal &/or customary framework	0.333	>80	>80
			3.1.2	Consultation, roles & responsibilities	0.333	>80	>80
			3.1.3	Long term objectives	0.333	>80	>80
	Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.25	>80	>80
			3.2.2	Decision making processes	0.25	>80	>80
			3.2.3	Compliance & enforcement	0.25	>80	>80
			3.2.4	Monitoring & management performance evaluation	0.25	>80	>80

Table 10. Final Principle Scores

	Final Principle Scores	
Principle	**Score**	**Score**
Principle 1 – Target Species	≥80	≥80
Principle 2 – Ecosystem	≥80	≥80
Principle 3 – Management System	≥80	≥80

7.2 Principle 1

7.2.1 Principle 1 background

7.2.1.1 Life History Information

Surfclam, UoA #1

Taxonomic classification

Class: Bivalvia
Order: Veneroida
Family: Mactridae
Genus: *Spisula*
Species: *solidissima*

Biology

(Text adapted from Cargnelli, L., S. Griesbach, D. Packer, and E. Weissberger. 1999. Essential Fish Habitat Source Document: Atlantic Surfclam, Spisula solidissima, Life History and Habitat Characteristics. NOAA Tech. Memo. NMFS-NE-142.)

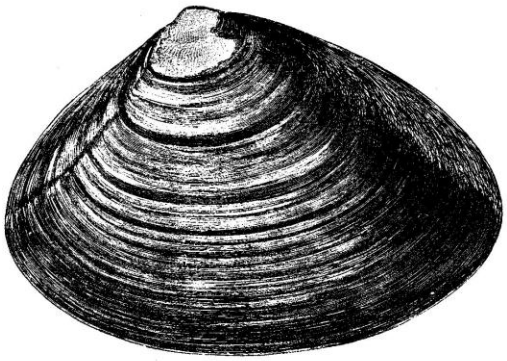

Figure 4. Atlantic surfclam, *Spisula solidissima* (from Goode 1884).

The Atlantic surfclam (Figure 4), *Spisula solidissima*, is a bivalve mollusk that inhabits sandy continental shelf habitats from the southern Gulf of St. Lawrence in Canada to Cape Hatteras, North Carolina, USA (Merrill and Ropes 1969). Atlantic surfclams are managed under the Mid-Atlantic Fishery Management Council Atlantic Surfclam and Ocean Quahog Fishery Management Plan (MAFMC 1997).

Life History

Unfertilized Atlantic surfclam eggs are 56 µm in diameter, unpigmented, and relatively free of yolk (Allen 1951, 1953), characteristics that are generally associated with planktotrophic eggs. Fertilization occurs in the water column above the beds of spawning clams (Ropes 1980). In the laboratory, the optimal concentration of gametes for fertilization is 0.8-4 x 10^6 sperm/ml and 5-30 x 10^3 eggs/ml (Clotteau and Dubé 1993). No information on fecundity in *S. solidissima* is available (Fay *et al.* 1983), however, fecundity of the southern subspecies *S. solidissima similis* ranges from 0.14-13 million eggs in individuals 26-50 mm shell height (Walker *et al.* 1996).

Fertilized eggs develop into pyramid-shaped, planktonic trochophore larvae approximately 9 h after fertilization at 21.7°C (Ropes 1980) and 40 h at 14°C (Loosanoff and Davis 1963). Veliger larvae, the first larval stage to possess a bivalved shell, appear in 72 h at 14°C and 28 h at 22°C (Loosanoff and Davis 1963). The pediveliger stage, a transitional "swimming-crawling" larval stage with development of a foot for burrowing (Fay *et al.* 1983), occurs 18 d after fertilization at 21.7°C (Ropes 1980). Metamorphosis to juveniles, which consists of complete absorption of the velum and settlement to the substrate, occurs anywhere from 19 to 35 d after fertilization depending on temperature (Fay *et al.* 1983). Size at metamorphosis is 230-250 µm shell length; however Ropes (1980) noted that larvae metamorphosed at 303 µm.

The size and age of sexual maturity is variable. Off New Jersey, Atlantic surfclams may reach maturity as early as 3 months after settlement and at lengths of less than 50 mm (Chintala and Grassle 1995; Chintala 1997). At the other extreme, clams from Prince Edward Island, Canada, may not reach maturity until 4 yrs of age and 80-95 mm shell length (Sephton 1987; Sephton and Bryan 1990). In Virginia, the minimum length at maturity is 45 mm; size rather than age is more important in determining sexual maturity (Ropes 1979). Because of the wide variability in age at maturity, juveniles and adults will be discussed together in this report.

Atlantic surfclams may reach a maximum size of 226 mm (Ropes 1980) and a maximum age of 31 yrs (Jones *et al.* 1978). Growth appears to be similar among different localities during the first 3-5 years of life (Ambrose *et al.* 1980; Sephton and Bryan 1990). However, after the first 5 yrs, clams offshore grow faster and attain a larger maximum size than clams inshore (Jones *et al.* 1978; Ambrose *et al.* 1980; Jones 1980; Wagner 1984). High clam density may negatively affect growth rate and maximum size (Fogarty and Murawski 1986; Cerrato and Keith 1992); density effects on growth have been detected at relatively low densities (> 50 clams per 352 m^2) (Weinberg 1998b). Growth lines in the shells of Atlantic surfclams are deposited at times of spawning and high temperature, but there is a question as to whether lines are annual (Jones *et al.* 1978; Jones 1980; Wagner 1984; Walker and Heffernan 1994). Growth is not uniform over the year; temperature significantly affects Atlantic surfclam growth, physiology, and behavior (Ambrose *et al.* 1980; Davis *et al.* 1997).

Geographical Distribution

Atlantic surfclams are distributed in western North Atlantic continental shelf waters from the southern Gulf of St. Lawrence, Canada to Cape Hatteras, North Carolina, USA (Merrill and Ropes 1969; Weinberg

1998a; Figure 5 and Figure 6). In United States waters, major concentrations of Atlantic surfclams are found on Georges Bank, south of Cape Cod, off Long Island, southern New Jersey, and the Delmarva Peninsula (Merrill and Ropes 1969; Ropes 1978). Although Atlantic surfclams can inhabit waters from the surf zone to a depth of 128 m, most are found at depths of less than 73 m (Figure 5 and Figure 6). (Ropes 1978). Along Long Island and New Jersey, the highest concentrations occur at < 18 m, whereas off the Delmarva Peninsula, the greatest concentrations occur from 18 to 36 m (Ropes 1978).

The terms pre-recruit and recruit are used here to describe Atlantic surfclam distribution. They refer to the exploited and unexploited portions of the stock. For stock assessment purposes, surfclams less than 12 cm have generally considered pre-recruits and surfclams 12 cm and larger have been considered to be fully-recruited to the fishery, with knife-edged selectivity. However, a new stock assessment model used in the 2013 stock assessment estimates a dome-shaped selectivity curve with selectivity near one at sizes 16+ cm on Georges Bank and 16-17+ cm in the south (NEFSC 2013).

The NMFS Northeast Fisheries Science Center (NEFSC) clam surveys [see Reid *et al*. (1999) for survey methods] collected Atlantic surfclams from Georges Bank to just north of Cape Hatteras (Figure 5 and Figure 6). Pre-recruits and recruits had similar distributions, although recruits were not collected quite as far to the south. The greatest number of catches of pre-recruits and recruits were made from the Hudson Canyon to Cape Hatteras inshore of the 60 m contour. The Gulf of Maine was not surveyed, although Atlantic surfclams are found there in areas containing suitable substrate (sand).

Reproduction

Atlantic surfclams spawn from late spring into early fall. In New Jersey, spawning occurs from late June to early August (Ropes 1968a), although spawning may begin as early as late May or early June closer inshore (Tarnowski 1982; J.P. Grassle, Rutgers University, New Brunswick, NJ, unpublished data). Spawning begins and ends earlier in the south; in Virginia, it may begin in May and end in July (Ropes 1979). The southern subspecies *Spisula solidissima similis* spawns in the spring to early summer (Kanti *et al.* 1993).

Spawning is not associated with a particular temperature or abrupt temperature changes (Ropes 1968a), but usually occurs when temperatures are greater than 15^{o}C. There may be a second, minor spawning in October, caused by breakdown of the thermocline; in extremely cold years, this second spawning may not occur (Ropes 1968a). Little is known about the effects of other environmental factors, such as salinity and dissolved oxygen, on Atlantic surfclam spawning.

Food Habits

Atlantic surfclams are planktivorous siphon feeders. Leidy (1878) noted the presence of many genera and species of diatoms in Atlantic surfclam guts. Ciliates were also a common component of the diet in the field. Riisgård (1988) showed that Atlantic surfclams retained particles as small as 4 µm in diameter. High concentrations of suspended clay particles may decrease the amount of algae ingested and digested (Robinson *et al.* 1984).

Millions of microscopic plants (phytoplankton) thrive in nearly every drop of coastal seawater. In the presence of sunlight and sufficient nutrients to grow, these plants photosynthesize and multiply, creating

a “bloom.” While most of the thousands of species of algae are harmless, this species is one of a few dozen that create potent toxins. The swimming, photosynthetic cells of *Alexandrium fundyense* are responsible for blooms in the northeast U.S. A closely related species called *Alexandrium tamarense* also occurs in these waters but *A. fundyense* is more abundant and thus its name is used to simplify discussions. The motile cells of *A. fundyense* originate from the germination of dormant cysts that accumulate in bottom sediments and allow the species to survive cold winter temperatures and unfavorable growing conditions. The cysts can also be resuspended by tides and storms (WHOI 2016).

The toxins produced by *A. fundyense* accumulate in filter-feeding shellfish such as clams, mussels and oysters making them unsafe for people and animals to eat. There is no risk to people who consume the flesh of fish, lobsters, and shrimp or who swim in the ocean. If eaten in sufficient quantity, these contaminated shellfish can result in illness or even death from a poisoning syndrome called paralytic shellfish poisoning, or PSP. Portions of Georges Bank have been closed for surfclam harvest due to PSP.

Predation

Atlantic surfclams have many predators, including the naticid snails *Euspira heros* and *Neverita duplicata* (Franz 1977; Dietl and Alexander 1997), the sea star *Asterias forbesi* (Meyer *et al.* 1981), lady crabs (*Ovalipes ocellatus*), Jonah crabs (*Cancer borealis*) (Stehlik 1993), and horseshoe crabs (*Limulus polyphemus*) (Botton and Haskin 1984). Fish predators include haddock (*Melanogrammus aeglefinus*) and Atlantic cod (*Gadus morhua*) (Ropes 1980). The sevenspine bay shrimp, (*Crangon septemspinosa*) preys on recently settled clams (Viscido 1994). In the New York Bight, crabs accounted for 48.3-100% of Atlantic surfclam mortality while naticid moon snails accounted for 2.1% of mortality (MacKenzie *et al.* 1985).

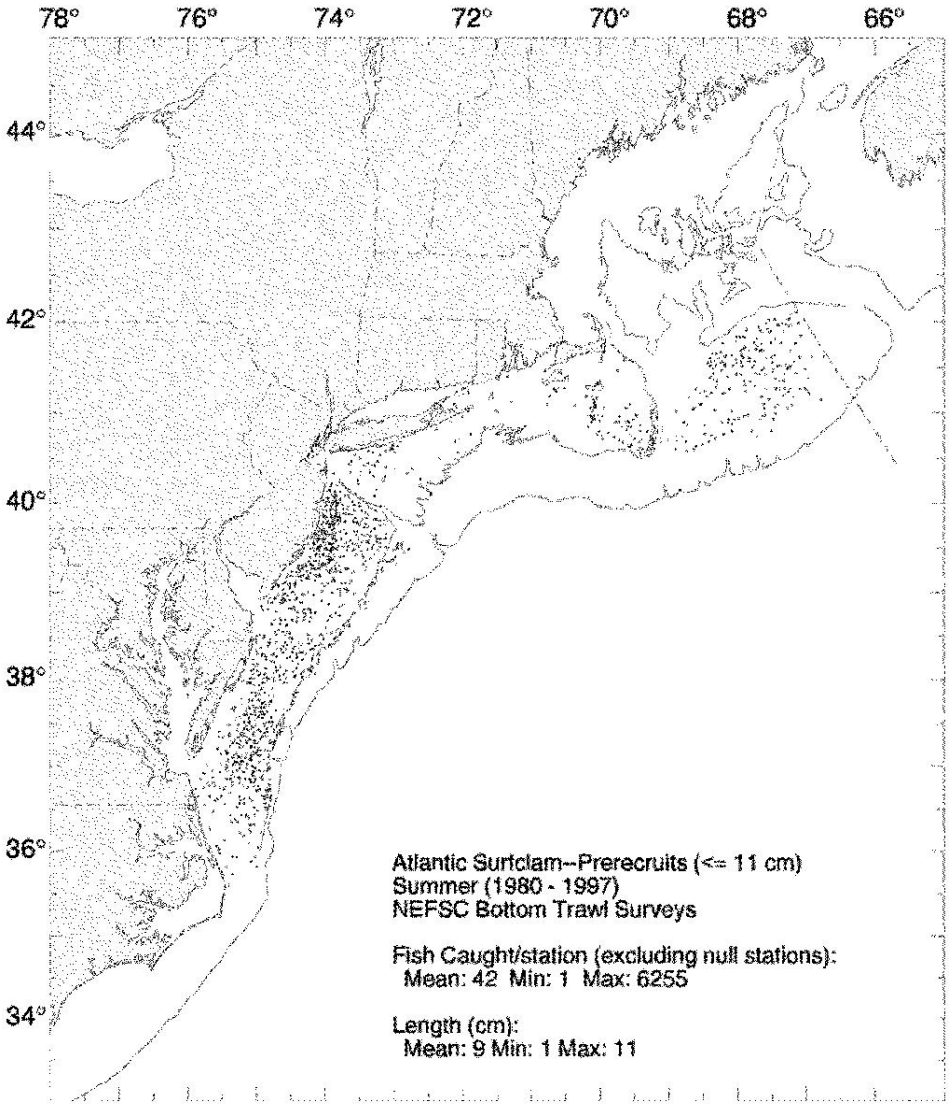

Figure 5. Distribution of Atlantic surfclam pre-recruits (≤11 cm) collected during NEFSC summer clam surveys from 1980-1997 [see Reid *et al.* (1999) for details]. Black dots represent stations where Atlantic surfclams were taken. The line, furthest offshore gives the demarcation of continental shelf.

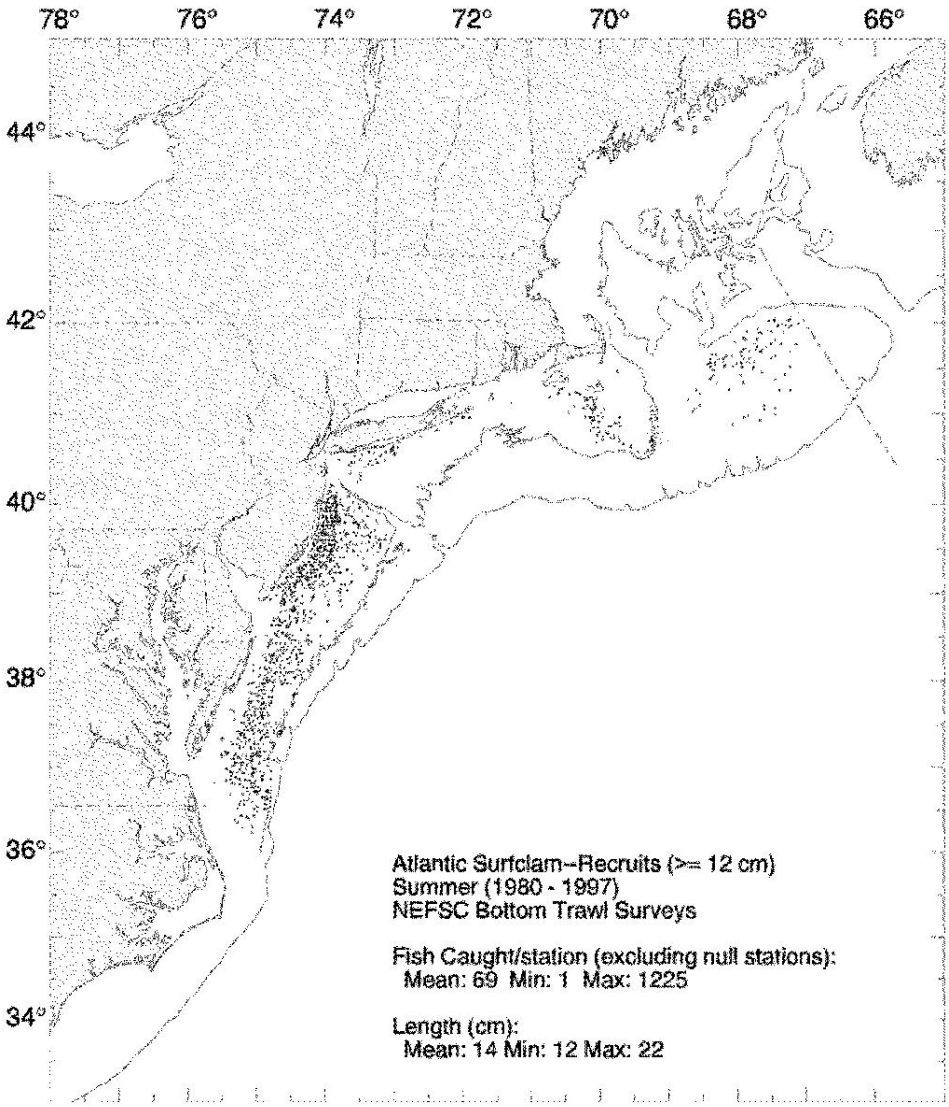

Figure 6. Distribution of Atlantic surfclam recruits (≥ 12 cm) collected during NEFSC summer clam surveys from 1980-1997 [see Reid *et al.* (1999) for details]. Black dots represent stations where Atlantic surfclams were taken.

Habitat Characteristics

(Information on the habitat characteristics of the Atlantic surfclam focuses primarily on Atlantic surfclam beds in U.S. waters; most of the information is from the Middle Atlantic Bight.)

Fertilization of Atlantic surfclam eggs is optimal at 6-24°C, 20-35 ppt salinity, and a pH of 7.8-10 (Allen 1953; Castagna and Chanley 1973; Clotteau and Dubé 1993). Eggs and sperm can withstand salinities as low as seawater diluted to 40% for 2-3 h (Schechter 1956).

Few studies have examined Atlantic surfclam larvae in the field. In New England, Mann (1985) reported high larval concentrations (up to 823 larvae/m^3) associated with 14-18^oC water masses and relatively low chlorophyll a concentrations. In New Jersey, Tarnowski (1982) noted high concentrations of Atlantic surfclam larvae in the spring and fall. Spring larvae were derived from inshore clams, while fall larvae were from offshore clams. Dispersal by currents occurs during the larval stage (Fay et al. 1983) and larval settlement may coincide with the relaxation of upwelling events (Ma 1997). Franz (1976) hypothesized that a convergence of tidal and longshore currents trap Atlantic surfclam larvae off western Long Island, although this theory is based on juvenile and adult distributions rather than larval samples. Spawning in nature occurs at temperatures > 15^oC and is typically heaviest when temperatures are at their highest (Jones 1981b; Sephton 1987).

The greatest concentrations of Atlantic surfclams are usually found in well-sorted, medium sand (Dames and Moore 1993), but they may also occur in fine sand (MacKenzie et al. 1985) and silty-fine sand (Meyer et al. 1981). Ambrose et al. (1980) noted a positive correlation between growth rate and mean sediment grain size when other variables were controlled, although Goldberg and Walker (1990) found that substrate type did not affect the growth rate of clams in the laboratory and field, although clams did not burrow in mud.

Growth is not uniform over the year. Ambrose et al. (1980) noted that growth of Atlantic surfclams in the Middle Atlantic Bight was positively correlated with temperature and negatively correlated with variation in temperature. Davis et al. (1997) found that growth in the coastal Gulf of Maine was higher at warmer temperatures and at higher chlorophyll a concentrations. Stable oxygen isotopes revealed that shell growth in New Jersey waters reflects seawater temperature; growth is most rapid in spring and early summer, slow in late-summer and fall, and extremely slow or non-existent in winter (Jones et al. 1983). In Delaware waters, Atlantic surfclam production is highest in August and September when temperatures are high (Howe et al. 1988).

Although Atlantic surfclams are found only at salinities higher than 28 ppt in the field, they are capable of surviving salinities as low as 12.5 ppt for 2 d (Castagna and Chanley 1973). This suggests that something other than salinity is controlling the distribution of Atlantic surfclams. In the laboratory, Atlantic surfclam heart rate increased as salinity dropped from 30 ppt to 20 ppt (deFur and Mangum 1979).

Atlantic surfclams are susceptible to low levels of dissolved oxygen (DO). Severe hypoxic events (DO < 3 ppm) in New Jersey have killed Atlantic surfclams several times (Ogren and Chess 1969; Garlo et al. 1979; Ropes et al. 1979). Weinberg and Helser (1996) showed spatial and temporal changes in growth rate and maximum size and hypothesized these changes may be related to low dissolved oxygen levels. Positive effects of hypoxia include the decimation of Atlantic surfclam predators, allowing successful recruitment of recently-settled clams (Garlo 1982).

There has been little work on the effects of currents on Atlantic surfclams, particularly on feeding and bedload transport of small clams (small clams along with sediment being moved along the seabed by bottom currents). The dynamic environments in which Atlantic surfclams live may substantially affect flux

of food and population distribution. For example, oceanic storms can displace adults a considerable distance from their burrows (Fay et al. 1983).

Ocean quahog, UoA #2

Taxonomic classification

Class: Bivalvia
Order: Veneroida
Family: Mactridae
Genus: : *Arctica*
Species: i*slandia*

Biology

(Text adapted from Cargnelli, L.,S. Griesbach, D. Packer, and E. Weissberger. 1999. Essential Fish Habitat Source Document: Ocean Quahog, Arctica islandica, Life History and Habitat Characteristics. NOAA Tech. Memo. NMFS-NE-148.)

Introduction

The ocean quahog, *Arctica islandica*, is a bivalve mollusk (Figure 7) found in temperate and boreal waters on both sides of the North Atlantic (Weinberg 1995). In U.S. waters, quahogs are managed under the Mid-Atlantic Fishery Management Council's Atlantic Surfclam and Ocean Quahog Fishery Management Plan (MAFMC 1997).

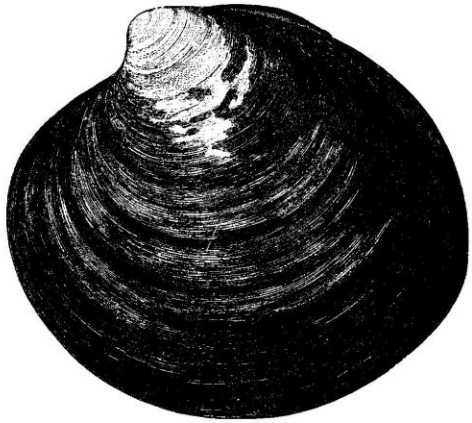

Figure 7. The ocean quahog, *Arctica islandica* (from Goode 1884).

Life History

The eggs and larvae of ocean quahogs are planktonic, drifting with currents until the larvae metamorphose into juveniles and settle to the bottom (MAFMC 1997). Eggs range in size from 80-95 µm in diameter (Loosanoff 1953). Larvae go through three stages of development, with the duration of each stage being temperature dependent. Fertilized eggs hatch into planktonic trochophore larvae, which develop into veliger larvae, the first larval stage to possess a bivalved shell. Veligers in turn develop into pediveligers, a transitional "swimming-crawling" larval stage with development of a foot for burrowing.

The minimum larval development period of ocean quahogs is 55 days at 8.5-10°C (Lutz *et al.* 1981, 1982), 60 days at 10-12°C, (Landers 1972, 1976), and 32 days at 13°C (Lutz *et al.* 1981, 1982). There is some variation in reported lengths at which metamorphosis occurs, from 175-200 µm (Landers 1972, 1976) to 240 µm (Lutz *et al.* 1981, 1982).

Mann and Wolf (1983) studied larval behavior in the laboratory. Trochophores were negatively geotactic (i.e., tend to move up in the water column), showed no phototaxis (i.e., did not orient themselves toward light), and showed no change in swimming behavior when water pressure was changed from 1-3 bar. Veligers also showed no phototaxis, but veligers 160-190 µm long moved upward with an increase in pressure and downward with a decrease in pressure. However, larger veligers showed no response to pressure change.

Growth of ocean quahogs is relatively fast during the juvenile stage. In a 3-year laboratory study, Lutz *et al.* (1982) found that quahog length ranged from 1.0 to 3.9 mm 7.5 months after metamorphosis. Kraus *et al.* (1989, 1992) reported a laboratory growth rate of 18.5 mm/year for the first two years of life, and 7.3 mm/year for the third year. In a one-year field caging study, Kennish *et al.* (1994) found that quahogs 9.2-19.9 mm shell length grew an average of 10-22 mm/year.

Recruitment of juveniles into the population is relatively low. The protracted spawning period suggests that recruitment may occur at low levels over several months, rather than in a single strong pulse. Kennish and Lutz (1995) attribute low recruitment to adverse environmental factors (poor substrate, high temperatures) and predation on recently settled individuals.

The ocean quahog is among the longest-lived and slowest growing of marine bivalves and may reach a maximum age of 225 years (Ropes and Murawski 1983; MAFMC 1997). They grow very slowly or not at all and individuals of similar size may vary greatly in age. Quahogs off Long Island grew 0.56 mm/year in 1970 and 1.17 mm/year in 1980, while those off New Jersey grew an average of 1 mm in 1.6 years. In Whitsand Bay, UK, quahogs grew 0-1.5 mm/year (Kennish *et al.* 1994; Kennish and Lutz 1995). Ocean quahogs from Georges Bank appear to be the youngest (Ropes and Pyoas 1982).

Growth rates may be reduced at high density. Beal and Kraus (1989) noted that growth was reduced by a factor of 1.2 when density was increased from 323-645 clams/m^2. Growth is also dependent upon temperature. Stable isotopes show a consistent growth shutdown temperature of about 6^{o}C for a clam from Nantucket Shoals, implying a May-December growing period (Weidman and Jones 1994).

Distribution

In the Western Atlantic, the ocean quahog is distributed on the continental shelf from Newfoundland to Cape Hatteras (Weinberg 1995). Greatest concentrations are in offshore waters south of Nantucket to the Delmarva Peninsula (Serchuk *et al.* 1982). The inshore limit of their distribution appears to be defined by the 16^{o}C bottom isotherm in the summer months (Mann 1989). They are found in relatively shallow water in eastern Maine (but never intertidally) and in deeper, more offshore waters south of Cape Cod (MAFMC 1997).

The terms pre-recruit and recruit are used here in describing the distributions of juveniles and adults. These terms refer to the exploited and unexploited portions of the stock. Ocean quahogs are exploited at a minimum shell height of 8 cm; thus, pre-recruits are ≤ 7 cm, and recruits are ≥8 cm.

Little is known about the distribution or abundance of ocean quahog eggs and larvae in the field. Mann (1985) noted quahog larvae in southern New England waters in May (1-30 m depth) and from July to November (20-40 m depth). The highest larval concentration was 512 larvae/m^3 in September at a 30 m depth. High larval concentrations were associated with temperatures of 14-18^{o}C. The presence of larvae in May suggests that larvae may survive over the winter. Larval settlement is believed to occur throughout the adult distribution range (Mann 1989).

Eggs and larvae are not enumerated by the Northeast Fisheries Science Center (NEFSC) Marine Resources Monitoring, Assessment and Prediction (MARMAP) program.

NEFSC summer ocean quahog surveys [see Reid *et al*. (1999) for details] collected ocean quahogs from Georges Bank to Cape Henry, Virginia.

Error! Not a valid bookmark self-reference.Error! Reference source not found. The greatest number of catches was made from Long Island to the Delmarva Peninsula. They occur further offshore south of the Hudson Canyon. The distribution of pre-recruits (≤ 7 cm) and recruits (≥8 cm) appears to be the same. However, pre-recruits are not sampled well by the survey gear. Thus, Error**! Not a valid bookmark self-reference.** may not accurately reflect the actual distribution of pre-recruits. The Gulf of Maine was not surveyed; however, quahogs tend to be found in fishable concentrations in relatively nearshore waters of the Gulf (Weinberg 1998).

Reproduction

The environmental stimuli for spawning are unclear. Jones (1981) notes that the initiation of spawning may be coincident with the highest bottom temperature. Mann (1982) suggests that temperature is probably a spawning stimulus, but only in conjunction with other stimuli, such as increases in pH, food availability, and increases in dissolved oxygen. In the laboratory, rapid temperature changes, salinity changes, or sperm suspensions did not induce spawning in ripe individuals (Landers 1976).

Ocean quahogs mature very slowly. Rowell *et al.* (1990) report the mean age of sexual maturity for Nova Scotian quahogs to be 13.1 years for males and 12.5 years for females. The earliest age of maturity was 7 years for both sexes, and maturity occurred at about 49 mm shell length. Ropes *et al.* (1984b) found that immature clams off Long Island were 2-8 years old, and 19 to 46 mm long. Thompson *et al.* (1980b) reported the average age of maturity for Middle Atlantic Bight quahogs was 9.38 years, but this was extremely variable.

Ocean quahog spawning is protracted, lasting from spring to fall. Multiple annual spawnings may occur at the individual and population levels (Mann 1982). Off Rhode Island, Loosanoff (1953) reports ocean quahog spawning from late June to late October. Mann (1982, 1985) reported a more protracted spawning period for the same region from May to November, with the most intense spawning occurring from August to November. Off New Jersey, spawning occurred from September to November, and sometimes persisted into January (Jones 1981). Fritz (1991) noted higher visceral weight in ocean quahogs off Cape May in spring and summer than in fall and winter, suggesting late summer spawning. Off Nova Scotia, spawning occurred from July to September; in some years, all individuals showed evidence of partial spawning from February to May (Rowell *et al.* 1990).

Food Habits

Ocean quahogs are suspension feeders on phytoplankton, using their relatively short siphons which are extended above the surface of the substrate to pump in water. Extremely high algal concentrations may interfere with feeding (Winter 1970). In the laboratory, Winter (1969) showed that the maximum rate of algal filtration by adult quahogs occurred at 20^{o}C and 50x10^{6} cells/l, but such high algal concentrations

are unlikely to occur in the field. In a 24 hour period, two feeding periods alternate with two digestion periods (Winter 1970).

Millions of microscopic plants (phytoplankton) thrive in nearly every drop of coastal seawater. In the presence of sunlight and sufficient nutrients to grow, these plants photosynthesize and multiply, creating a "bloom." While most of the thousands of species of algae are harmless, this species is one of a few dozen that create potent toxins. The swimming, photosynthetic cells of *A. fundyense* are responsible for blooms in the northeast U.S. A closely related species called *Alexandrium tamarense* also occurs in these waters but *A. fundyense* is more abundant and thus its name is used to simplify discussions. The motile cells of *A. fundyense* originate from the germination of dormant cysts that accumulate in bottom sediments and allow the species to survive cold winter temperatures and unfavorable growing conditions. The cysts can also be resuspended by tides and storms.

The toxins produced by *A. fundyense* accumulate in filter-feeding shellfish such as clams, mussels and oysters making them unsafe for people and animals to eat. There is no risk to people who consume the flesh of fish, lobsters, and shrimp or who swim in the ocean. If eaten in sufficient quantity, these contaminated shellfish can result in illness or even death from a poisoning syndrome called paralytic shellfish poisoning, or PSP. Portions of Georges Bank have been closed for ocean quahog harvest due to PSP.

Predation

Many animals prey on ocean quahogs. Invertebrate predators include rock crabs (Stehlik 1993), sea stars (Kennish *et al.* 1994), and other crustaceans (Kraus *et al.* 1991). Teleost predators of ocean quahogs include longhorn sculpin, *Myoxocephalus octodecemspinosus*, ocean pout, *Macrozoarces americanus* (Packer and Langton, in prep.), haddock (Clarke 1954), and cod (Clarke 1954; Brey *et al.* 1990). Medcof and Caddy (1971) noted many predators feeding on quahogs damaged by a dredge. These included cod, winter flounder, sculpin, skates, moon snails, and hermit crabs. Other potential predators seen in the dredge tracks but not observed feeding included eelpout, sea stars, and whelks.

Habitat Characteristics

(Information on the habitat requirements and preferences of ocean quahogs concentrates primarily on U.S. stocks.)

Although larvae in laboratory studies can survive temperatures as high as 20°C, ocean quahogs tend to grow optimally between 13 and 15°C (Mann and Wolff 1983). Field studies southwest of Cuttyhunk, Massachusetts, Mann (1985) showed that the highest concentrations of larvae occurred between 14 and 18°C from August to September. They were found at depths of 1-30 m in May and from 20-40 m from late July to November. Larvae were collected at an average salinity of 32.4 ppt.

Juvenile ocean quahogs are found offshore in sandy substrates (Kraus et al. 1989, 1992) but may survive in muddy intertidal environments if protected from predators (Kraus et al. 1991). Witbaard et al. (1997) showed that laboratory-reared juvenile quahogs were able to grow at temperatures as low as 1°C. Shell growth increased tenfold between 1 and 12°C, however the greatest change in growth rate occurred in the lower temperature range of 1-6°C. Small changes in spring bottom water temperatures may have a large impact on the resulting shell growth (Witbaard et al. 1997). Juveniles have been shown to survive temperatures as high as 20°C (Kraus et al. 1989, 1992). In the Middle Atlantic Bight, juvenile ocean quahogs are typically found at depths of 45-75 m and at salinities of 32-34 ppt.

Adult ocean quahogs are usually found in dense beds over level bottoms, just below the surface of the sediment which ranges from medium to fine grain sand (Medcof and Caddy 1971; Beal and Kraus 1989; Brey et al. 1990; Fogarty 1981; MAFMC 1997). Based on field distributions on both sides of the Atlantic, Golikov and Scarlato (1973) estimated the optimal temperature for ocean quahogs to be 6-16°C. Mann (1989) reported the inshore limit of quahog distribution as the 16°C bottom isotherm in summer months. Merrill et al. (1969) reported a lethal temperature of 13-16°C; quahogs held at 21°C died in a few days. Although the species has been found at depths of 14-82 m, most are found at depths of 25 to 61 m (Merrill and Ropes 1969; Serchuk et al. 1982) and some have been found as deep as 256 m (Ropes 1978). Ocean quahogs are found at oceanic salinities, but Oeschger and Storey (1993) successfully kept them at 22 ppt in the lab for several weeks.

Ocean quahogs are capable of surviving low dissolved oxygen levels. In both the laboratory and field, quahogs can burrow in the sand and respire anaerobically for up to seven days (Taylor 1976). Declining O_2 tension results in an increased rate of ventilation, reduced O_2 utilization, and heart rate changes (Brand and Taylor 1974; Taylor and Brand 1975). Under anoxic conditions, enzymes are modified to reduce metabolism and energy release (Oeschger 1990; Oeschger and Storey 1993). Quahogs may also undergo self-induced anaerobiosis (Oeschger 1990). Even with the ability to survive hypoxic conditions, ocean quahogs may still experience negative effects of low oxygen levels. During a hypoxic event off New Jersey in 1976, up to 13.3% of ocean quahogs died in the shoreward part of the population. However, quahogs in deeper water were not subjected to hypoxia (Ropes et al. 1979).

7.2.1.2 Status of stocks

Surfclam, UoA #1

The first MSC assessment of the US surfclam /ocean quahog fishery (DeAlteris and Allen, 2016) was based on a 2013 stock assessment of the surfclam resource (NEFSC. 2013. 56th Northeast Regional Stock Assessment Workshop (56th SAW) Assessment Summary Report. U.S. Dept Commerce, Northeast Fish Sci Cent Ref Doc. 13-04; 42 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://nefsc.noaa.gov/publications/).

A new benchmark stock assessment for surfclams was conducted in late 2016. This Atlantic surfclam stock assessment was peer reviewed and approved for management at Stock Assessment Workshop (SAW) 61 (NEFSC 2016, 2017). A statistical catch at age and length model called SS3 was used and incorporated age and length structure, and was conducted as two assessment area pieces and then combined (NEFSC 2016, 2017). A more detailed description of the stock assessment is available in the SAW 61 documents (i.e., summary, report, SARC panel reviews) available at: http://www.nefsc.noaa.gov/saw.

As a result of SAW 61, biological reference points were developed and revised from the prior SAW. The new reference points are ratios rather than absolute values. This approach allows for conclusions about the status of the surfclam stock despite substantial uncertainty in the actual biomass of the stock.

The Atlantic surfclam stock was determined not to be overfished in 2015 (NEFSC 2016). Based on recommended reference points for the whole stock which use spawning stock biomass (SSB), estimated SSB2015/SSBThreshold = 2.54 (probability overfished < 0.01). It was determined that overfishing did not occur in 2015 (NEFSC 2016), based on new recommended reference points, estimated F2015/FThreshold = 0.295 (probability overfishing < 0.01).

The benchmark assessment was most recently updated with a management track assessment in 2021. *The following sections are taken from the MAFMC Atlantic Surfclam Fishery Information Document, April 2021, and MAFMC Atlantic Surfclam and Ocean Quahog Fishery Performance Report, April 2021, available at http://www.mafmc.org/surfclams-quahogs; https://www.mafmc.org/s/d_2021_SC_FishInfoDoc_2021_04_13.pdf; https://www.mafmc.org/s/c_FPR_for2021_SurfclamOceanQuahog.pdf;*

The most current assessment of the Atlantic surfclam (*Spisula solidissima*) stock is a management track assessment of the existing 2016 benchmark Stock Synthesis (SS) assessment (SAW 61; NEFSC 2017). Based on the previous assessment the stock was not overfished, and overfishing was not occurring. This assessment updates commercial fishery catch data, research survey indices of abundance, commercial

length composition, survey length composition and conditional age at length data as well as the analytical SS assessment model and reference points through 2019. Stock projections have been updated through 2026.

Based on this updated track assessment, the Atlantic surfclam stock is not overfished and overfishing is not occurring (Figure 8, Figure 9). 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 (SSBMSY proxy = 1,027; Figure 8). The 2019 fully selected fishing mortality was estimated to be 0.036 which is 25.8% of the overfishing threshold proxy (FMSY proxy = 0.141; Figure 9).

In summary, there has been no change to the status of the Atlantic surfclam since the last benchmark assessment in 2016. The stock is not overfished and overfishing is not occurring.

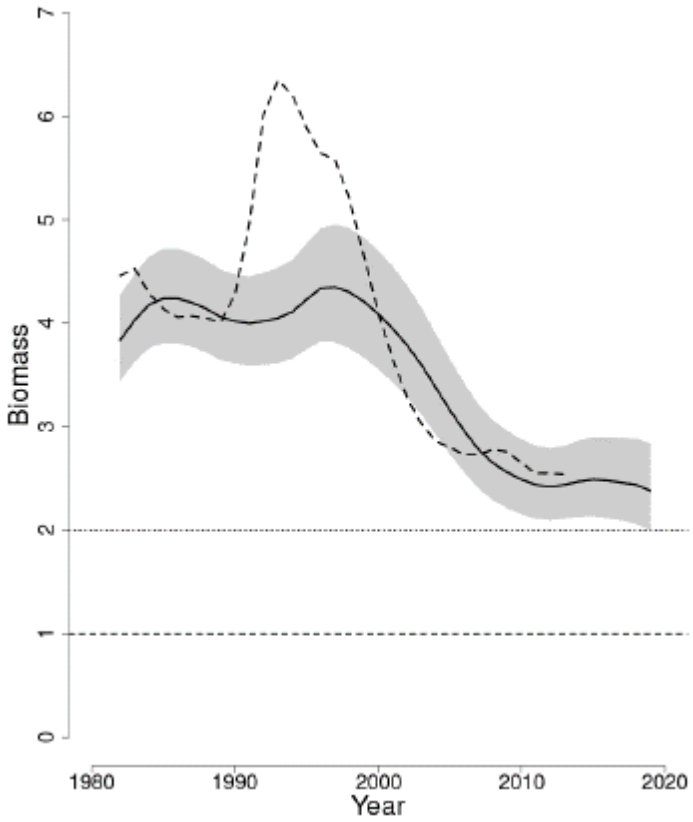

Figure 8. Trends in spawning stock biomass of Atlantic surfclam between 1982 and 2019 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ (½ $SSB_{MSY\ proxy}$; horizontal dashed line) as well as SSB_{Target} ($SSB_{MSY\ proxy}$; horizontal dotted 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

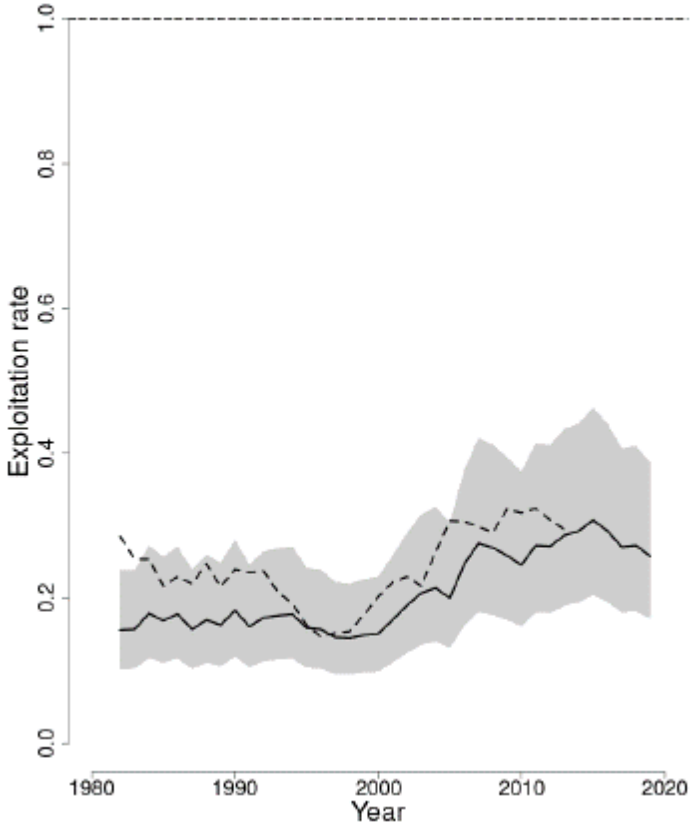

Figure 9. Trends in the fully selected fishing mortality (F_{Full}) of Atlantic surf-clam between 1982 and 2019 from the current (solid line) and previous (dashed line) assessment and the corresponding $F_{Threshold}$ ($F_{MSY\ proxy}$=0.141; horizontal dashed line), based on the 2020 assessment. Units of fishing mortality are the ratio of annual F to the F threshold ($F/F_{Threshold}$). The approximate 90% lognormal confidence intervals are shown.[3]

Ocean quahog, UoA #2

The first MSC assessment of the US surfclam /ocean quahog fishery (DeAlteris and Allen, 2016) was based on a 2013 stock assessment update of the ocean quahog resource (Chute A., Hennen D., Russell R. and Jacobson L. 2013. Stock assessment update for ocean quahogs (*Arctica islandica*) through 2011. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc.)

Stock assessments for ocean quahog in the EEZ were completed by the NEFSC in 1995, 1998, 2000, 2004, 2007 and 2009. The assessment before the most recent (NEFSC 2009) concluded that the EEZ ocean quahog resource was not overfished and that overfishing was not occurring). The 2013 ocean quahog assessment update (Chute et al. 2013) used data from 1978 through 2011 in a forward projecting stock assessment model, based on the Deriso-Schnute delay-difference equation. This was the same peer-reviewed and approved method developed at the NMFS Stock Assessment Workshop 48 (NEFSC 2009). Chute et al. (2013) characterize the ocean quahog population as an unproductive stock with infrequent recruitment, which is therefore vulnerable to overfishing. During SARC 48 (NEFSC 2009) Biological Reference Points (BRPs) for ocean quahogs were revisited and changes were recommended based on the unique population dynamics of very long-lived species with low rates of adult natural mortality. The revised BRPs were peer reviewed and considered the best science (Chute et al. 2013) and were used in management decisions from the time that they were recommended. Details of the reasoning behind the BRP revisions and analysis done to explore the implications of a range of potential BRP values were provided in the 2009 assessment report (NEFSC 2009).

A new benchmark stock assessment for ocean quahogs was conducted in early 2017. The ocean quahog stock assessment was peer reviewed and approved for management at SAW 63 (NEFSC 2017). A statistical catch at age and length model called SS3 was used and incorporated length structure, and was conducted as two assessment area pieces and then combined (NEFSC 2017). More detailed descriptions of the stock assessment are available in the SAW 63 documents (i.e., summary, report, SARC panel reviews) available at: http://www.nefsc.noaa.gov/saw.

New SAW 63 biological reference points were developed and revised from the prior SAW. The new reference points are ratios rather than absolute values. This approach allows for conclusions about the status of the ocean quahog stock despite substantial uncertainty in the actual biomass of the stock.

The ocean quahog stock was determined not to be overfished in 2016 (NEFSC 2017), based on recommended reference points for the whole stock which use spawning stock biomass (SSB), estimated SSB2016/SSBThreshold = 2.04 (probability overfished < 0.01). It was determined that overfishing did not occur in 2016 (NEFSC 2017), based on new recommended reference points, estimated F2016/FThreshold = 0.207 (probability overfishing < 0.01).

The following sections are taken from the Ocean Quahog Fishery Information Document, April 2021, and Atlantic Surfclam and Ocean Quahog Fishery Performance Report, April 2021, available at http://www.mafmc.org/surfclams-quahogs;
https://www.mafmc.org/s/c_FPR_for2021_SurfclamOceanQuahog.pdf;
https://www.mafmc.org/s/d_2021_OQ_FishInfoDoc_2021_04_13.pdf

The most current assessment of the ocean quahog (*Arctica islandica*) stock is a management track assessment of the existing 2017 benchmark Stock Synthesis (SS) 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. Stock projections have been updated through 2026.

Based on this updated assessment, the ocean quahog stock is not overfished and overfishing is not occurring (Figure 10, Figure 11). 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 (SSBMSY proxy = 2,113; Figure 10). The 2019 fully selected fishing mortality was estimated to be 0.005 which is 25.5% of the overfishing threshold proxy (FMSY proxy = 0.019; Figure 11).

There is little information about annual recruitment variability for ocean quahog. Model estimated recruitment has been stable and near unfished recruitment levels since 2000 (NEFSC 2017).

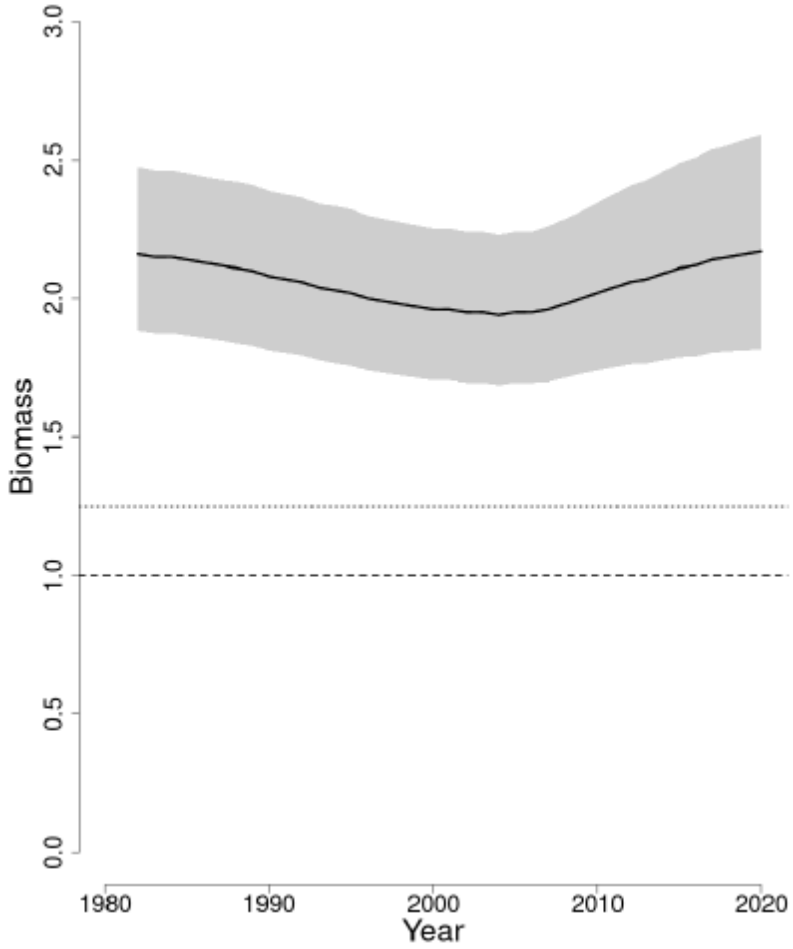

Figure 10. Trends in spawning stock biomass of ocean quahog between 1982 and 2020 from the current (solid line) and previous (dashed line) assessment and the corresponding $SSB_{Threshold}$ (horizontal dashed line) as well as SSB_{Target} ($SSB_{MSY\ proxy}$; horizontal dotted line) based on the 2020 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.

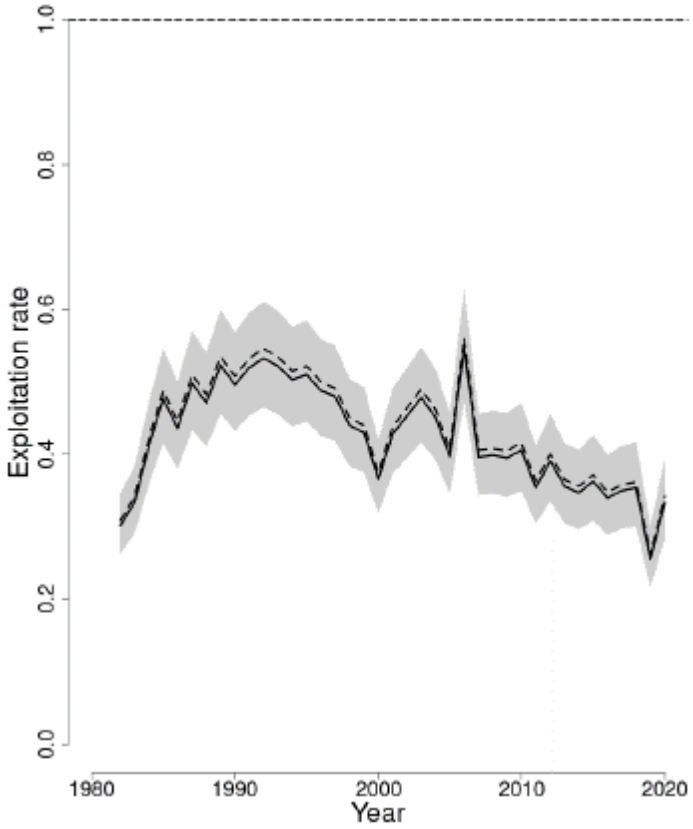

Figure 11. Trends in the fully selected fishing mortality (F_{Full}) of ocean quahog between 1982 and 2020 from the current (solid line) and previous (dashed line)assessment and the corresponding $F_{Threshold}$ ($F_{MSY\ proxy}$=0.019; horizontal dashed line), based on the 2020 assessment. Units of fishing mortality are the ratio of annual F to the F threshold ($F/F_{Threshold}$). The approximate 90% lognormal confidence intervals are shown.[3]

7.2.1.3 Seasonal Operation of the Fishery

Surfclam, UoA #1

The fishery does not operate on a seasonal basis. It is a market driven fishery, so fishing effort is related to market demand/availability.

Ocean quahog, UoA #2

The fishery does not operate on a seasonal basis. It is a market driven fishery, so fishing effort is related to market demand/availability.

7.2.1.4 Fishing and Management

Surfclam, UoA #1

There have been no major changes to the overall management system since the Individual Fishing Quota (ITQ) system was implemented in 1990. The Fishery Management Plan (FMP) for Atlantic surfclam (*Spisula solidissima*) became effective in 1977. The FMP established the management unit as all Atlantic surfclams in the Atlantic Exclusive Economic Zone (EEZ). The FMP is managed by the Mid-Atlantic Fishery Management Council (Council), in conjunction with the NMFS as the Federal implementation and enforcement entity. The primary management tool is the specification of an annual quota, which is allocated to the holders of allocation shares (ITQs) at the beginning of each calendar year as specified in Amendment 8 to the FMP (1988). In addition to the Federal water fishery, there is a small fishery prosecuted in the state waters of New York, New Jersey, and Massachusetts. The FMP, including subsequent Amendments and Frameworks, is available on the Council website at: http://www.mafmc.org.

In May 2021, the SSC decided there was no compelling reason to change its previously-set 2022 Acceptable Biological Catch (ABC) for surfclams (https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/60bfc1b8dc98c54b33d1aa63/1623179705235/MAFMC+SSC+Report+May+2021+meeting_final.pdf) . The MAFMC recommended, and a status quo determination for the 2022 annual quota for the surfclam fishery:

- Surfclam annual quota 26,218 mt or 3,400,000 bushels

As reported previously, the MAFMC and NMFS believe that these quota levels will keep the surfclam fishery sustainable far into the foreseeable future.

Ocean quahog, UoA #2

The Fishery Management Plan (FMP) for ocean quahog (Arctica islandica) became effective in 1977. The FMP established the management unit as all ocean quahog in the Atlantic Exclusive Economic Zone (EEZ). The FMP is managed by the Mid-Atlantic Fishery Management Council (Council), in conjunction with NMFS as the Federal implementation and enforcement entity. The primary management tool is the specification of an annual quota, which is allocated to the holders of allocation shares (Individual Transferable Quotas - ITQs) at the beginning of each calendar year as specified in Amendment 8 to the FMP (1988). In addition to the Federal waters fishery, there is a small fishery prosecuted in the state waters of Maine. The FMP, including subsequent Amendments and Frameworks, are available on the Council website at: http://www.mafmc.org.

In May 2021, the SSC decided there was no compelling reason to change its previously-set 2022 Acceptable Biological Catch (ABC) for ocean quahogs (https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/60bfc1b8dc98c54b33d1aa63/1623179705235/MAFMC+SSC+Report+May+2021+meeting_final.pdf) . The MAFMC recommended a status quo determination for the 2022 annual quota for the ocean quahog fishery:

Ocean quahog annual quota 24,689 mt or 5,061,245 bushels

As reported previously, the MAFMC and NMFS believe that these quota levels will keep the ocean quahog fishery sustainable far into the foreseeable future.

7.2.1.5 Catch profiles

Surfclam, UoA #1

The commercial fishery for surfclam in Federal waters is prosecuted with large vessels and hydraulic dredges. Surfclam landings and commercial quotas are given in Table 11 and Figure 12. The areas where ocean quahog are found is shown in Figure 4. The distribution of the fishery has changed over time, as shown in Figure 13and Figure 14, with a shift to increased landings in Southern New England and Georges Bank areas.

Table 11. Federal surfclam quotas and landings: 1998-2021. Landings for state waters are approximated as total landings - EEZ landings and may not accurately reflect state landings. SSC determined OFLs and ABCs included for years specified.

Year	OFL (mt)	ABC/ ACL (mt)	Total Landings (mt meats; w/state waters)	EEZ Landings (mt meats)	EEZ Landingsa ('000 bu)	EEZ Quota ('000 bu)	% Harvested
1998	NA	NA	24,506	18,234	2,365	2,565	92%
1999	NA	NA	26,677	19,577	2,539	2,565	99%
2000	NA	NA	31,093	19,788	2,566	2,565	100%
2001	NA	NA	31,237	22,017	2,855	2,850	100%
2002	NA	NA	32,645	24,006	3,113	3,135	99%
2003	NA	NA	31,526	24,994	3,241	3,250	100%
2004	NA	NA	26,463	24,197	3,138	3,400	92%
2005	NA	NA	22,734	21,163	2,744	3,400	81%
2006	NA	NA	25,779	23,573	3,057	3,400	90%
2007	NA	NA	27,091	24,915	3,231	3,400	95%
2008	NA	NA	25,223	22,510	2,919	3,400	86%
2009	NA	NA	22,396	20,065	2,602	3,400	77%
2010	129,300	96,600	19,941	17,984	2,332	3,400	69%

2011	114,000	96,600	20,044	18,839	2,443	3,400	72%
2012	102,300	96,600	18,393	18,054	2,341	3,400	69%
2013	93,400	96,600	18,924	18,551	2,406	3,400	71%
2014	81,150	60,313	18,834	18,227	2,364	3,400	70%
2015	75,178	51,804	18,517	18,154	2,354	3,400	69%
2016	71,512	48,197	18,202	18,039	2,339	3,400	69%
2017	69,925	44,469	17,690	16,902	2,192	3,400	64%
2018	Not specified	29,363b	17,114	16,269	2,110	3,400	62%
2019	74,281c	56,419c	16,502	14,986	1,943	3,400	57%
2020	74,110c	56,289c	13,182d	11,956d	1,550d	3,400	46%
2021	51,361	47,919	NA	NA	NA	3,400	NA

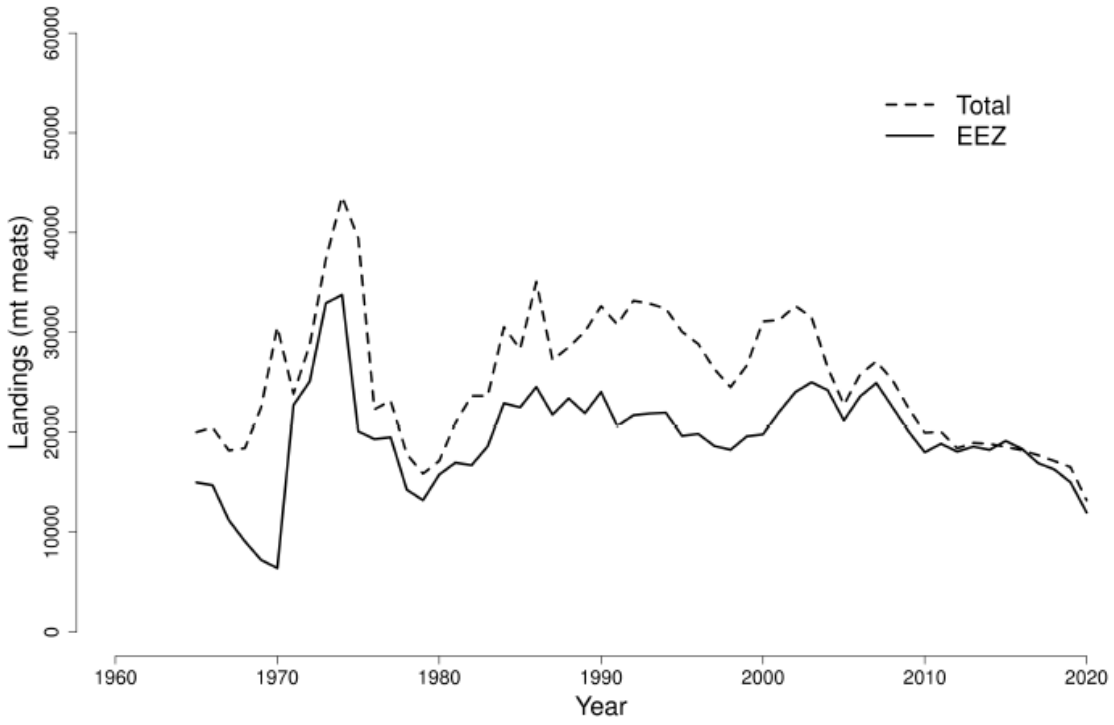

Figure 12. Surfclam landings (total and EEZ) during 1965-2019, and preliminary 2020.

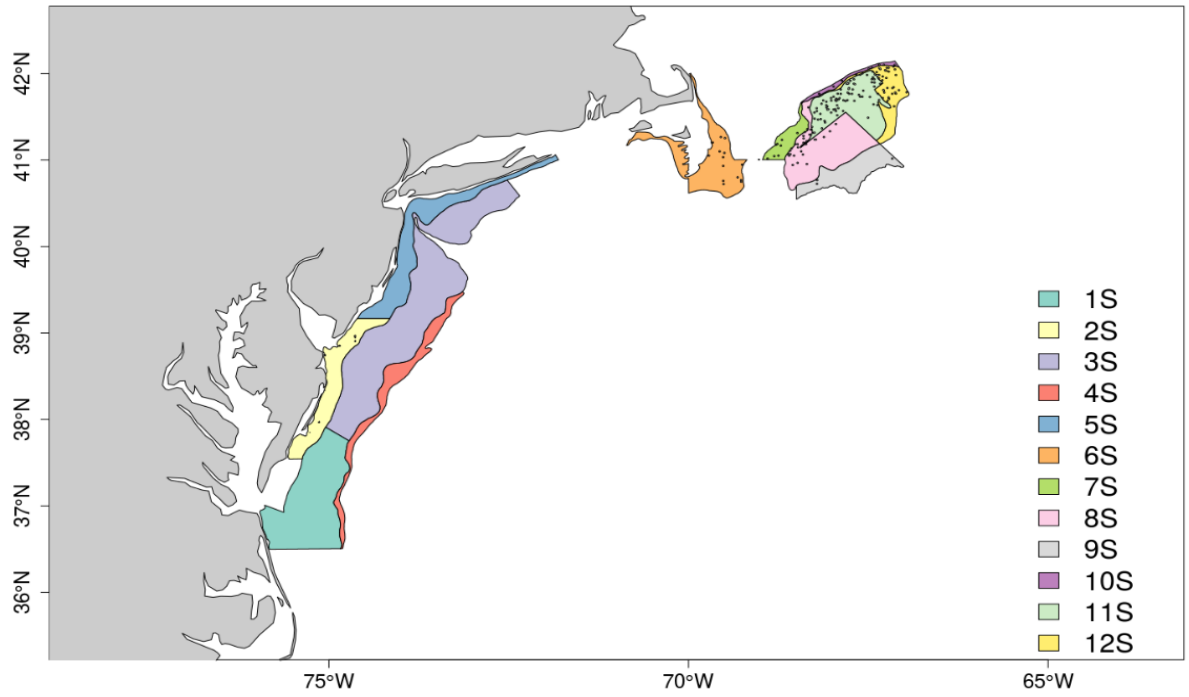

Figure 13. Surfclam stock assessment regions and NEFSC shellfish survey strata. The shaded strata are where surfclam are found.

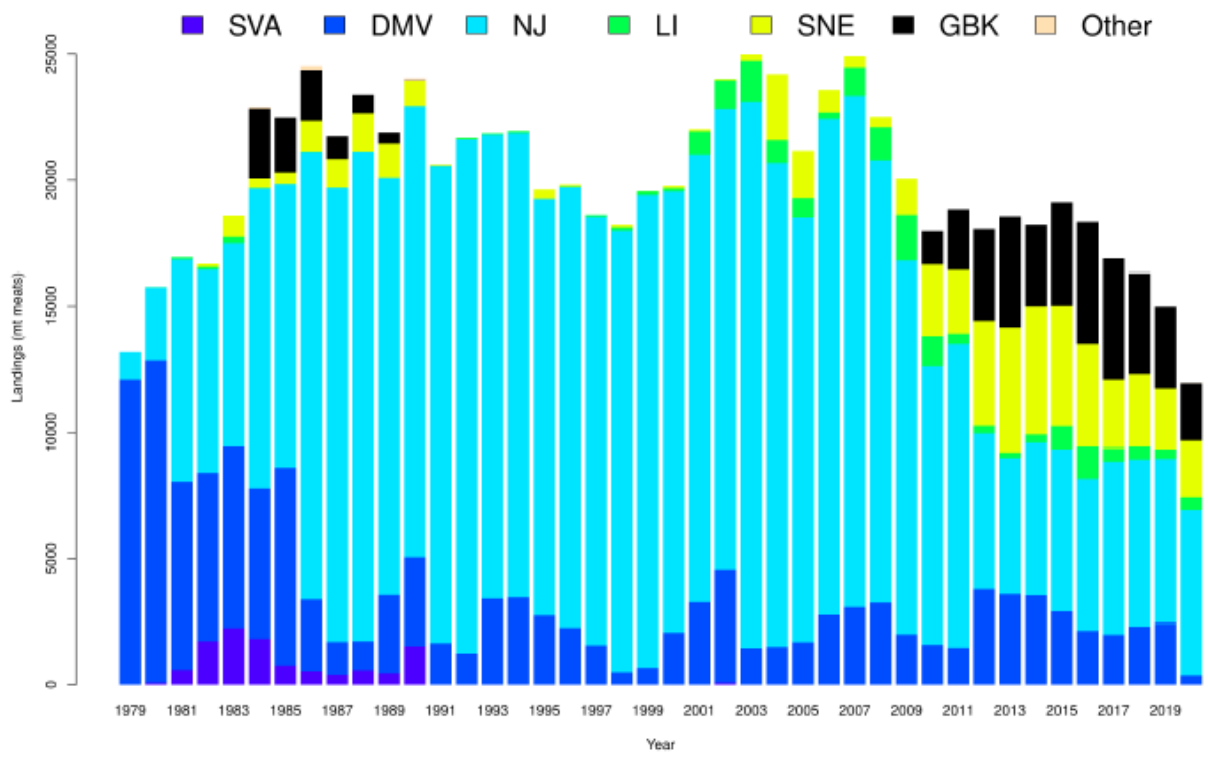

Figure 14. Surfclam landings from the US EEZ during 1979-2019, and preliminary 2020.

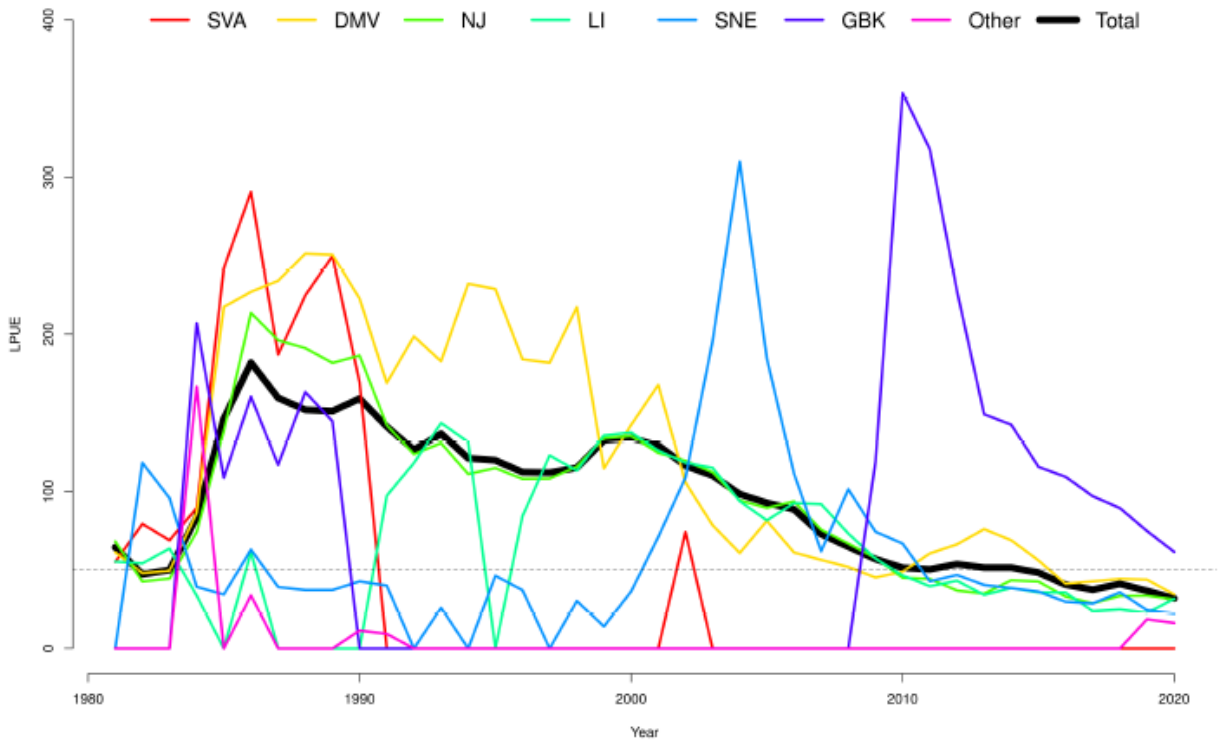

Figure 15. Nominal landings per unit effort (LPUE in bushels landed per hour fished) for surfclam, by region, during 1981-2019, and preliminary 2020. LPUE is total landings in bushels divided by total fishing effort.3

Ocean quahog, UoA #2

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 fishery prosecuted with small vessels (35-45 ft) targeting quahog for the local fresh, half shell market. Ocean quahog landings and commercial quotas are given below in Table 12 and Figure 16. The distribution of the fishery has changed over time. The areas where ocean quahog are found is shown in Figure 17. The distribution of the fishery has

changed over time (Figure 18 and Figure 19). The bulk of the fishery from 1980-1990 was being prosecuted off the Delmarva but is now being prosecuted in more Northern areas.

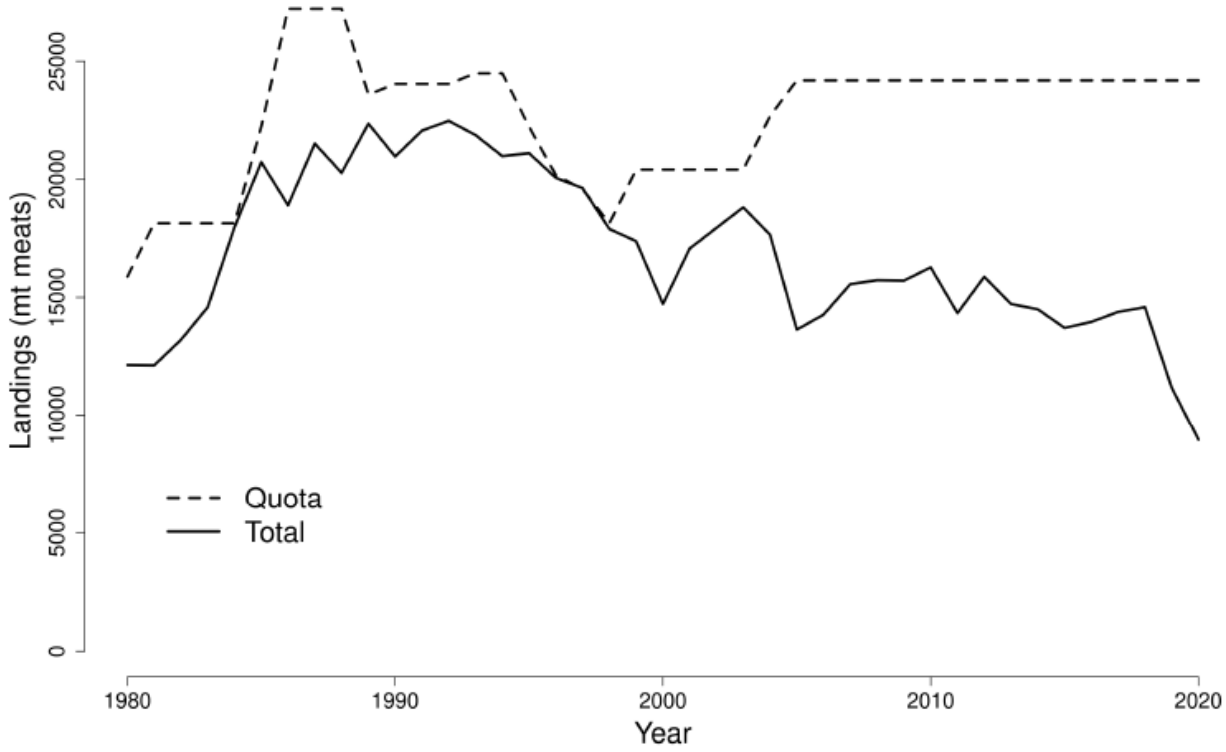

Figure 16. Ocean quahog landings (total and EEZ) during 1965-2019, and preliminary 2020.

Table 12. Federal ocean quahog quotas and landings: 1998-2021. SSC determined OFLs and ABCs included for years specified.

Year	OFL (mt)	ABC/ ACL (mt)	EEZ Landingsa (mt meats)	EEZ Landingsa,b ('000 bu)	EEZ Quota ('000 bu; excludes 100,000 ME bu)	% Harvested
1998	NA	NA	17,897	3,946	4,000	99%
1999	NA	NA	17,381	3,832	4,500	85%
2000	NA	NA	14,723	3,246	4,500	72%
2001	NA	NA	17,069	3,763	4,500	84%
2002	NA	NA	17,947	3,957	4,500	88%
2003	NA	NA	18,815	4,148	4,500	92%
2004	NA	NA	17,655	3,892	5,000	78%
2005	NA	NA	13,635	3,006	5,333	56%
2006	NA	NA	14,273	3,147	5,333	59%
2007	NA	NA	15,564	3,431	5,333	64%
2008	NA	NA	15,727	3,467	5,333	65%
2009	NA	NA	15,710	3,463	5,333	65%
2010	NA	NA	16,271	3,587	5,333	67%
2011	34,800	26,100	14,332	3,160	5,333	59%
2012	34,800	26,100	15,864	3,497	5,333	66%
2013	34,800	26,100	14,721	3,245	5,333	61%

2014	Not specified	26,100	14,498	3,196	5,333	60%
2015	Not specified	26,100	13,709	3,022	5,333	56%
2016	Not specified	26,100	13,965	3,079	5,333	58%
2017	Not specified	26,100	14,386	3,172	5,333	59%
2018	61,600	44,695	14,587	3,216	5,333	60%
2019	63,600	46,146	11,178	2,464	5,333	46%
2020	63,100	45,783	8,939c	1,971c	5,333	37%
2020	44,960	44,031	NA	NA	5,333	NA

a Column excludes Maine Landings which have varied from 48-387 mt per year from 1998-2020 (see assessment for additional details on the Maine fishery). b 1 ocean quahog bushel is

approximately 10 lb. c Preliminary, incomplete 2020 data. Source: NMFS clam vessel logbook reports.

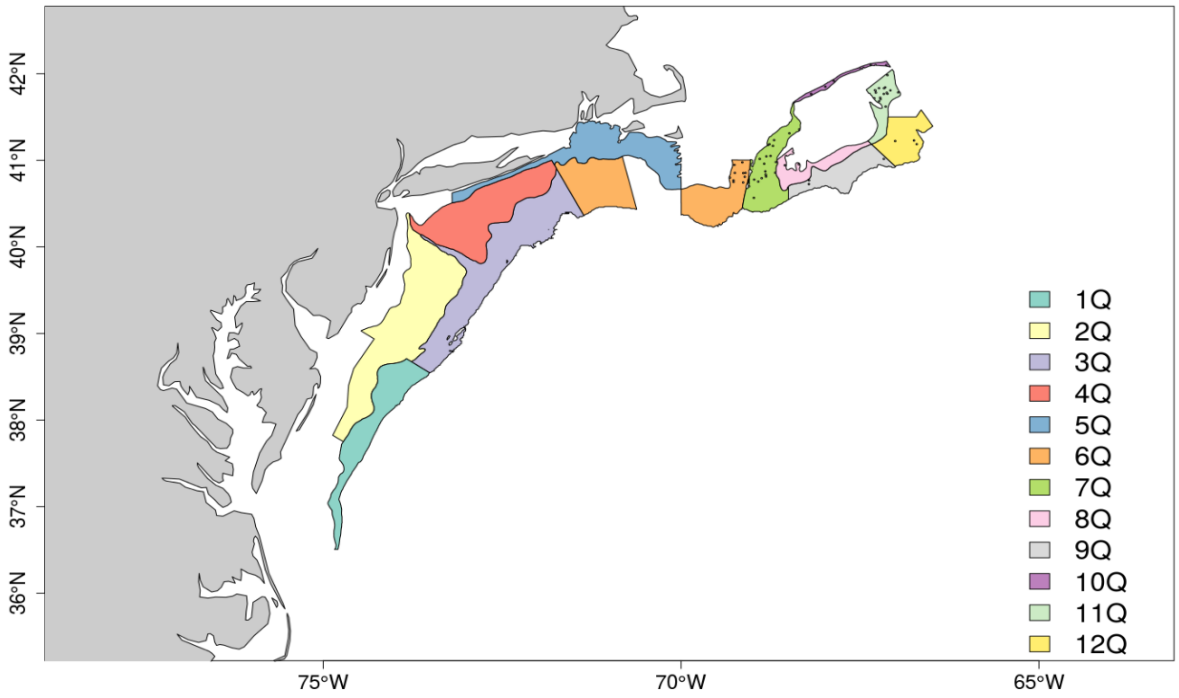

Figure 17. Ocean quahog stock assessment regions and NEFSC shellfish survey strata. The shaded strata are where quahog are found.

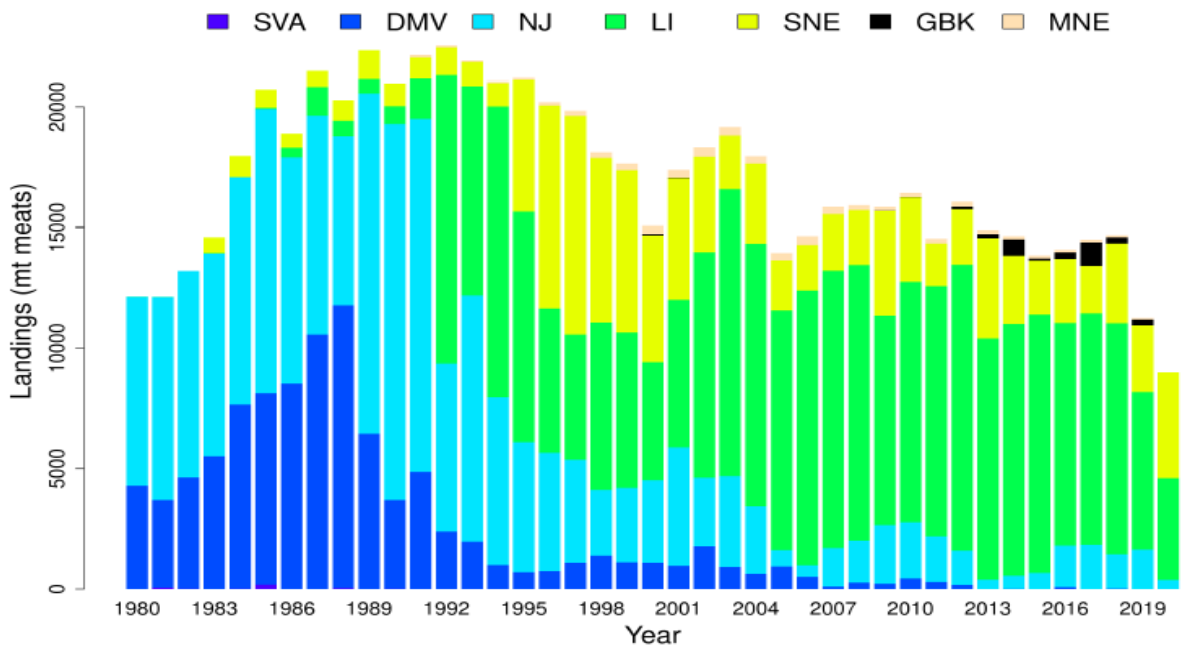

Figure 18. Ocean quahog landings from the US EEZ during 1979-2019, and preliminary 2020.

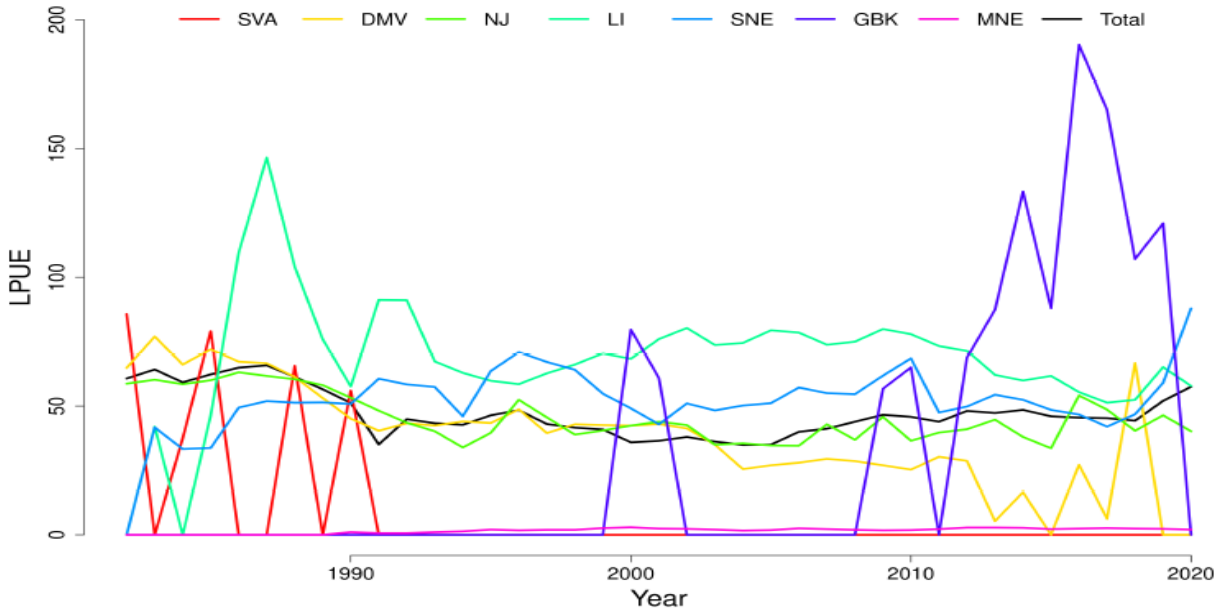

Figure 19. Nominal landings per unit effort (LPUE in bushels landed per hour fished) for ocean quahog, by region, during 1981-2019, and preliminary 2020. LPUE is total landings in bushels divided by total fishing effort.

7.2.1.6 Total Allowable Catch (TAC) and catch data

The TAC is equal to ACT (Annual Catch Target), is expressed in bushels (bu) or meat weight in metric tons (mt), which is actual quota or landings but includes 12% for additional mortality or losses due to harvesting.

UoC share of UoA for both surfclams and ocean quahogs is estimated at 95%.

Surfclam and ocean quahog quotas are generally denoted in bushels of whole shellfish. For stock assessment purposes bushels are converted to metric tons (mt) of meat weight using 17 pounds of meat per bushel of Atlantic surfclams and 10 pounds of meat per bushel of ocean quahogs. 2204.62 pounds equals one metric ton, a metric ton of surfclam meats is about equivalent to 114 bushels of live surfclams. A metric ton of ocean quahog meats is about equivalent to 205 bushels.

Source for catch data: NEFSC logbook database

Surfclams, UoA #1

Table 13. Surfclam Total Allowable Catch (TAC) and catch data

TAC=ACT (including 12% incidental mortality)	Year	2020	Amount	29,364 mt
UoA share of TAC (including 12% incidental mortality)	Year	2020	Amount	3,400,000 bu 29,364 mt
UoC share of TAC	Year	2020	Amount	3,230,000 bu 27,895 mt
Total green weight* catch by UoC	Year (most recent)	2019	Amount	37,300 mt
	Year (second most recent)	2018	Amount	40,499 mt

Note: Surfclam and ocean quahog quotas are generally denoted in bushels of whole shellfish. For stock assessment purposes bushels are converted to metric tons using 17 pounds of meat per bushel of Atlantic surfclams and 10 pounds of meat per bushel of ocean quahogs. 2204.62 pounds equals one metric ton, A metric ton of surfclam meats is equivalent to 130 bushels of live surfclams. A metric ton of ocean quahog meats is equivalent to 220 bushels

* Total green weight (an MSC term) is larger than the TAC because surfclam quotas are generally denoted in bushels of whole shellfish. For stock assessment purposes bushels are converted to metric tons (mt) of meat weight using 17 pounds of meat per bushel of Atlantic surfclams, 2204.62 pounds equals one metric ton, a metric ton of surfclam meats is about equivalent to 114 bushels of live surfclams. Green weight (animal in the shell) of the catch or landings excludes the 12% incidental mortality, and results from a conversion of 2.62 for meat weight (mt) to green weight (mt) for surfclams.

Ocean quahog, UoA #2

Table 14. Ocean Quahog Total Allowable Catch (TAC) and catch data

TAC=ACT (including 5% Inc. mortality)	Year	2020	Amount	26,035 mt
UoA share of TAC	Year	2020	Amount	5,330,000 bu 26,035 mt
UoC share of TAC	Year	2020	Amount	5,066,350 bu 24,733 mt
Total green weight catch by UoC*	Year (most recent)	2019	Amount	44,812 mt
	Year (second most recent)	2018	Amount	58,479 mt

* Total green weight (an MSC term) is larger than the TAC because ocean quahog quotas are generally denoted in bushels of whole shellfish. For stock assessment purposes bushels are converted to metric tons (mt) of meat weight using 10 pounds of meat per bushel of ocean quahogs, 2204.62 pounds equals one metric ton, a metric. A metric ton of ocean quahog meats is about equivalent to 205 bushels. Green weight (animal in the shell) of the catch or landings excludes the 5% incidental mortality, and results from a conversion of 4.22 for meat weight (mt) to green weight (mt) for ocean quahogs.

7.2.2 Principle 1 Performance Indicator scores and rationales

There are two UoAs under consideration in this re-assessment, UoA #1 is surfclams and UoA #2 is ocean quahogs. The scoring tables have been partitioned to separate each UoA when there is separate information unique to each UoA , or when there is the potential that each UoA might have a different score for an individual PI or SI. In general, all the P1 scoring tables consider each UoA separately, and provide a separate score for each UoA.

PI 1.1.1 – Stock Status

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Stock status relative to recruitment impairment			
	Guide post	It is likely that the stock is above the point where recruitment would be impaired (PRI).	It is highly likely that the stock is above the PRI.	There is a high degree of certainty that the stock is above the PRI.
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes
Rationale				

UoA#1, Surfclam

The most current assessment of the Atlantic surfclam (*Spisula solidissima*) stock is a management track assessment update of the existing 2016 benchmark Stock Synthesis (SS) assessment (SAW 61; NEFSC 2017). Based on the previous assessment the stock was not overfished, and overfishing was not occurring. This assessment updated commercial fishery catch data, research survey indices of abundance, commercial length composition, survey length composition and conditional age at length data as well as the analytical SS assessment model and reference points through 2019. Stock projections were updated through 2026.

Based on this updated track assessment, the Atlantic surfclam stock is not overfished and overfishing is not occurring (see **Error! Reference source not found.** and Figure 8**Error! Reference source not found.** in the previous background section). 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 (SSBMSY proxy = 1,027; see **Error! Reference source not found.** in the previous background section). The 2019 fully selected fishing mortality was estimated to be 0.036 which is 25.8% of the overfishing threshold proxy (FMSY proxy = 0.141; see Figure 8 in the previous background section).

In summary, there has been no change to the status of the Atlantic surfclam stock since the last benchmark assessment in 2016. The stock is not overfished and overfishing is not occurring.

Therefore, because there is a high degree of certainty that the stock is above the PRI, the stock meets the requirements of the SG 60, 80 and 100 levels for SIa.

UoA#2, Ocean Quahog

The most current assessment of the ocean quahog (*Arctica islandica*) stock is a management track assessment of the existing 2017 benchmark Stock Synthesis (SS) 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. Stock projections have been updated through 2026.

Based on this updated assessment, the ocean quahog stock is not overfished and overfishing is not occurring (see **Error! Reference source not found.** and **Error! Reference source not found.** in the previous background se ction). 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 (SSBMSY proxy = 2,113; see **Error! Reference source not found.** in the previous background section). The 2019 fully selected fishing mortality was estimated to be 0.005 which is 25.5% of the overfishing threshold proxy (FMSY proxy = 0.019; see **Error! Reference source not found.** in the previous background section).

Therefore because there is a high degree of certainty that the stock is above the PRI, the stock meets the requirements of the SG 60, 80 and 100 levels for SIa.

b	Stock status in relation to achievement of Maximum Sustainable Yield (MSY)			
	Guide post		The stock is at or fluctuating around a level consistent with MSY.	There is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		UoA#1, Surfclam Yes UoA#2, Ocean Quahog Yes	UoA#1, Surfclam Yes UoA#2, Ocean Quahog Yes

Rationale

UoA#1, Surfclam

According to the NMFS NEFSC 2013 and 2016 stock assessment reports, and the most recent 2021 track assessment update, the biomass has not fallen below Bmsy since the fishery began, so the biomass has remained above the target reference point, and there is a high degree of certainty that the stock has been fluctuating around a level at least consistent with MSY over the recent years.

Therefore, because there is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years, the stock meets the requirements of the SG 80 and 100 levels for SIb.

UoA#2, Ocean Quahog

As noted above, the stock has undergone fishing down since the beginning of the fishery, and the biomass has not yet reached Bmsy. Ocean quahogs have never been overfished since the inception of the fishery in the late 1970s. The probability of overfishing and overfished status for this stock therefore appears low. Therefore, because there is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years, the stock meets the requirements of the SG 80 and 100 levels for SIb.

References

Chute A., Hennen D., Russell R. and Jacobson L. 2013. Stock assessment update for ocean quahogs (Arctica islandica) through 2011. U.S. Dept Commerce, Northeast Fish Sci Cent Ref Doc.

[NEFSC] Northeast Fisheries Science Center. 2016. 61st Northeast Regional Stock Assessment Workshop (61st SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-13; 26 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.

[NEFSC] Northeast Fisheries Science Center. 2017. 63rd Northeast Regional Stock Assessment Workshop (63rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-09; 28 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.

[MAFMC] Mid-Atlantic Fishery Management Council. 2021. Atlantic Surfclam and Ocean Quahog Fishery Performance Report. April 2021. Available at: https://www.mafmc.org/s/c_FPR_for2021_SurfclamOceanQuahog.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 2021. Atlantic Surfclam Fishery Information Document. April 2021. Available at: https://www.mafmc.org/s/d_2021_SC_FishInfoDoc_2021_04_13.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 2021. Ocean Quahog Fishery Information Document. April 2021. Available at: https://www.mafmc.org/s/d_2021_OQ_FishInfoDoc_2021_04_13.pdf

Stock status relative to reference points

	Type of reference point	Value of reference point	Current stock status relative to reference point
Reference point used in scoring stock relative to PRI (SIa)	UoA#1, Surfclam $SSB/SSB_{Threshold}$ = 1 is the new minimum stock size threshold which defines overfished status, where $SSB_{Threshold}$ is calculated as $SSB_0/4$, UoA#2, Ocean Quahog $SSB/SSB_{Threshold}$ = 1 is the new minimum stock size threshold which defines overfished status, where $SSB_{Threshold}$ is calculated as $0.4*SSB_0$	UoA#1, Surfclam 514 ('000 mt) UoA#2, Ocean Quahog 1363 ('000 mt)	UoA#1, Surfclam Spawning stock biomass (SSB) in 2019 was estimated to be 1,222 ('000 mt) which is 239% of the biomass threshold (SSBMSY proxy = 514 ('000 mt). UoA#2, Ocean Quahog SSB in 2019 was estimated to be 3,651 ('000 mt) which is 267% of the biomass threshold or $SSB_{Threshold}$
Reference point used in scoring stock relative to MSY (SIb)	UoA#1, Surfclam SSB/SSB_{Target} = 2 is the new biomass target (or SSB_{MSY}-Proxy), where SSB_{Target} is calculated as $SSB_0/2$, UoA#2, Ocean Quahog SSB/SSB_{Target} = 1.25 is the new biomass target (or	UoA#1, Surfclam SSBMSY proxy = 1,027 ('000mt) UoA#2, Ocean Quahog SSBMSY proxy = 2,113 ('000 mt)	UoA#1, Surfclam SSB in 2019 was estimated to be 1,222 ('000 mt) which is 119% of the biomass target UoA#2, Ocean Quahog SSB in 2019 was estimated to be 3,651 ('000 mt) which

	SSB_{MSY}-Proxy), where SSB_{Target} is calculated as 0.5*SSB0,		is 173% of the biomass target or SSB_{MSY}-Proxy
Draft scoring range and information gap indicator added at Announcement Comment Draft Report			
Draft scoring range		UoA#1, Surfclam: ≥80 UoA#2, Ocean Quahog: ≥80	
Information gap indicator		Information sufficient to score PI	
Overall Performance Indicator scores added from Client and Peer Review Draft Report			
Overall Performance Indicator score			
Condition number (if relevant)			

PI 1.1.2 – Stock rebuilding

PI 1.1.2		Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	Rebuilding timeframes			
	Guide post	A rebuilding timeframe is specified for the stock that is the shorter of 20 years or 2 times its generation time. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.		The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the stock.
	Met?	Not scored		Not scored
Rationale				
Stock not reduced, therefore not scored.				
b	Rebuilding evaluation			
	Guide post	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe.	There is evidence that the rebuilding strategies are rebuilding stocks, or it is likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.	There is strong evidence that the rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.
	Met?	Not scored	Not scored	Not scored
Rationale				
No rebuilding necessary, therefore not scored.				
References				
n/a				

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	Not scored
Information gap indicator	

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	Not scored
Condition number (if relevant)	

PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guide post	The harvest strategy is expected to achieve stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in PI 1.1.1 SG80.
	Met?	UoA#1, Surfclam Yes UoA#2, Ocean Quahog Yes	UoA#1, Surfclam Yes UoA#2, Ocean Quahog Yes	UoA#1, Surfclam Yes UoA#2, Ocean Quahog Yes
Rationale				

UoA#1, Surfclam

For the surfclam resources in the federally managed fishing areas, the Council's SSC sets the ABC each year, based on NMFS NESC peer reviewed stock assessments, and under the FMP the ABC equals the ACL ("annual catch limit"). It is illegal under the MSA for the ACL to exceed the SSC's ABC level. The ACL then may be reduced by the Council if there is management uncertainty when it sets the annual catch target (annual quota). Under the MAFMC risk policy, the level of ABC cannot permit a probability of more than 35% that overfishing will occur if the actual harvest is at that ABC level. There is a control rule in place, and there is pre-existing evidence via the advent of the ITQ system of the ability of the management system to control effort, taking into account issues such as overcapacity and its causes. There is a strong information base and monitoring of stock status and the responsiveness of the management system and fleet to stock status.

The harvest control rule, the "ABC control rule" (see PI 1.2.2), is responsive to the state of the stock. There is some uncertainty regarding precisely how the rule as described will work as limit reference points are approached to ensure limits are not surpassed, but this is taken up under PI 1.2.2.

As this PI is focused in the strategy's ability to be responsive to the state of the stock and to achieve stock management objectives (for the target species) the fishery meets the requirements of the SG60, 80 and 100 levels for SIa.

UoA#2, Ocean Quahog

For ocean quahog resources in the federally managed fishing areas, the Council's SSC sets the ABC each year, based on NMFS NEFSC peer reviewed stock assessments, and under the FMP the ABC equals the ACL ("annual catch limit"). It is illegal under the MSA for the ACL to exceed the SSC's ABC level. The ACL then may be reduced by the Council if there is management uncertainty when it sets the annual catch target (annual quota). Under the MAFMC risk policy, the level of ABC cannot permit a probability of more than 35% that overfishing will occur if the actual harvest is at that ABC level.

There is a control rule in place, and there is pre-existing evidence via the advent of the ITQ system of the ability of the management system to control effort, taking into account issues such as overcapacity and its causes.

There is a strong information base and monitoring of stock status and the responsiveness of the management system and fleet to stock status.

The new harvest control rule, the “ABC control rule” (see PI 1.2.2), is responsive to the state of the stock. There is some uncertainty regarding precisely how the rule as described will work as limit reference points are approached to ensure limits are not surpassed, but this is taken up under PI 1.2.2.

Therefore the fishery meets the requirements of the SG60, 80 and 100 levels for SIa.

b	Harvest strategy evaluation			
	Guide post	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	Y UoA#1, Surfclam: No UoA#2, Ocean Quahog: No

Rationale

UoA#1, Surfclam

Evidence exists that the harvest strategy is meeting its objectives (SG 80 scoring issue (b)) in that both the ocean quahog and surfclam resources have never been overfished, and exploitation levels for both species and fishing mortality levels are well below target levels and above biomass-based limits. The harvest control rule, the “ABC control rule” (see PI 1.2.2), is designed to be responsive to the state of the stock. There is some uncertainty regarding precisely how the rule as described will work as limit reference points are approached to ensure limits are not surpassed, but this is taken up under PI 1.2.2. Current evidence suggests that regardless, the fishery is currently meeting its objectives. Therefore the fishery meets the requirements of the SG 60 and 80 levels for SIb, but not the requirements of SG100 level, as the harvest strategy has not yet been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels..

UoA#2, Ocean Quahog

Evidence exists that the harvest strategy is meeting its objectives in that the ocean quahog resource has never been overfished, and exploitation levels, although approaching them, are still well below target fishing mortality levels, and above biomass-based limits. The harvest control rule, the “ABC control rule” (see PI 1.2.2), is responsive to the state of the stock. There is some uncertainty regarding precisely how the rule as described will work as limit reference points are approached to ensure limits are not surpassed, but this is taken up under PI 1.2.2 Therefore the fishery meets the requirements of the SG 60 and 80 but not the SG 100 levels for SIb as the harvest strategy has not yet been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.

c	Harvest strategy monitoring

	Guide post	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes		

Rationale

UoA#1, Surfclam

As noted for SIa, the Council's SSC sets the ABC each year, based on NMFS NESC peer reviewed stock assessments conducted every 3 years, and under the FMP the ABC equals the ACL ("annual catch limit"). Therefore the fishery meets the requirements of SIc at the SG 60 level.

UoA#2, Ocean Quahog

As noted for SIa, the Council's SSC sets the ABC each year, based on NMFS NESC peer reviewed stock assessments, and under the FMP the ABC equals the ACL ("annual catch limit"). Therefore the fishery meets the requirements of SIc at the SG 60 level.

d	Harvest strategy review			
	Guide post			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			UoA#1, Surfclam Yes UoA#2, Ocean Quahog Yes

Rationale

UoA#1, Surfclam

As noted for SIa, the Council's SSC sets the ABC each year, based on NMFS NEFSC peer reviewed stock assessments, and under the FMP the ABC equals the ACL ("annual catch limit"). It is illegal under the MSFCMA for the ACL to exceed the SSC's ABC level. The ACL then may be reduced by the Council if there is management uncertainty when it sets the annual catch target (annual quota). Under the MAFMC risk policy, the level of ABC cannot permit a probability of more than 35% that overfishing will occur if the actual harvest is at that ABC level. Given this annual consideration of the ABC and ACL, which forms the basis of the harvest strategy, the fishery meets the requirements of SId at the SG 100 level.

UoA#2, Ocean Quahog

As noted for SIa, the Council's SSC sets the ABC each year, based on NMFS NESC peer reviewed stock assessments, and under the FMP the ABC equals the ACL ("annual catch limit"). It is illegal under the MSA for the ACL to exceed the SSC's ABC level. The ACL then may be reduced by the Council if there is management uncertainty when it sets the annual catch target (annual quota). Under the MAFMC risk policy, the level of ABC cannot permit a probability of more than 35% that overfishing will occur if the actual harvest is at that ABC level. Therefore, given the annual review of the ABC and ACL, which forms the basis of the harvest strategy, the fishery meets the requirements of SId at the SG 100 level.

e	Shark finning

	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	UoA#1, Surfclam: NA UoA#2, Ocean Quahog: NA	UoA#1, Surfclam: NA UoA#2, Ocean Quahog: NA	UoA#1, Surfclam: NA UoA#2, Ocean Quahog: NA
Rationale				

UoA#1, Surfclam

Sharks are not a target species in this fishery, therefore this Scoring Issue need not be scored if sharks are not a target species

UoA#2, Ocean Quahog

Sharks are not a target species in this fishery, therefore this Scoring Issue need not be scored if sharks are not a target species

f	Review of alternative measures			
	Guide post	There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes
Rationale				

UoA#1, Surfclam

Based on the observed catch composition data in P2 and NEFSC (2013 and 2016), there is essentially no discarding of target species, as there is no active federal minimum size requirement in place. The dredge is highly selective to capture surfclams and ocean quahogs that are commercially valuable, catching 80-95% of clams of suitable size in their path (Wallace & Hoff 2004, Meyer et al 1981, Thorarinsdottir et al 2010). The 56th Stock Assessment Workshop Assessment Report states that the commercial clam dredge has "relatively well understood selectivity" (NEFSC 2013). This size-selectivity is considered one manner in which the resource is protected from the effects of fishing for surfclams in particular as they reproduce at small sizes and are sexually mature for several years before becoming available to the fishing gear (NEFSC 2013a, NEFSC 2016). See background section on

Fishing **Practices** for more detail regarding gear selectivity. Therefore, there is minimal mortality of unwanted catch of the target stock, and this incidental mortality is accounted for in stock assessments (estimated at 12% for surfclam).

There is a national bycatch reduction program that collects and evaluates data on bycatch, discarding and un-intended mortality of fishing operations (NMFS 2013; SBRM 2016). Therefore, it is expected that should

alternative measures to minimize mortality of unwanted catch be merited, there is a program in place capable of doing so. With this, the harvest strategy meets the requirements of the SG 60, 80 and 100 levels for SIf.

UoA#2, Ocean Quahog

Based on the observed catch composition data in P2 and NEFSC (2013), there is no discarding of target species, as there is no active federal minimum size requirement in effect. The dredge is highly selective to capture surfclams and ocean quahogs that are commercially valuable, catching 80-95% of clams of suitable size in their path (Wallace & Hoff 2004, Meyer et al 1981, Thorarinsdottir et al 2010). There is good information on size selectivity for the clam dredge, which is used in stock assessment reports (e.g. Chute et al. 2013, NEFSC 2017). See background section on

Fishing **Practices** for more detail regarding gear selectivity. Therefore, there is minimal mortality of unwanted catch of the target stock, and this incidental mortality is accounted for in stock assessments (estimated at 5% for ocean quahog).

There is a national bycatch reduction program that collects and evaluates bycatch, discarding and un-intended mortality of fishing operations (NMFS 2013, SBRM 2016). Therefore, it is expected that should alternative measures to minimize mortality of unwanted catch be merited, there is a program in place capable of doing so. With this, the harvest strategy meets the requirements of the SG 60, 80 and 100 levels for SIf.

References

The FMP, including subsequent Amendments and Frameworks, is available on the Council website at: http://www.mafmc.org.

Chute A., Hennen D., Russell R. and Jacobson L. 2013. Stock assessment update for ocean quahogs (Arctica islandica) through 2011. U.S. Dept Commerce, Northeast Fish Sci Cent Ref Doc.

Chute. T. 2013. summary of surfclam and ocean quahog observer bycatch data. NMFS, NEFSC, unpublished data provided by Dan Hennan.

National Marine Fisheries Service. 2013. U.S. National Bycatch Report First Edition Update 1 [L. R. Benaka, C. Rilling, E. E. Seney, and H. Winarsoo, Editors]. U.S. Dep. Commer., 57 p. Online edition: http://www.st.nmfs.noaa.gov/observer-home/first-edition-update-1

[NEFSC] Northeast Fisheries Science Center. 2013. 56th Northeast Regional Stock Assessment Workshop (56th SAW) Assessment Report. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-10; 868 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/

[NEFSC] Northeast Fisheries Science Center. 2013(a). 56th Northeast Regional Stock Assessment Workshop (56th SAW) Assessment Summary Report. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-10; 868 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/

[NEFSC] Northeast Fisheries Science Center. 2016. 61st Northeast Regional Stock Assessment Workshop (61st SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-13; 26 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.

[NEFSC] Northeast Fisheries Science Center. 2017. 63rd Northeast Regional Stock Assessment Workshop (63rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-09; 28 p. Available

from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications. (SBRM) Standardized Bycatch Reporting Methodology Program 2016: http://www.nefsc.noaa.gov/fsb/SBRM/

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	UoA#1, Surfclam: ≥80 UoA#2, Ocean Quahog: ≥80
Information gap indicator	The information is sufficient to score this fishery

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	Guide post	Generally understood HCRs are in place or available that are expected to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.	Well defined HCRs are in place that ensure that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs.	The HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time.
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes

Rationale

UoA#1, Surfclam

There is a well-defined harvest control rule in place (since 2012) that is consistent with the harvest strategy and ensures that the exploitation rate is reduced as limit reference points are approached for the surfclam fishery. This rule was update in Framework 4 to the surfclam / ocean quahog fishery management plan (https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5fdcd5e542e81c390ad45974/1608308199619/Omnibus+Risk+Policy+EA_final+submission_10_2020.pdf) This new rule takes into account main uncertainties as follows:

> For stocks with a ratio of B to BMSY of 1.0 or higher (i.e., the stock is at BMSY or higher), the maximum probability of overfishing (based upon peer reviewed assessments) may not exceed 35%. As the ratio of B/ BMSY becomes less than 1.0 and continues to decline, the allowable maximum probability of overfishing declines commensurately, in a linear fashion, until the maximum allowable probability of overfishing becomes zero at a B/BMSY ratio of 0.10. So in a scenario where the biomass is diminishing, falling below BMSY and approaching the threshold, in order to conform with the allowable probability of overfishing, the quota must be commensurately reduced.

Therefore the fishery meets the requirements of the SG 60, 80 and 100 levels for SIa.

UoA#2, Ocean Quahog

There is a well-defined harvest control rule in place (since 2012) that is consistent with the harvest strategy and ensures that the exploitation rate is reduced as limit reference points are approached for the ocean quahog fisheries. . This rule was update in Framework 4 to the surfclam / ocean quahog fishery management plan (https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5fdcd5e542e81c390ad45974/1608308199619/Omnibus+Risk+Policy+EA_final+submission_10_2020.pdf) . This new rule takes into account main uncertainties as follows:

For stocks with a ratio of B to BMSY of 1.0 or higher (i.e., the stock is at BMSY or higher), the maximum probability of overfishing (based upon peer reviewed assessments) may not exceed 35%. As the ratio of B/ BMSY becomes less than 1.0 and continues to decline, the allowable maximum probability of overfishing declines commensurately, in a linear fashion, until the maximum allowable probability of overfishing becomes zero at a B/BMSY ratio of 0.10. So in a scenario where the biomass is diminishing, falling below BMSY and approaching the threshold, in order to conform with the allowable probability of overfishing, the quota must be commensurately reduced.

Therefore the fishery meets the requirements of the SG 60, 80 and 100 levels for SIa.

b	HCRs robustness to uncertainty			
	Guide post		The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a wide range of uncertainties including the ecological role of the stock, and there is evidence that the HCRs are robust to the main uncertainties.
	Met?		UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: No UoA#2, Ocean Quahog: No

Rationale

UoA#1, Surfclam

There is a well-defined harvest control rule in place (since 2012) that is consistent with the harvest strategy and ensures that the exploitation rate is reduced as limit reference points are approached for the surfclam fishery, but it does not account for a wide range of uncertainties. However, it is likely that the HCR is robust to the main uncertainties because the analysis of the stock abundance is probabilistic and therefore incorporates uncertainty into the estimation of stock size. Therefore, the fishery certainly meets the requirements of the SG 80 levels for SIb, but does not meet the SG100 level, and in particular the is no evidence that the HCR is robust to the main uncertainties.

UoA#2, Ocean Quahog

There is a well-defined harvest control rule in place (since 2012) that is consistent with the harvest strategy and ensures that the exploitation rate is reduced as limit reference points are approached for the ocean quahog fisheries, but it does not take account of a wide range of uncertainties including the ecological role of the stock. However it is likely that the HCR is robust to the main uncertainties because the analysis of the stock abundance is probabilistic and therefore incorporates uncertainty into the estimation of stock size. Therefore, the fishery meets the requirements of the SG 80 level for SIb, but not the SG 100 level, and in particular the is no evidence that the HCR is robust to the main uncertainties.

c	HCRs evaluation			
	Guide post	There is some evidence that tools used or available to implement HCRs are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the HCRs.

	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: No UoA#2, Ocean Quahog: No
Rationale				
UoA#1, Surfclam As this is a relatively new HCR that hasn't been tested for these fisheries, evidence may be limited to indicate that the tools are effective in achieving the exploitation levels required under HCR based on the fact that NMFS has been successful at implementing appropriate HCRs in many fisheries, and that these HCRs have been tested and have resulted in both reducing overfishing and rebuilding previously overfished stocks. However, like most successful fisheries management, the available evidence that the tools or measures are appropriate and will be effective cannot be demonstrated until there is a failure in management. Therefore, the fishery certainly meets the requirements of the SG60 and 80 levels for SIc, but does not meet the SG100 level as there is no evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the HCRs. **UoA#2, Ocean Quahog** As this is a new HCR that hasn't been tested for these fisheries, evidence may be limited to indicate that the tools are effective in achieving the exploitation levels required under HCR. However, like most successful fisheries management, while the available evidence that the tools or measures are appropriate and will be effective cannot be demonstrated until there is a failure in management. Therefore, the fishery certainly meets the requirements of the SG60 and 80 levels for SIc, but does not meet the SG100 level as there is no evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the HCRs.				
References				
The FMP, including subsequent Amendments and Frameworks, is available on the Council website at: http://www.mafmc.org. [MAFMC] Mid-Atlantic Fishery Management Council.. 2021, OMNIBUS Acceptable Biological Catch and Risk Policy Framework Adjustment, Framework 4 to the Surfclam / Ocean Quahog Fishery Management Plan (https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5fdcd5e542e81c390ad45974/1608308199619/Omnibus+Risk+Policy+EA_final+submission_10_2020.pdf				
Draft scoring range and information gap indicator added at Announcement Comment Draft Report				
Draft scoring range		UoA#1, Surfclam: ≥80 UoA#2, Ocean Quahog≥80:		
Information gap indicator		Information sufficient to score PI		
Overall Performance Indicator scores added from Client and Peer Review Draft Report				
Overall Performance Indicator score				
Condition number (if relevant)				

PI 1.2.3 – Information and monitoring

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Range of information			
	Guide post	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes
Rationale				

UoA#1, Surfclam

A comprehensive range of information related to stock structure, stock productivity, fleet composition, stock abundance UoA removals and other information including environmental information and other data are described and used in stock assessments and therefore available to support the harvest strategy for surfclams (e.g. NEFSC 2013 and NEFSC 2016). The combination of regular scientific surveys and complete fishery dependent landings data allows for the development of robust assessment models with few uncertainties. The fishery is ITQ based, and the landed surfclams are tracked from the boat to processing by the National Shellfish Sanitation Program. There is no opportunity for unreported landings. See the background on stock assessment for further detail.

Therefore the fishery meets the requirements of the SG 60, 80 and 100 levels for SIa.

UoA#2, Ocean Quahog

A comprehensive range of relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy for ocean quahogs and are described in the stock assessment reports and to conduct the stock assessment (e.g. Chute et al 2013, NEFSC 2017). The combination of regular scientific surveys and complete fishery dependent landings data allows for the development of robust assessment models with few uncertainties. The fishery is ITQ based, and the landed ocean quahogs are tracked from the boat to processing by the National Shellfish Sanitation Program. There is no opportunity for unreported landings. Therefore the fishery meets the requirements of the SG 60, 80 and 100 levels for SIa.

b	Monitoring			
	Guide post	Stock abundance and UoA removals are monitored and	Stock abundance and UoA removals are regularly	All information required by the harvest control rule is

		at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes
Rationale				

UoA#1, Surfclam

Peer-reviewed age-structured stock assessments are undertaken regularly (every 3 years) in order to determine stock status, and fishery removals are monitored through mandatory reporting requirements to a fine spatial scale supported by VMS data. This is considered to be a level of coverage sufficient to support the harvest control rule. There are no recreational or other fishery removals of either species outside of the ITQ holders.

There is also a demonstrated good understanding of inherent uncertainties in stock assessment reports. For example, the 2013 stock assessment report (NEFSC 2013) begins with a description of the assessment Terms of Reference (TORs), explicitly noting characterization of uncertainty and bias in sources of data and estimations, the use of sensitivity analyses, and identification of research recommendations. Based on these TORs, uncertainties are discussed throughout the stock assessment report, including progress relative to uncertainties in past models (NEFSC 2013). Main uncertainties from the 2016 stock assessment reports are summarized in the background of this report in the section for surfclam.

Therefore the fishery meets the SG 60, 80 and 100 levels for SIb.

UoA#2, Ocean Quahog

Regular peer-reviewed age-structured stock assessments are undertaken regularly in order to determine stock status, and fishery removals are monitored through mandatory reporting requirements to a fine spatial scale supported by VMS data. This is considered to be a level of coverage sufficient to support the harvest control rule. There are no recreational or other fishery removals of either species outside of the ITQ holders. Stock assessment reports, including the 2013 update to the ocean quahog stock assessment, discuss uncertainties in data sources and model estimations throughout, and provide recommendations for future research and assessments (e.g. Chute et al 2013).

Therefore the fishery meets the SG 60, 80 and 100 levels for SIb.

c	Comprehensiveness of information			
	Guide post		There is good information on all other fishery removals from the stock.	
	Met?		UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	
Rationale				

UoA#1, Surfclam

Surfclams are only captured by dredges, and generally are not a bycatch of other gears in other fisheries, as is evidenced by the bycatch data for other fisheries. Therefore, the fishery meets the SG80 level for SIc.

UoA#2, Ocean Quahog

Ocean quahogs are only captured by dredges, and generally are not a bycatch of other gears in other fisheries, as is evidenced by the bycatch data for other fisheries. Therefore, the fishery meets the SG80 level for SIc.

References

The FMP, including subsequent Amendments and Frameworks, is available on the Council website at: http://www.mafmc.org.

Chute A., Hennen D., Russell R. and Jacobson L. 2013. Stock assessment update for ocean quahogs (Arctica islandica) through 2011. U.S. Dept Commerce, Northeast Fish Sci Cent Ref Doc.

[NEFSC] Northeast Fisheries Science Center. 2013. 56th Northeast Regional Stock Assessment Workshop (56th SAW) Assessment Report. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-10; 868 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/

[NEFSC] Northeast Fisheries Science Center. 2016. 61st Northeast Regional Stock Assessment Workshop (61st SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-13; 26 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications
.
[NEFSC] Northeast Fisheries Science Center. 2017. 63rd Northeast Regional Stock Assessment Workshop (63rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-09; 28 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	UoA#1, Surfclam: ≥80 UoA#2, Ocean Quahog: ≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	
Condition number (if relevant)	

PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Appropriateness of assessment to stock under consideration			
	Guide post		The assessment is appropriate for the stock and for the harvest control rule.	The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.
	Met?		UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes
Rationale				

UoA#1, Surfclam

Information on the status of Atlantic surfclam resource in the U.S. EEZ is summarized in the Assessment Summary Report from the 61st Northeast Regional Stock Assessment Workshop (NEFSC 2016), and in the 2021 track assessment update (summarized in MAFMC 2021a). Regular, peer reviewed (internally prior to a stock assessment workshop and externally at the workshop) age-structured stock assessments are undertaken for surfclams. These assessments take uncertainty into account and are thought to be appropriate for the biology of the species, the stocks and harvest control rule, therefore the fishery meets the SG 80 and 100 requirements for SIa.

UoA#2, Ocean Quahog

Information on the status of the ocean quahog is summarized in the Assessment Summary Report from the 63rd Northeast Regional Stock Assessment Workshop (NEFSC 2017), and in the 2021 track assessment update 9summarized in MAFMC, 2021b). Regular, peer reviewed age-structured stock assessments are undertaken for ocean quahogs. These assessments take uncertainty into account and are believed to be appropriate for the stocks and harvest control rule, therefore the fishery meets the SG 80 and 100 requirements for SIa.

b	Assessment approach			
	Guide post	The assessment estimates stock status relative to generic reference points appropriate to the species category.	The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.	
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	
Rationale				

UoA#1, Surfclam

Being a highly localized fishery, stock conditions are often described for regions rather than for the whole stock area (NEFSC 2013, 2016). The surfclam EEZ resource is summarized by six regions and two stock assessment areas. From north to south, the regions are: Georges Bank (GBK), Southern New England (SNE), Long Island (LI), New Jersey (NJ), Delmarva (DMV) and southern Virginia (SVA) and the two stock assessment areas are northern (GBK) and southern (remaining regions). Stock assessment results from the two areas were combined to evaluate the status of the stock for the entire EEZ resource. The resource is defined as a single stock, although there are differences between regions in biological characteristics and fishing activity.

The 56th SAW in 2013 and the 61st SAW conducted a stock assessment on the Atlantic surfclam resource in the U.S. EEZ. Surfclams and fisheries in state waters are assessed separately. The 2013and 2016 assessment used a statistical catch-at-age and length model (SS3) replacing the biomass dynamic model (KLAMZ) used previously. The new model incorporated age and length structure. Age composition data from the 1982 to 2019 NEFSC clam surveys, and commercial length composition from port samples (when available) were utilized in the assessment for the first time. Stock assessment results from the northern and southern areas were combined to evaluate the status of the stock for the entire EEZ. New reference points were estimated that are believed to be more appropriate for the stock.

Therefore, the assessment meets the requirements of the SG 60 and 80 levels for SIb.

UoA#2, Ocean Quahog

Stock assessments for ocean quahog in the EEZ were completed by the NEFSC in 1995, 1998, 2000, 2004, 2007, 2009 and 2017. In the SAW 63 assessment, a statistical catch at age and length model called SS3 was used and incorporated length structure and was conducted as two assessment area pieces and then combined (NEFSC 2017). More detailed descriptions of the stock assessment are available in the SAW 63 documents (i.e., summary, report, SARC panel reviews) available at: http://www.nefsc.noaa.gov/saw. New SAW 63 biological reference points were developed and revised from the prior SAW. The new reference points are ratios rather than absolute values. This approach allows for conclusions about the status of the ocean quahog stock despite substantial uncertainty in the actual biomass of the stock.

The 2017 benchmark assessment and the 2021 track assessment update concluded that the EEZ ocean quahog resource was not overfished and that overfishing was not occurring.

Therefore, the assessment meets the requirements of the SG 60 and 80 levels for SIb.

c	Uncertainty in the assessment			
	Guide post	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes

Rationale

UoA#1, Surfclam

The stock assessment as described above in the body of this report takes uncertainty into account and estimates stock status relative to reference points in a probabilistic way. Therefore, the fishery meets the SG 60, 80 and 100 levels for SIc.

UoA#2, Ocean Quahog

The stock assessment described in the body of this report takes uncertainty into account and estimates stock status relative to reference points in a probabilistic way. Therefore, the assessment meets the requirements of the SG 60, 80 and 100 levels for SIc.

d	Evaluation of assessment			
	Guide post			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes

Rationale

UoA#1, Surfclam

As noted previously, the assessment process is robust, and explores alternative assessment approaches. Therefore, the fishery meets the SG 100 level for SId.

UoA#2, Ocean Quahog

As noted previously, the assessment process is robust and explores alternative assessment approaches. Therefore, the fishery meets the SG 100 level requirements for SId.

e	Peer review of assessment			
	Guide post		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes	UoA#1, Surfclam: Yes UoA#2, Ocean Quahog: Yes

Rationale

UoA#1, Surfclam

As noted in SIa, the NMFS NEFSC benchmark stock assessment for surfclams is peer reviewed internally and externally. Therefore, the assessment meets the requirements for SG 80 and 100 for SIe.

UoA#2, Ocean Quahog

As noted in the justification for SIa, the NMFS NEFSC benchmark stock assessment for ocean quahogs is peer reviewed both internally and externally. Therefore, the assessment meets the requirements of SG 80 and 100 levels for SIe.

References

Chute A., Hennen D., Russell R. and Jacobson L. 2013. Stock assessment update for ocean quahogs (Arctica islandica) through 2011. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc.)

[MAFMC] Mid-Atlantic Fishery Management Council. 2021a. Atlantic Surfclam Fishery Information Document. April 2021. Available at: https://www.mafmc.org/s/d_2021_SC_FishInfoDoc_2021_04_13.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 2021b. Ocean Quahog Fishery Information Document. April 2021. Available at: https://www.mafmc.org/s/d_2021_OQ_FishInfoDoc_2021_04_13.pdf

NMFS, Northeast Fisheries Science Center. 2013. 56th Northeast Regional Stock Assessment Workshop (56th SAW) Assessment Summary Report. U.S. Dept Commerce, Northeast Fish Sci Cent Ref Doc. 13-04; 42 p. http://nefsc.noaa.gov/publications/)

[NEFSC] Northeast Fisheries Science Center. 2016. 61st Northeast Regional Stock Assessment Workshop (61st SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-13; 26 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications
.
[NEFSC] Northeast Fisheries Science Center. 2017. 63rd Northeast Regional Stock Assessment Workshop (63rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-09; 28 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	UoA#1, Surfclam: ≥80 UoA#2, Ocean Quahog: ≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

7.3 Principle 2

7.3.1 Background

Numerous species are caught incidentally and impacted by the operation of the fishery by the hydraulic clam dredge fishery for Surfclams and Ocean Quahogs. Compared with other fisheries managed by the MAFMC, non-target interactions in the Surfclam and Ocean Quahog hydraulic dredge fishery are relatively low. For species managed under their own FMP, incidental catch/discards are considered as part of the management of that fishery.

Species composition of bycatch in clam dredges varies by region. In the Mid-Atlantic, habitat of Atlantic Surfclams and Ocean Quahogs overlaps with habitat of Summer Flounder, Scup, Black Sea Bass, Squid, Mackerel, Butterfish, Bluefish and Dogfish. In the Northeast, clam habitat is shared with Atlantic Cod, Haddock, Monkfish, Ocean Pout, American Plaice, Pollock, Redfish, White Hake, Windowpane Flounder, Winter Flounder, Witch Flounder, Yellowtail Flounder, Atlantic Halibut and Atlantic Sea Scallops. Many highly migratory species use habitat that overlaps with the Atlantic Surfclams and Ocean Quahogs; being very mobile, they travel faster than the hydraulic dredges and are not expected to be impacted (Malchoff 1999, NMFS 2000).

Clam dredges used in the subject fisheries are designed to capture 80-95% of the target catch, retain minimal unmarketable clams, and result in low bycatch of other species (Wallace and Hoff 2005). Bycatch of juvenile finfish is minimal because the fishery occurs on sandy bottom areas, rather than areas with structured bottom, such as corals and rocks, that juvenile finfish are often associated with. Nuckols III (1998) reported that tows for Surfclams in waters less than 30 meters depth may result in higher bycatch than tows in deeper water.

There is no minimum size in effect for landing Surfclams or Ocean Quahogs. The marketable clam size is industry set, according to the processor's requirements. The bar spacing in the cage or bag section of the hydraulic calm dredge is set to provide a size distribution of clams that is marketable to processors. As a result, there is no discarding of "undersize" clams because there are no undersize clams (NEFSC 2013). There may be some incidental mortality for clams left on the bottom due predation, if the clams do not re-burrow, but incidental mortality is accounted for in the respective stock assessment reports (estimated at 12% for Surfclam and 5% for Ocean Quahog) (NEFSC 2013, Chute et al. 2013).

Wallace and Hoff (2004) reported that fishing on Surfclams and Ocean Quahogs resulted in no significant bycatch of other species. During three clam surveys conducted by the Northeast Fishery Science Center, approximately ninety percent of the total number of animals caught were Surfclams and Ocean Quahogs, with approximately 85% of them collected alive (Wallace and Hoff 2004). The 1,577 survey tows caught only 210 fish, with Little Skate comprising over half of these. One percent of the catch was Atlantic sea scallops (Wallace and Hoff 2004). The scientific survey gear contained a liner in the dredge to collect all objects encountered, meaning that the commercial clam dredges probably retain less than the survey

gear. The dredge bars in the commercial gear are also spaced further apart to retain only the targeted species. As a further incentive, processers may decrease payment to vessels for large amounts of other objects in the tows other than the targeted clams (Wallace and Hoff 2004). The low bycatch in the scientific surveys is thought to be reflected in the commercial catch, although it is not recorded (Malchoff 1999, NMFS 2000).

7.3.1.1 Observer Programs/Information Sources

For the purpose of this MSC full assessment, it was necessary to evaluate catch data collected at sea during commercial fishing operations to determine the species composition of the catch for each directed target species fishery. The primary database used to assess catch characteristics and discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. The observer data for the Surfclam and Ocean Quahog hydraulic clam dredge fisheries were provided by Gina Shield of the NMFS NEFSC. The data are summarized and presented for Surfclam in Table 15, and Table 17 for Ocean Quahog and described below.

According to the data used in the 2018, 2019, and 2020 SBRM reports, observer coverage for Surfclam & Ocean Quahog trips ranged from 0.5% - 2% during period from July, 2018 - June, 2020 (SBRM 2018, SBRM 2019, SBRM 2020). This relatively low coverage is due to the NEFOP allocating fewer sea days to fleets that have the smallest fraction of discards and the smallest fraction of total mortality due to discards. Though low, this coverage meets the SBRM requirement of providing discard estimates with the required CV for federally managed species, as this UoA has demonstrated to be highly selective for the target species with very little bycatch.

Surfclam (UoA #1)

There were 55 observed Surfclam trips between 2018-2020 (27 in 2018, 21 in 2019, and 7 in 2020). The average percentage of target species catch in the Surfclam fishery was 95%, ranging from 92.8% - 96.1% over the 2018-2020 period. The bycatch of any single species did not exceed 1% of the total catch in any of the three years except for Ocean Quahog, which represented 5.4% of the catch in 2020 and less than 2% in other years (1.8% average for 2018-2020). The results describing the bycatch in this clam dredge fishery are similar to those presented in the first annual audit report and in the initial assessment report and do not represent any significant change in the assessment team's understanding of the fishery (Table 15).

Ocean Quahog (UoA #2)

For Ocean Quahog, there were 36 observed trips (17 in 2018, 13 in 2019, and 6 in 2020). The average percentage of target species catch in the Ocean Quahog fishery was 98.8%, ranging from 98.4% - 99.7% over the 2018-2020 period. The bycatch of any single species did not exceed 1% of the total catch in any

of the three years. The results describing the bycatch in this clam dredge fishery are similar to those presented in the first annual audit report and in the initial assessment report and do not represent any significant change in the assessment team's understanding of the fishery (Table 17).

7.3.1.2 Overview of Non-target Catch

All species that are affected by the fishery and that are not part of the Unit of Certification are considered under Principle 2. This includes species that are retained for sale or personal use (assessed under Performance Indicator 2.1), bycatch species that are discarded (Performance Indicator 2.2), and species that are considered endangered, threatened or protected by the government in question or are listed by the Convention of International Trade of Endangered Species (CITES) (Performance Indicator 2.3). This section contains an evaluation of the total impact of the fishery on all components in P2 and includes both observed and unobserved fishing mortality. Unobserved mortality may occur from illegal, unregulated or unreported (IUU) fishing, biota that are injured and subsequently die as a result of coming in contact with fishing gear, ghost fishing, waste, or biota that are stressed and die as a result of attempting to avoid being caught by fishing gear.

Primary species

For the purposes of a MSC evaluation, primary species are those in the catch, and within the scope of the MSC program (fishes or shellfish), and not defined by the client as the target – which by definition is evaluated under Principle 1. Primary species will usually be species of commercial value to either the UoA or fisheries outside the UoA, with management tools controlling exploitation as well as known reference points in place. In addition, the institution or arrangement that manages the species (or its local stock) will usually have some overlap in a jurisdiction with the UoA fishery.

Secondary species

Species associated with the target that is harvested under some management regime, where measures are in place intended to achieve management, and these are reflected in either limit or target reference points are evaluated as Primary species within Principle 2. In contrast, secondary species include fish and shellfish species that are not managed according to reference points. Secondary species are also considered to be all species that are out of the scope of the standard (birds/ mammals/ reptiles/ amphibians) and that are not ETP species. These types of species could in some cases be landed intentionally to be used either as bait or as food for the crew or for other subsistence uses but may also in some cases represent incidental catches that are undesired but somewhat unavoidable in the fishery. Given the often unmanaged status of these species, there are unlikely to be reference points for biomass or fishing mortality in place, as well as a general lack of data availability.

Main species

For Primary and Secondary species, species may be considered "Main" based on either resilience/vulnerability and catch volume. Species that are not "Main" are Minor. Main and Minor species must meet different Performance Indicators (PIs) in P2.

7.3.1.3 Overview of Species Classification

The analysis for P2 is made considering that the UoAs and the UoCs (to be determined) are the same and composed of the U.S. northeast hydraulic clam dredge fleet with federal permits to land U.S. Atlantic Surfclam (UoA 1) and Ocean Quahog (UoA 2).

From the bycatch distribution summary and the percent live bycatch amount provided by NMFS-NEFSC for Surfclam and Ocean Quahog fisheries, the species composition of the catch for each fishery was estimated (Table 15 and Table 17, respectively). Based on the percentage of the species captured for each fishery and the status of the management of the fishery for those species, the primary and secondary, major and minor classifications were assigned.

An important characteristic of hydraulic dredge gear which distinguishes it from other types of fishing gear (e.g., otter trawl, longline, purse seine, etc.) is its specific design to release non-target organisms and debris that do not conform to the specific size and shape of the target species. This is to prevent the overabundance of non-target catch being brought up in each haul, thereby increasing the efficiency of each tow. This makes it difficult to quantify the amount and composition of bycatch associated with hydraulic dredge fishing operations, as much of the bycatch is swept out of the cage after interaction with the hydraulic dredge gear. Research surveys are regularly conducted by the NEFSC, with the primary purpose being to collect abundance, biomass, shell length, and meat weight data for both species, as well as age data for Surfclams to be used in stock assessments for the EEZ stocks. Because the hydraulic clam dredge sampling gear is designed to reduce bycatch, data are not collected for non-target species (Jacobson and Hennen, 2019).

Table 15. Catch summary for the Surfclam fishery for species comprising at least 0.01% of the catch, based on observed trips in 2018-2020. Percent UoA catch from the initial assessment is included for comparison. Data obtained from NEFOP records between 2018-2020.

Common Name	Total Catch (lbs.)	% UoA Catch	% UoA Catch (initial assmt)	MSC Classification
SURFCLAM *(Spisula solidissima)*	2,969,433	95.00%	97.00%	Primary-minor
OCEAN QUAHOG *(Arctica islandica)*	56,295	1.80%	0.61%	Primary-minor
WINTER SKATE (*Raja ocellata)*	30,063	0.96%	0.01%	Primary-minor
MUSSEL, NK	16,738	0.54%	NA	Secondary-minor
MOONSHELL SNAIL, NK *(Naticidae)*	10,342	0.33%	0.04%	Secondary-minor
SPINY DOGFISH (*Squalus Acanthias)*	7,186	0.23%	0.10%	Primary-minor
HORSESHOE CRAB (*Limulus Polyphemus)*	7,011	0.22%	0.03%	Primary-minor
LITTLE SKATE (*Raja eriancea)*	6,837	0.22%	0.33%	Primary-minor

Common Name	Total Catch (lbs.)	% UoA Catch	% UoA Catch (initial assmt)	MSC Classification
SNAIL, NK	4,913	0.16%	0.02%	Secondary-minor
MONKFISH *(Lophius Americanus)*	3,784	0.12%	0.21%	Primary-minor
SEA SCALLOP (*Placopecten magellanicus)*	3,058	0.10%	1.24%	Primary-minor
LITTLE/WINTER SKATE, NK (*Leucoraja)*	2,387	0.08%	0.01%	Primary-minor
SAND DOLLAR (*Mellita spp.*)	1,180	0.04%	0.02%	Secondary-minor
SMOOTH SKATE (*Malacoraja senta*)	910	0.03%	NA	Primary-minor
LADY CRAB (*Ovalipes ocellatus*)	902	0.03%	NA	Secondary-minor
ROCK CRAB (*Cancer irroratus*)	852	0.03%	0.01%	Secondary-minor
SPONGE, NK	414	0.01%	0.03%	Secondary-minor
STARGAZER, NK	400	0.01%	0.22%	Secondary-minor
NORTHERN STARGAZER (*Astroscopus guttatus*)	374	0.01%	NA	Secondary-minor
SUMMER FLOUNDER (*Paralichthys Dentatus)*	253	0.01%	NA	Primary-minor
SMOOTH DOGFISH (*Mustelus canis)*	236	0.01%	NA	Primary-minor
JONAH CRAB (*Cancer Borealis)*	235	0.01%	NA	Secondary-minor
NORTHERN SEA ROBIN (*Prionotus carolinus*)	226	0.01%	NA	Secondary-minor
CLEARNOSE SKATE (*Raja eglanteria)*	222	0.01%	NA	Primary-minor
AMERICAN LOBSTER (*Homarus Americanus)*	178	0.01%	NA	Primary-minor
Total UoA Catch	**3,124,429**	**99.96%**	**99.98%**	

Table 16. Comparison of Surfclam catch (lbs.) over the three-year period of observed trips (2018-2020) with data from the previous (2015) assessment.

Common Name	2018	2019	2020	Mean Catch (2018-2020)
SURFCLAM	1,475,276	1,104,419	389,738	989,811
OCEAN QUAHOG	19,955	13,834	22,506	18,765
WINTER SKATE	22,030	6,992	1,041	10,021
MUSSEL, NK	8,715	7,965	58	5,579
MOONSHELL SNAIL, NK	3,533	5,917	892	3,447
SPINY DOGFISH	6,725	62	399	2,395
HORSESHOE CRAB	1,573	4,720	718	2,337
LITTLE SKATE	4,926	995	916	2,279
SNAIL, NK	3,078	1,795	40	1,638
MONKFISH	2,168	893	723	1,261
SEA SCALLOP	1,131		1,927	1,529
LITTLE/WINTER SKATE, NK	2,362	9	16	796
SAND DOLLAR	1,060		120	590
SMOOTH SKATE	910			910
LADY CRAB	877	10	15	301
ROCK CRAB	369	481	2	284
SPONGE, NK	372	2	40	138
STARGAZER, NK		107	293	200

Common Name	2018	2019	2020	Mean Catch (2018-2020)
NORTHERN STARGAZER	69	193	112	125
SUMMER FLOUNDER	201	37	15	84
SMOOTH DOGFISH	236			236
JONAH CRAB	146	64	25	78
NORTHERN SEA ROBIN	112	102	12	75
CLEARNOSE SKATE		214	8	111
AMERICAN LOBSTER	106	72		89
Total UoA Catch	**3,364,855**	**2,672,985**	**1,459,402**	**7,497,242**

Table 17. Catch summary for the Ocean Quahog fishery for species comprising at least 0.01% of the catch, based on observed trips in 2018-2020. Percent UoA catch from the initial assessment is included for comparison. Data obtained from NEFOP records between 2018-2020.

Common Name	Total Catch (lbs.)	% of UoA Catch	% UoA Catch (initial assmt)	MSC Classification
OCEAN QUAHOG *(Arctica islandica)*	7,409,837	98.80%	92.00%	Primary-minor
SEA SCALLOP (*Placopecten magellanicus)*	34,236	0.46%	4.46%	Primary-minor
MONKFISH *(Lophius Americanus)*	15,190	0.20%	0.48%	Primary-minor
LITTLE SKATE (*Raja eriancea)*	13,716	0.18%	1.62%	Primary-minor
WINTER SKATE (*Raja ocellata)*	10,247	0.14%	0.10%	Primary-minor
SPINY DOGFISH (*Squalus Acanthias)*	4,592	0.06%	0.11%	Primary-minor
SURFCLAM *(Spisula solidissima)*	3,559	0.05%	NA	Primary-minor
MOONSHELL SNAIL, NK *(Naticidae)*	1,680	0.02%	NA	Secondary-minor
LITTLE/WINTER SKATE, NK (*Leucoraja)*	951	0.01%	NA	Primary-minor
JONAH CRAB (*Cancer Borealis)*	889	0.01%	0.05%	Secondary-minor
SEASTAR,NK	703	0.01%	0.05%	Secondary-minor
SUMMER FLOUNDER (*Paralichthys Dentatus)*	667	0.01%	0.03%	Primary-minor
SPONGE, NK	578	0.01%	NA	Secondary-minor
SKATE, NK (*Rajidae)*	397	0.01%	0.70%	Primary-minor
Total UoA Catch	**7,497,242**	**99.97%**	**99.60%**	

Table 18. Comparison of Ocean Quahog catch (lbs.) over the three-year period of observed trips (2018-2020) with data from the previous (2015) assessment.

Common Name	2018	2019	2020	Mean Catch (2018-2020)
OCEAN QUAHOG	3,310,986	2,643,163	1,455,688	2,469,946
SEA SCALLOP	22,189	11,493	554	11,412
MONKFISH	9,614	5,270	306	5,063
LITTLE SKATE	7,531	5,452	733	4,572
WINTER SKATE	6,183	3,815	249	3,416
SPINY DOGFISH	2,501	1,143	948	1,531

Common Name	2018	2019	2020	Mean Catch (2018-2020)
SURFCLAM	3,557	2		1,780
MOONSHELL SNAIL, NK	276	746	658	560
LITTLE/WINTER SKATE, NK	624	269	58	317
JONAH CRAB	292	429	168	296
SEASTAR,NK	229	470	4	234
SUMMER FLOUNDER	438	193	36	222
SPONGE, NK	44	534		289
SKATE, NK	391	6		199
Total UoA Catch	**3,364,855**	**2,672,985**	**1,459,402**	**7,497,242**

Table 19. Elements in UoA 1 fishery (Surfclam)

Component	Designation	Scoring elements	Data-deficient
Primary	Minor	OCEAN QUAHOG	No
Primary	Minor	WINTER SKATE	No
Primary	Minor	SPINY DOGFISH	No
Primary	Minor	HORSESHOE CRAB	No
Primary	Minor	LITTLE SKATE	No
Primary	Minor	MONKFISH	No
Primary	Minor	SURFCLAM	No
Primary	Minor	SEA SCALLOP	No
Primary	Minor	SMOOTH SKATE	No
Primary	Minor	SUMMER FLOUNDER	No
Primary	Minor	SMOOTH DOGFISH	No
Primary	Minor	CLEARNOSE SKATE	No
Primary	Minor	AMERICAN LOBSTER	No

Table 20. Elements in UoA #2 fishery (Ocean Quahog)

Component	Designation	Scoring elements	Data-deficient
Primary	Minor	SEA SCALLOP	No
Primary	Minor	MONKFISH	No
Primary	Minor	LITTLE SKATE	No
Primary	Minor	WINTER SKATE	No
Primary	Minor	SPINY DOGFISH	No
Primary	Minor	SURFCLAM	No
Primary	Minor	SUMMER FLOUNDER	No

7.3.1.4 Primary Species

Primary Species in Surfclam Fishery

Data from Table 15 were used to determine the MSC defined primary and secondary species related to the catch of the target species, Surfclams. Based on this analysis, the average catch of all non-target species was less than 5%, precluding designation of any species as Main Primary (evaluated under SG80 for PIs 2.1.1, 2.1.2, and 2.1.3). Additionally, none of the non-target species were considered to be "less resilient" and caught at levels close to the 2% inclusion level for less resilient species to be designated as Main Primary. Therefore, all non-target species were classified as either primary or secondary "minor". Note that Ocean Quahog is not scored as a non-target species, as it is also its own target species.

Minor species do not receive the same depth of consideration as main species in the MSC system. Primary minor species are considered under the SG100 scoring issues and include Winter Skate, Spiny Dogfish, Horseshoe Crab, Little Skate, Monkfish, Sea Scallop, Smooth Skate, Summer Flounder, and Smooth Dogfish. A brief description of each primary minor species identified in the Surfclam fishery follows:

Sea Scallop: Sea Scallop is included in an MSC certified fishery and is managed in federal waters by the New England Fishery Management Council and NOAA Fisheries under the Atlantic Sea Scallop Fishery Management Plan.the stock of this species is neither overfished nor experiencing overfishing, relative to reference points (NEFSC 2018).

Atlantic Spiny Dogfish: The Atlantic Spiny Dogfish is an MSC certified fishery that is currently undergoing re-assessment. In the most recent stock assessment update, the population of spiny dogfish was found not to be overfished or experiencing overfishing (NEFSC 2018). While the 2018 stock assessment determined that the spiny dogfish stock was not overfished or experiencing overfishing, it was noted that biomass had declined in recent years requiring a significant reduction in the 2019-2020 quota to ensure overfishing did not occur. Ultimately, a 46% reduction in quota was allocated for the 2019-2020 fishing season.

Horseshoe Crab: Horseshoe Crab is an invertebrate species that is valuable for biomedical applications and as bait. Horseshoe Crab is managed by the ASMFC under the Interstate Fishery Management Plan for Horseshoe Crab (1998) and its subsequent addenda. While no reference points have been established for management purposes, surveys have been used to determine the status by using indices of probability of Horseshoe Crab abundance relative to 1998 levels (ASFMC 2021). In 2019, the Horseshoe Crab Benchmark Stock Assessment (ASFMC 2019) evaluated the stock status of the resource by region using the criteria described, finding populations within the Delaware Bay and Southeast regions remaining consistently neutral and good, respectively, through time. The Northeast region population has changed from poor to neutral, while the status of the New York region population has trended downward from good, to neutral, and now to poor.

Monkfish: Monkfish is also a managed species and, according to the 2016 stock assessment, it was not overfished nor experiencing overfishing, relative to its reference points. However, due to recent (NEFSC 2019) invalidation of the growth curve, Biological Reference Points used in previous assessments are no longer considered relevant for assessing the status of the species.

Summer Flounder: Summer Flounder is jointly managed by the MAFMC and the Atlantic States Marine Fisheries Commission (ASMFC). In 2019, the NEFSC completed a stock assessment update (SAW/SARC-66) for summer flounder which indicated that the summer flounder stock was neither overfished nor experiencing overfishing in 2017 (NEFSC 2019).

Northeast Skate Complex: Winter Skate, Little Skate, Smooth Skate, and Clearnose Skate are managed under the Northeast Skate Complex FMP. Skates in the Complex lack data, and their status is currently assessed based on indices of change in the three-year moving average for NEFSC Groundfish Survey biomass. Recent requirements to report skate landings by species should improve estimates of fishing mortality for these species. Skates are caught and discarded as bycatch in numerous fisheries, but the rate of discards has decreased in recent years as the value of skate products has increased. According to the most recent abundance indices from the Northeast Fisheries Science Center (NEFSC), skates identified as minor primary in the fishery under assessment are not currently considered overfished and are not experiencing overfishing (NEFMC 2020). A summary of stock status in the NEFMC's most recent Annual Monitoring Report (NEFMC 2020) was provided as follows:

For Winter skate, the 2017-2019 NEFSC fall average biomass index of 8.61 kg/tow is above the biomass threshold reference point (2.83 kg/tow) and above the BMSY proxy (5.66 kg/tow). The 2017-2019 average index is above the 2016-2018 index by 19.2%. It is recommended that this stock is not overfished, and overfishing is not occurring.

For Little skate, there was little 2020 survey coverage; therefore, stock status cannot be updated. The 2017-2019 NEFSC spring average biomass index of 5.32 kg/tow is above the biomass threshold reference point (3.07 kg/tow) but below the BMSY proxy (6.15 kg/tow). The 2017-2019 average index is above the 2016-2018 average by 13.4%. It was recommended in 2019 that this stock is not overfished, and overfishing is not occurring.

For Smooth skate, the 2017-2019 NEFSC fall average biomass index of 0.27 kg/tow is above the biomass threshold reference point (0.134 kg/tow) and at the BMSY proxy (0.27 kg/tow). The 2017-2019 index is about equal to the 2016-2018 index. It is recommended that this stock is not overfished and is rebuilt, and overfishing is not occurring.

For Clearnose skate, the 2017-2019 NEFSC fall average biomass index (no data for 2017) of 1.05 kg/tow is above the biomass threshold reference point (0.33 kg/tow) and the BMSY proxy (0.66 kg/tow). The 2017-2019 index is above the 2016 and 2018 index by 73.1%. It is recommended that this stock is not overfished, and overfishing is not occurring.

Smooth Dogfish: The Smooth Dogfish is managed in state waters under the ASMFC's Interstate Fishery Management Plan for Atlantic Coastal Sharks (ASMFC, 2013). Federal management for Smooth Dogfish falls under the Consolidated Atlantic Highly Migratory Species Fishery Management Plan per Amendment 3 (NMFS 2010). The Atlantic smooth dogfish stock was recently assessed and is not considered overfished nor is overfishing occurring (SEDAR 2015).

American Lobster: American Lobster is cooperatively managed by the states (under the ASMFC) and the NOAA Fisheries under Amendment 3 to the Interstate Fishery Management Plan (FMP) and its Addenda (1997). According to the 2015 stock assessment conducted by the ASMFC, there is record high stock abundance and recruitment in the Gulf of Maine and Georges Bank, and record low abundance and recruitment failure in Southern New England. The Gulf of Maine and Georges Bank stock is not overfished. However, the ASMFC considers the Southern New England stock severely depleted due to environmental factors and fishing pressure. Neither stock is subject to overfishing. Updates on the status of American Lobster stocks can be accessed on the ASMFC website.

Primary Species in Ocean Quahog Fishery

Data from Table 17 were used to determine the MSC defined primary and secondary species related to the catch of the target species, Ocean Quahogs. Based on this analysis, the average catch of all non-target species was less than 5%, precluding classification of any species as designated as Main Primary (evaluated

under SG80 for PIs 2.1.1, 2.1.2, and 2.1.3). Additionally, none of the non-target species were considered to be “less resilient” and caught at levels close to the 2% inclusion level for less resilient species to be designated as Main Primary (MSC SA3.4.2). Therefore, all non-target species were classified as either primary or secondary “minor”. Note that Surfclams are not scored as a non-target species, as it is also its own target species.

Primary minor species are considered under the SG100 scoring issues and these include Sea Scallop, Monkfish, Little Skate, Winter Skate, Spiny Dogfish, and Summer Flounder. A brief description of each primary minor species identified in the Ocean Quahog fishery follows:

Sea Scallop: Sea Scallop is included in an MSC certified fishery and the stock of this species is neither overfished nor experiencing overfishing, relative to reference points.

Monkfish: Monkfish is also a managed species and, according to the 2016 stock assessment, it was not overfished nor experiencing overfishing, relative to its reference points. However, due to recent (NEFSC 2019) invalidation of the growth curve, Biological Reference Points used in previous assessments are no longer considered relevant for assessing the status of the species.

Northeast Skate Complex: Winter Skate, Little Skate, Smooth Skate, and Clearnose Skate are managed under the Northeast Skate Complex FMP. Skates in the Complex lack data, and their status is currently assessed based on indices of change in the three-year moving average for NEFSC Groundfish Survey biomass. Recent requirements to report skate landings by species should improve estimates of fishing mortality for these species. Skates are caught and discarded as bycatch in numerous fisheries, but the rate of discards has decreased in recent years as the value of skate products has increased. According to the most recent abundance indices from the Northeast Fisheries Science Center (NEFSC), skates identified as minor primary in the fishery under assessment are not currently considered overfished and are not experiencing overfishing (NEFMC 2020). A summary of stock status in the NEFMC’s most recent Annual Monitoring Report (NEFMC 2020) was provided as follows:

> For Winter skate, the 2017-2019 NEFSC fall average biomass index of 8.61 kg/tow is above the biomass threshold reference point (2.83 kg/tow) and above the BMSY proxy (5.66 kg/tow). The 2017-2019 average index is above the 2016-2018 index by 19.2%. It is recommended that this stock is not overfished, and overfishing is not occurring.
>
> For Little skate, there was little 2020 survey coverage; therefore, stock status cannot be updated. The 2017-2019 NEFSC spring average biomass index of 5.32 kg/tow is above the biomass threshold reference point (3.07 kg/tow) but below the BMSY proxy (6.15 kg/tow). The 2017-2019 average index is above the 2016-2018 average by 13.4%. It was recommended in 2019 that this stock is not overfished, and overfishing is not occurring.

Atlantic Spiny Dogfish: The Atlantic Spiny Dogfish is an MSC certified fishery that is currently undergoing re-assessment. In the most recent stock assessment update, the population of spiny dogfish was found not to be overfished or experiencing overfishing (NEFSC 2018). While the 2018 stock assessment determined that the spiny dogfish stock was not overfished or experiencing overfishing, it was noted that biomass had declined in recent years requiring a significant reduction in the 2019-2020 quota to ensure overfishing did not occur. Ultimately, a 46% reduction in quota was allocated for the 2019-2020 fishing season.

Summer Flounder: Summer Flounder is jointly managed by the MAFMC and the Atlantic States Marine Fisheries Commission (ASMFC). In 2019, the NEFSC completed a stock assessment update (SAW/SARC-66) for summer flounder which indicated that the summer flounder stock was neither overfished nor experiencing overfishing in 2017 (NEFSC 2019).

7.3.1.5 Secondary Species

Secondary Species in Surfclam Fishery

Data from Table 15 were used to determine the MSC-defined secondary species related to the catch of the target species (Surfclams). Other than the target catch, no other species comprised more than 5% of the total UoA catch, thus no secondary main species were evaluated under performance indicators 2.2.1, 2.2.2, and 2.2.3. There were no minor species close to the 5% inclusion level for resilient species, and no "less-resilient" species were close to the 2% threshold (MSC SA3.4.2). Secondary minor species are considered under the SG100 scoring. Several species of finfish and invertebrates were classified as secondary minor species in the Surfclam fishery. The Jonah Crab is managed by NOAA and the ASMFC, but there are no stock assessments or established biological reference points for the stock. As such, it is not known whether this species is overfished or whether overfishing is occurring. Other secondary minor species include organisms that were not identified to the species level or that have limited or no biological data on which to base any recovery or rebuilding plan, should that be necessary (see secondary species listed in Table 15).

Secondary Species in Ocean Quahog Fishery

Data from Table 17 were used to determine the MSC-defined secondary species related to the catch of the target species (Ocean Quahogs). There are no Secondary main species for MSC evaluation, evaluated under performance indicators 2.2.1, 2.2.2, and 2.2.3, as the catch of no species (other than the target species) exceed 5%. Secondary minor species are considered under the SG100 scoring issues include Jonah crab, which is managed by the Atlantic States Marine Fisheries Commission, but for which there are no reference points. There are no minor species close to the 5% inclusion level for resilient species, and no "less-resilient" species were close to the 2% threshold. As noted above, the Jonah Crab is managed by NOAA and the ASMFC, but there are no stock assessments or established biological reference points for the stock. As such, it is not known whether this species is overfished or whether overfishing is occurring.

Other secondary minor species include organisms that were not identified to the species level or that have limited or no biological data on which to base any recovery or rebuilding plan, should that be necessary (e.g., moonshell snail, seastar, and sponge).

7.3.1.6 Endangered, Threatened and Protected (ETP) Species

Overview

ETP species have been classified according to v2.01 SA3.1.5 such that:

1) Species that are recognized by national ETP legislation

2) Species listed in the binding international agreements given below:

    - Appendix 1 of the Convention on International Trade in Endangered Species (CITES), unless it can be shown that the particular stock of the CITES listed species impacted by the UoA under assessment is not endangered.

    - Binding agreements concluded under the Convention on Migratory Species (CMS), including:

        - Annex 1 of the Agreement on Conservation of Albatross and Petrels (ACAP)

        - Table 1 Column A of the African-Eurasian Migratory Waterbird Agreement (AEWA)

        - Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS)

        - Annex 1, Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)

        - Wadden Sea Seals Agreement

        - Any other binding agreements that list relevant ETP species concluded under this Convention

3) Species classified as 'out-of-scope' (amphibians, reptiles, birds, and mammals) that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN), or critically endangered (CE).

Outcome/Management

The commercial fisheries for surfclam and ocean quahog are prosecuted with hydraulic clam dredges, a type of bottom tending mobile gear. Based on the best available information, this gear type is not expected to pose an interaction risks to any protected species. Since 1989, the date of NMFS' earliest observer records for federally managed fisheries, there has been no observed or documented interactions between gear used in the surfclam and ocean quahog fishery and any ESA-listed or MMPA protected species; as a result, no take is anticipated or exempted for this fishery (NMFS 2020; NMFS Observer Program, unpublished data). Pursuant to the Marine Mammal Protection Act (MMPA), NMFS publishes a

List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery.

The categorization in the LOF determines whether participants in that fishery are subject to certain provisions of the MMPA such as registration, observer coverage, and take reduction plan requirements. Individuals fishing in Category I or II fisheries must comply with requirements of any applicable take reduction plan. The Potential Biological Removal (PBR) is the product of minimum population size, one-half the maximum productivity rate, and a recovery factor and is used as a standard metric against which mortalities in a stock may be assessed. PBR is really designed as a metric to be used when comparing all estimated annual, anthropogenic mortalities, so as to decide if a marine mammal stock should be considered a strategic stock. A strategic stock is defined by the MMPA "as a marine mammal stock for which the level of direct human-caused mortality exceeds the potential biological removal level; which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; or which is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA." While there is considerable analysis that goes into estimating PBR, in fact it is not a limit as compared to fishery-based limits (target and threshold).

Categorization of fisheries is based on the following two-tiered, stock-specific approach:

Tier 1 - Considers the cumulative fishery mortality and serious injury of a given marine mammal, for that particular stock. If the total annual mortality and serious injury rates of mammals within a given mammal stock resulting from all fisheries are less than or equal to ten percent of the stock's potential biological removal rate (PBR), all fisheries associated with this stock fall into Category III. If mortality and serious injury rates are greater than ten percent of PBR, the following Tier 2, analysis occurs.

Tier 2 - Considers fishery-specific mammal mortality and serious injury for a particular mammal stock. Specifically, this analysis compares fishery-specific annual mortality and serious injury rates to a given mammal stock's PBR to designate the fishery as a Category I, II, or III fishery. Category I fisheries have frequent incidental mortality or serious injury of marine mammals; Category II fisheries have occasional incidental mortality or serious injury of marine mammals; and Category III fisheries have a remote likelihood or no known incidental mortality or serious injury of marine mammals

The Surfclam and Ocean Quahog fishery in the Mid-Atlantic is classified as a Category III fishery; there have been no observed or documented interactions of any protected species of marine mammals, sea turtles, or fish with hydraulic clam dredges and therefore, operation of Surfclam and Ocean Quahog fisheries are not expected to pose an interaction risk to the species listed in the MMPA LOF (https://www.fisheries.noaa.gov/national/marine-mammal-protection/new-england-and-mid-atlantic-offshore-surf-clam-and-quahog-dredge).

Information

The NMFS Office of Protected Species collects and analyses data on interactions between fisheries and ETP species using data primarily from observer programs and logbooks in commercial fisheries, scientific surveys at sea, standings on shore. These data sources are reviewed annually to revise the LOF and based on the categorization of fisheries as described above, resources are allocated for additional at sea observer coverage for fisheries that are considered a risk to ETP species.

7.3.1.7 Habitat Impacts

Overview

When assessing the status of habitats and the impacts of fishing, teams are required to consider the full area managed by the local, regional, national, or international governance body(s) responsible for fisheries management in the area(s) where the UoA operates (this is called the "managed area" for assessment purposes).

According to MSC FCPV2.1 GSA 3.13.3, the assessment team must determine and justify which habitats are commonly encountered, vulnerable marine ecosystems (VMEs), and minor (i.e., all other habitats) for scoring purposes, [where]:

"A commonly encountered habitat shall be defined as a habitat that regularly comes into contact with a gear used by the UoA, considering the spatial (geographical) overlap of fishing effort with the habitat's range within the management area(s) covered by the governance body(s) relevant to the UoA; and

A VME shall be defined as is done in paragraph 42 subparagraphs (i)-(v) of the FAO Guidelines (definition provided in GSA 3.13.3.21) [as having one or more of the following characteristics: uniqueness or rarity, functional significance, fragility, Life-history traits of component species that make recovery difficult, and/or structural complexity]. This definition shall be applied both inside and outside EEZs and irrespective of depth."

Both commonly encountered and VME habitats are considered 'main' habitats for scoring purposes (GSA 3.13.3).

[1] According to MSC FCPV2.1 GSA 3.13.3.2: VMEs have one or more of the following characteristic, as defined in paragraph 42 of the FAO Guidelines:
[2] Vulnerability "represents the extent to which the effects of fishing gear on a feature are adverse. Vulnerability' is defined as the combination of how susceptible the feature is to a gear effect and how quickly it can recover following the fishing impact (NEFMC 2011).

Outcome

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 (MAFMC 2020). The northeast shelf ecosystem includes the Gulf of Maine, Georges Bank, the Mid-Atlantic Bight, and the continental slope. The habitat in which the UoA operates has been well characterized in terms of substrate, geomorphology, and biota. The Northwest Atlantic Marine Ecoregional Assessment, completed in 2010, compiled data from grab sampling, drop camera, towed camera, and bathymetric surveys to map more than 140,745 square miles of the Northwest Atlantic, characterizing geological and biological aspects of the benthos in detail (Green et al. 2010) (Figure 20). Factors including bathymetry, sediment grain size, sediment texture, salinity, bottom temperature, topographic features, and tidal current were incorporated into the assessment, acknowledging their importance in benthic community distribution and function. Findings from this assessment are considered to be at suitable resolution for supporting identification and protection of vulnerable benthic ecology, as well as marine spatial planning (Bethoney 2017).

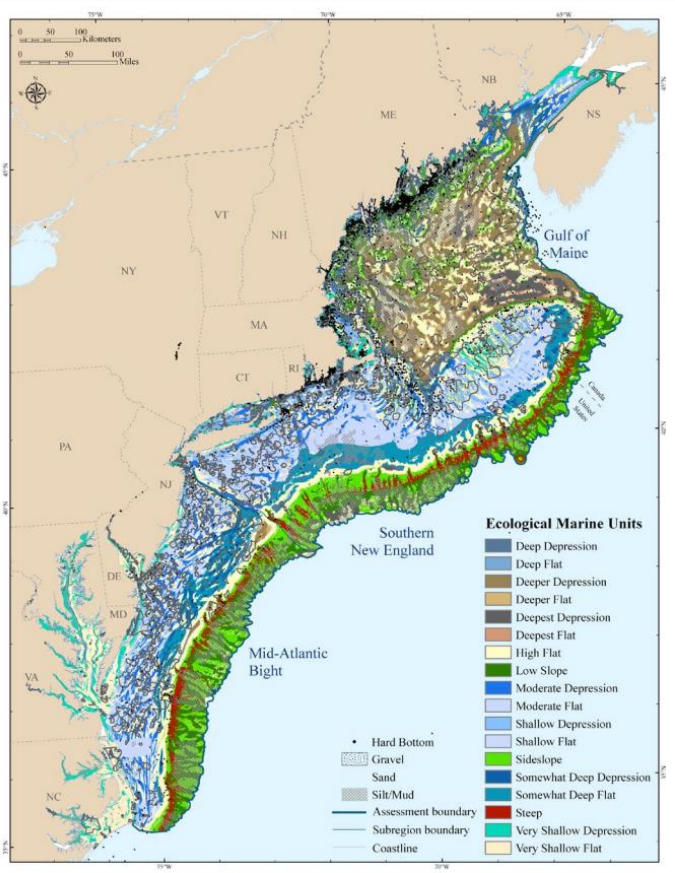

Figure 20. Ecological Marine Units of the Northwest Atlantic region. Scale 1:7,250.000. (Source: Greene et al. 2010)

As part of the NEFMC development of the Omnibus Essential Fish Habitat Amendment 2, seabed vulnerability to fishing gear impacts was evaluated using the Swept Area Seabed Impact (SASI) approach (NEFMC 2018). The vulnerability assessment reviewed habitat impacts literature relevant to the Northeast U.S. to organize seabed features (e.g., sponges, biogenic burrows, bed forms, etc.) according to vulnerability[2], susceptibility[3] (initial effect by single pass of fishing gear) and recovery[4] values. The model combines fishing effort data with geological and biological habitat information inferred from substrate data and seafloor boundary water flow estimates (NEFMC 2011). Habitats were characterized by geological and biological features known to provide shelter for managed species directly or provide shelter for their prey. While both components (geological, biological) are assumed to occur in every habitat type, the presence or absence of particular features is assumed to vary based on substrate type and natural disturbance (energy) regime. As natural disturbance (i.e., high or low energy environment) plays a significant role in creating or maintaining geological features, the SASI model inferred this important variable by computing shear stress based on both modelled velocity and a depth-based estimate of bottom roughness (NEFMC 2011). Thus, habitat types in the vulnerability assessment were distinguished by dominant substrate, level of natural disturbance, and the presence or absence of various biological features. The three characterizations (sediment, geological and biotic features) align with the MSC definition for benthic habitat characteristics (substratum, geomorphology, and biota) for assessment (MSC SA3.13.2).

[2] Vulnerability "represents the extent to which the effects of fishing gear on a feature are adverse. Vulnerability' is defined as the combination of how susceptible the feature is to a gear effect and how quickly it can recover following the fishing impact (NEFMC 2011).

[3] Susceptibility: "the percentage of total habitat features encountered by fishing gear during a hypothetical single pass fishing event that have their functional value reduced (NEFMC 2011)

[4] Recovery: "the time in years that would be required for the functional value of that unit of habitat to be restored": Recovery does not necessarily mean a restoration of the exact same features, but that after recovery the habitat would have the same functional value. (NEFMC 2011).

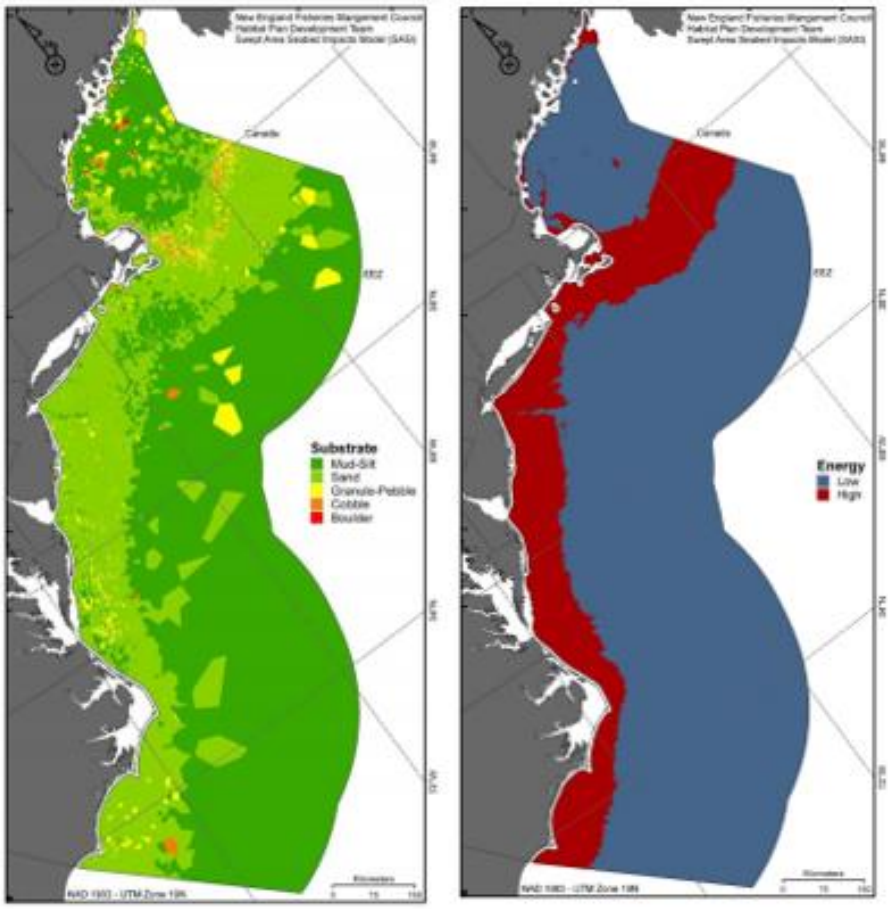

Figure 21. Dominant substrate for the entire model domain (a) and inferred amount of energy resulting from depth and sheer stress combined (b) (Source: NEFMC 2011)

The biological features associated with each combination of seafloor substratum (mud, sand, granule-pebble, cobble or boulder) and seafloor energy (high or low) are shown in Table 21. The susceptibility and recovery of each seabed feature and energy combination was scored on a 0-3 scale for various gear types. Across all gears, geological and biological features were generally found to be most susceptible to impacts from hydraulic dredges as compared to other gear types (average S scores for all features in a particular substrate and energy environment ranged from 2.5-2.8 out of 3, Table 22), with higher S scores reflecting a higher proportion of features with >25% encountered estimated to have a reduction in functional habitat value. For comparison, average otter trawl and scallop dredge S scores ranged from 1.0 to 2.0. It should be noted that 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).

Table 21. Ten habitat types identified in the Vulnerability Assessment. (Source: NEFMC 2011)

	High Energy		***Low energy***	
	Geological features (modify 50% of A)	***Biological features (modify 50% of A)***	***Geological features (modify 50% of A)***	***Biological features (modify 50% of A)***
Mud	Biogenic burrows, biogenic depressions, sediments	Cerianthid burrowing anemones, hydroids, mussels, tube-dwelling amphipods	Biogenic burrows, biogenic depressions, sediments	Cerianthid burrowing anemones, sea pens, hydroids, mussels, tube-dwelling amphipods
Sand	Biogenic burrows, biogenic depressions, sediments, bedforms, shell deposits	Cerianthid burrowing anemones, tube-dwelling amphipods, ascidians, hydroids, *Filograna implexa*, sponges, mussels, scallops	Biogenic burrows, biogenic depressions, sediments, shell deposits	Cerianthid burrowing anemones, sea pens, tube-dwelling amphipods, ascidians, hydroids, *Filograna implexa*, sponges, mussels, scallops
Granule-pebble	Scattered granule-pebble, granule-pebble pavement, shell deposits	Actinarian anemones, cerianthid burrowing anemones, ascidians, brachiopods, bryozoans, hydroids, macroalgae, *Filograna implexa*, other tube-dwelling polychaetes, sponges, mussels, scallops	Scattered granule-pebble, shell deposits	Actinarian anemones, cerianthid burrowing anemones, ascidians, brachiopods, bryozoans, hydroids, *Filograna implexa*, other tube-dwelling polychaetes, sponges, mussels, scallops
Cobble	Scattered cobble, piled cobble, cobble pavement	Actinarian anemones, ascidians, brachiopods, bryozoans, hydroids, macroalgae, *Filograna implexa*, other tube-dwelling polychaetes, sponges, mussels	Scattered cobble, piled cobble	Actinarian anemones, ascidians, brachiopods, bryozoans, hydroids, *Filograna implexa*, other tube-dwelling polychaetes, sponges, mussels
Boulder	Scattered boulder, piled boulder	Actinarian anemones, ascidians, brachiopods, bryozoans, hydroids, macroalgae, *Filograna implexa*, other tube-dwelling polychaetes, sponges, scallops, mussels	Scattered boulder, piled boulder	Actinarian anemones, ascidians, brachiopods, bryozoans, hydroids, *Filograna implexa*, other tube-dwelling polychaetes, sponges, scallops, mussels

Table 22. Summary of susceptibility and recovery scores for hydraulic dredge gear. (Source: NEFMC 2011)

Hydraulic Dredge					
		Average S Score		Average R Score	
Substrate	Energy	Geological	Biological	Geological	Biological
Sand	High	2.8	2.6	0.6	1.8
	Low	2.8	2.7	1.5	1.8
Granule-pebble	High	2.7	2.8	1.3	1.8
	Low	2.5	2.8	2.0	2.2

Gear Impact on Habitat: Hydraulic dredges are commonly fished in fine-grain sandy substrates but can also be used in large-grain sand and mixed mud/sand/gravel substrates. In the Surfclam and Ocean Quahog fisheries, two types of hydraulic dredges are used: stern rig and side rig dredges. For side rig dredges, a chain bag drags behind the dredge and smooths the trench created by the dredge. This chain bag results in more damage to small clams and other bycatch than occurs with the stern rig dredge (MAFMC 2003). The latter is a giant sieve that allows small clams and other bycatch to fall out of and into the trench with minimal injury. Improvements in the gear efficiency have decreased bottom time and helped limit the harvest to a relatively small area within the Mid-Atlantic and New England regions, recalling the fact that this fishery is limited not by quota, but by market demand. For a review of hydraulic dredge impact studies, refer to the Clam Dredge Framework Adjustment Appendix B (NEFMC 2018).

Hydraulic dredges use high pressure water jets to inject water into the sediment ahead of the dredge blade, creating steep-sided trenches 8-30 cm deep with mounds of sediment along the edges of the trench. Hydraulic dredges also fluidize sediments in the bottom and sides of trenches, re-suspend and disperse fine sediment, and cause a re-sorting of sediments that settle back into trenches. The “knife” or cutting edge on the leading bottom edge of the dredge opening picks up clams and Ocean Quahogs that have been separated from the sediment and guides them into the body of the dredge (i.e. the cage) (MAFMC 2003). Water penetrates about 8-30 cm into the sediment. Too much pressure will blow sediment into the clams and decrease quality. The knife is 5.5 inches deep for Surfclams and 3.5 inches deep for Ocean Quahogs. If the knife is the incorrect size, the clams and Ocean Quahogs can be cut and damaged, leading to increased mortality of clams left on the bottom (MAFMC 2003). Dredge tows begin at about 2.5 knots and slow as the dredge accumulates clams. The dredge is retrieved when the speed drops below 1.5 knots. Tows can last a few minutes in very dense beds; however, a typical tow is fifteen minutes in length (MAMFC 2003). As of 2019, there were 51 active Surfclam and Ocean Quahog vessels, a decrease from the more than 150 vessels operating in 1990. The reduction in vessels may reflect the vertical integration of operations opting for larger, newer, more efficient vessels (MAFMC-NMFS 2020).

In response to a 2001 workshop to evaluate the potential habitat impacts of fishing gears used in the Northeast region, the MAFMC 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 (Northeast Region Essential Fish Habitat Steering Committee 2002). In 2000, the overall area impacted by the clam fisheries was approximately 100 square nautical miles or 343 km^2, compared to the large area of high energy sand on the continental shelf (Northeast Region Essential Fish Habitat Steering Committee 2002).

Nevertheless, hydraulic clam dredges have been shown to significantly impact physical and biological components of the benthic community (NEFMC 2011). The overall impact of towed gears and the recovery time of the ecosystem vary depending on intensity of the interaction (the total area impacted and the frequency of tows), the composition of the seabed habitat, and the level of natural perturbation (DeAlteris, 2005). Habitats and communities that are subject to high levels of natural perturbation are more likely to recover quickly from towed gears (Hiddink et al. 2006). However, the high-pressure water and cutting bar used to extract clams associated with hydraulic dredges can impact the seabed to deeper depths than would naturally be impacted. The weight and force applied by the dredge and pressurized jets can reduce habitat complexity by removing existing structure and burrows, creating unnatural mounds, filling interstitial spaces between sediments, and suspending sediments.

In addition to physical impacts, hydraulic clam dredges are likely to result in mortality of any organisms in their wake. Sessile or less mobile species and life stages (mollusks, fish and squid egg mops, larvae) that are unable to escape the dredge path would be subject to greater mortality. In addition to the direct mortality of benthic infauna, clam dredging can temporarily increase predation on dislodged organisms, and reduce overall species abundance in localized areas. Hydraulic clam dredges have the highest potential to cause significant, lasting habitat damage of any fishing gear type (NEFMC 2011). In the SASI model analysis, hydraulic dredges were given higher vulnerability scores than other bottom-tending gears (otter trawls and scallop dredges) in sand and small gravel (granule-pebble) substrates. Because hydraulic dredge gears are applied across relatively small areas of the Mid-Atlantic and New England, their impact to benthic habitat has been considered more localized than for bottom trawls or scallop dredges, which are used much more commonly and have a greater total swept area.

Figure 22 shows a simulation of the combined vulnerability of geological and biological features to hydraulic dredging, as determined from application of the SASI model in the recent Omnibus Habitat Amendment 2 (NEFMC 2018, Appendix D). From the simulation, it is clear that hydraulic dredge gears pose a significant risk to certain areas, as indicated by the red and orange shading. The increased vulnerability of these areas may be attributed to the lower resilience of geological components due to the lower energy environments. To conclude that the impact of hydraulic dredge gear on associated habitats is minimal, for the purposes of this assessment, more information will be needed to understand the level of interaction of UoA vessels with these more vulnerable areas.

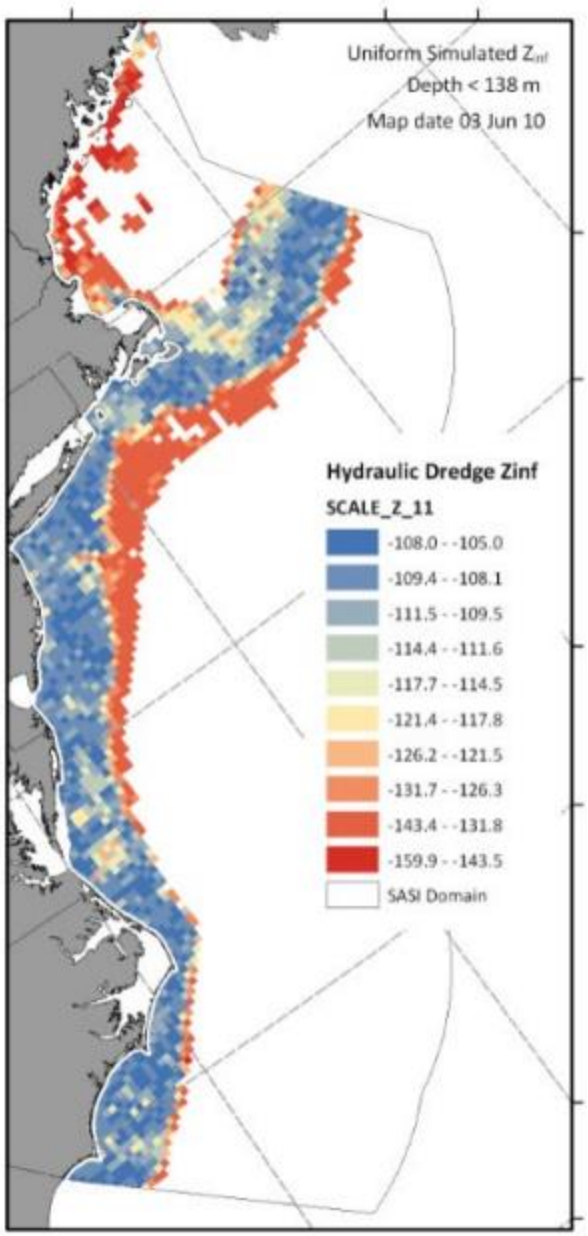

Figure 22. Simulation of the combined vulnerability of geological and biological features to hydraulic dredging. Red = high vulnerability; Blue = low vulnerability (NEFMC 2018).

Commonly Encountered Habitat

Spatial extent of UoA: The spatial area of operation of the clam dredge fleet is mapped through an ongoing national program using vessel monitoring system (VMS) data, which is compulsory for all vessels participating in the fishery. VMS data show spatial and temporal trends in fishing effort, as well as any

participation of the fishery in closed exempted areas, spanning the years 2006-2010, 2012-2014, and 2015-2016 (**Figure 16, a-c**). Areas with higher densities of clams are more likely to be dredged intensively, leading to a higher percentage of the bottom being affected (MAFMC 2003). This is the case off New Jersey, where a high proportion of the area is affected by dredging due to the small spatial scale and homogenous bottom.

Hydraulic dredge gears are assumed not to be able to fish in mud, cobble, or boulder substrates and fishing generally targets sandy substrates that have the least likelihood of damaging the dredge gear (NMFS NOAA 2020, NEFMC 2018, Appendix D)

Captains actively monitor their acoustic displays and avoid what they consider to be hard bottom. If large amounts of cobble or rock are encountered, the captain will move to another nearby location to avoid damaging their gear and having to deal with lots of rocks on the deck. While these complex habitats are not preferred by vessel operators, they are encountered while using this gear and adverse impacts to these habitats can occur. Available habitat information indicate that complex habitats can occur throughout the areas fished by UoA vessels, but these areas are patchy and mixed with areas of less complex sediment.

Surfclam and Ocean Quahog habitats are both considered to be high energy environments, which have stronger tidal and bottom currents, and thus lower recovery times after dredge passes than lower energy environments (Wallace and Hoff 2005, MAFMC 2011 from NEFMC 2011). However, even in these high energy environments, tracks and associated impacts left by hydraulic calm dredges may endure for long periods, due to the depth of gear penetration into the substrate. For example, one study by Gilkenson et al. (2015) found that follow-up, side scan sonar surveys conducted after an initial 1998 dredge impact study were still able to detect dredge tacks 5 and 10 years later, despite the study area having been exposed to significant wave action from winter storms.

Because fishing gears do not substantively alter the water column, impacts to the pelagic environment are assumed to be negligible.

Figure 23. Density of commercial fishing vessel activity for the Surfclam\Ocean Quahog fisheries in the northeastern U.S. based on Vessel Monitoring Systems (VMS) from fishing vessels from (a) 2006-2010 (b) 2012-2014 and (c) 2015 to 2016. Green shaded areas represent the Environmental Degradation Closures. Note that the recent GSC HMA closure is not shown on these maps. (Source: **Northeast Ocean Data**)

Commonly Encountered Habitat for Surfclams: Atlantic Surfclams are found in continental shelf waters from Cape Hatteras, North Carolina, north to the Gulf of St. Lawrence/Newfoundland in depths of 10-40 meters. At the depths where Surfclams are fished, dynamic current conditions often prevail, and seafloor sediments are regularly disturbed and re-suspended by storms and by strong bottom currents. Surfclams are harvested primarily in a small area off the New Jersey and Long Island coasts where the bottom is a sandy substrate. The greatest concentrations of Surfclams are usually found in well-sorted, medium sand, but they may also occur in fine and silty fine sand. Because they are found in shallower water where tidal and wave perturbations can be stronger, Surfclams can be encountered in areas with rockier substrate than Ocean Quahogs, which are found in more offshore waters. For example, over the three-year period of observer coverage, 285,440 lbs of rock debris were reported in observed Surfclam trips (note this represents only 0.5 – 2% of the actual catch), compared with 11,878 lbs of rock debris in Ocean Quahog trips.

Hydraulic clam dredges operate in soft bottom areas consisting of large grain sand, fine sand, sand and small grain gravel, sand and small amounts of mud, and sand and small amounts of clay (MAFMC 2003). Most tows for the Atlantic Surfclam are made in large grain sand, as boat captains prefer not to tow in areas with a hard bottom substrate where gear can be lost or damaged. Mud sediments may be avoided to reduce the risk that mud will be blown into the clam bodies and reduce clam quality.

Commonly Encountered Habitat for Ocean Quahogs: Ocean Quahogs are harvested over a larger spatial area than Surfclams, including in offshore waters where habitat consists mostly of finer sand and silt/clay substrates that are less affected by natural physical disturbances. Adult Ocean Quahogs are usually found at depths of 40-80 m in dense beds over level bottoms, just below the surface of the sediment which ranges from medium to fine grain sand. The Ocean Quahog fishery had a lesser amount of rock debris (11,878 lbs) reported by observers between 2018-2020 compared with the Surfclam fishery, possibly reflecting the slightly lower-energy, finer-sediment bottom type of habitats targeted by Ocean Quahog fishery.

Management of Commonly Encountered Habitats

Mitigation for the habitat impacts associated with hydraulic clam dredges (and other bottom tending gears) has primarily been implemented via habitat access restrictions and have included the following measures:

Environmental Degradation Closures: Several areas have been closed to closed to the harvesting of Surfclams and Ocean Quahogs, due to the presence of harmful contaminants. These include the Boston Foul Ground, the 106 Dumpsite, the New York Bight, and the Georges Bank Paralytic Shellfish Poisoning (PSP) Closure Area. In 2013, a portion of the Georges Bank PSP Closure Area was re-opened and hydraulic dredge gear is now being used on more complex, hard-bottom habitats (e.g., Nantucket Shoals). The habitat impact analysis conducted by the NMFS concluded that the adverse impacts of renewed clam dredging on the shoals of Georges Bank 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 believed the gear could be efficiently operated. These closures offer some protection of habitat from the clam dredge fisheries.

Great South Channel HMA Closure: To remain in compliance with the requirements of the MSA, the NEFMC's Omnibus Essential Fish Habitat (EFH) Amendment 2 (OHA2) reviewed and updated EFH and HAPC designations for NEFMC managed species. This ultimately resulted in the implementation of measures to minimize impacts of fishing on the designated EFH and HAPC areas. As part of these measures, the Great South Channel Habitat Management Area (GSC-HMA) was delineated, restricting access to all bottom-tending fishing gears, including hydraulic clam dredges (NOAA, 2020). A one-year clam dredge exemption was authorized to allow time for the Council to consider research to weigh the potential impacts of certain bottom tending gears on these areas. NOAA published a final rule on May 19, 2020 allowing the hydraulic dredge gear fisheries to operate year-round in two small areas (McBlair and Fishing Rip) and seasonally in a third area (Old South) within the GSC-HMA (Figure 24).

As part of the GSC HMA closure to bottom tending gears, the Council plans to outline a research agenda for the GSC HMA. The clam industry will commit to providing funding for reasonable research costs. The goal of this research program is to improve the scientific foundation for management of the area. The expectation is that results would be available to inform Council consideration of extending or altering the exemption program currently in place. The research program may include before-after-control-impact studies of dredging effects, including an evaluation of habitat recovery at multiple time steps, and acoustic or other types of fine-scale habitat mapping.

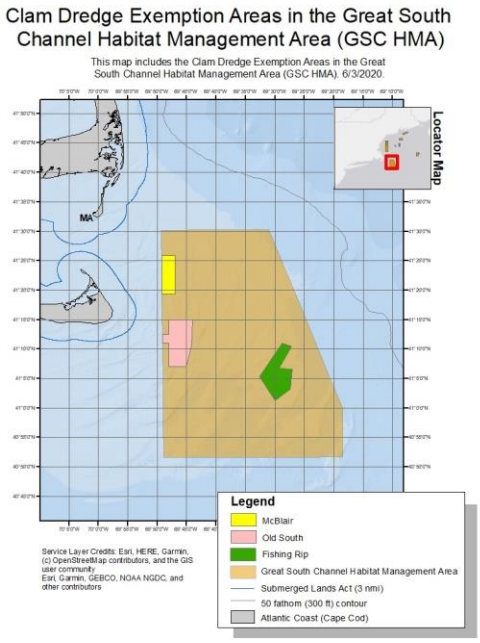

Figure 24. Boundaries of the Great South Channel HMA (beige) showing year-round (McBlair and Fishing Rip) and seasonal (Old South) areas where Surfclam and Ocean Quahog fishing is permitted. (Source: NOAA 2020)

Wind Development Planning Areas: Development of offshore wind infrastructure is expected to occupy portions of the principal operating areas used by the Surfclam and Ocean Quahog fisheries. This, along with recent HMA closures, could have the potential to focus fishing effort on alternative areas (i.e., displacement fishing).

Vulnerable Marine Ecosystems (VME)

The definition of VME provided by MSC SA3.13.3.21 and related guidance is based on the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas (2009). Although the FAO Guidelines were written for deep-sea fisheries, for MSC purposes the Guidelines' VME characteristics also considered to apply to non-deep-sea fisheries. As stated in the FAO DSF Guidelines (paragraph 42), "A marine ecosystem should be classified as vulnerable based on the characteristics that it possesses…",

including its uniqueness or rarity, functional significance, fragility, structural complexity, and the life-history traits of component species that make recovery difficult. MSC guidance further states that it intends that the CAB consider VMEs and 'potential' VMEs as accepted, defined, or identified by relevant management authorities. Only defined VMEs are considered under 2.4.1, while 'potential' VME's should be additionally recognized under 2.4.2 as a precautionary measure.

VMEs have been identified in the Northwest Atlantic, including seamount, coral, sponge, and seapen area closures (for a description of VMEs in the North Atlantic, see NAFO). However, these areas are outside of US jurisdiction. Within the US EEZ, the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires that fishery management plans (FMPs) evaluate and minimize, to the extent practicable, the adverse effects of fishing on Essential Fish Habitat (EFH). The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". Within areas designated as EFH, Habitat Areas of Particular Concern (HAPC) are designated to prioritize the conservation, management, and research of specific types or areas of habitat that are particularly vulnerable to human impacts, as identified by any of the eight regional fishery management councils and NOAA. See Appendix A of the MAFMC 2012-2026 Environmental Assessment (2020) for a list of EFH federally managed species known to occupy EFH that may be vulnerable to bottom-tending gears, such as hydraulic dredges.

Within the ecoregion, species that are considered less resilient due to their fragility or life history traits include sponges and corals. These species are typically considered within the group of vulnerable marine ecosystems (VME). Bycatch of any sponge and coral is monitored (by NEFOB) and interventions take place where required under the NMFS National Bycatch Reduction Strategy, which includes objectives to (1) identify areas of high bycatch of corals and sponges, (2) work with regional Fishery Management Councils and the fishing industry to close these areas to high bycatch gears as called for in the Strategic Plan for Coral and Sponge Ecosystems, and (3) collect better data on coral bycatch and post-interaction mortality (Hourigan, et. al., 2017). Minimal interactions with sponges were reported by observers between 2018-2020. Furthermore, there is no reported interaction of the fishery with coral aggregations (Wigley and Tholke 2018-2020). Protected coral areas are found at depths greater than 200m, offshore from 450-meter seaward, and are thus all far beyond the operating depth of the clam dredge fishery.

For both UoAs, Deep-Sea Coral and Sponge Ecosystems are considered VMEs. Internationally, the United Nations General Assembly resolutions (UNGA Resolutions 61/105, 64/72, and 66/68) have identified cold water coral habitats as vulnerable marine ecosystems in need of protection from significant adverse impacts of mobile bottom fishing. The Oslo-Paris (OSPAR) Convention for the Protection of the Marine Environment of the North East Atlantic includes deep-sea sponge aggregations (DSSAs) in their List of Threatened and/or Declining Species and Habitats (OSPAR 2008). Regionally and nationally, through the MSA and the National Marine Sanctuaries Act, coral and sponge habitats are protected. The NOAA Strategic Plan for Deep-Sea Coral and Sponge Ecosystems (NOAA 2010) identifies goals, objectives, and approaches to guide NOAA's research, management, and international cooperation activities on deep-sea coral and sponge ecosystems.

Management of VMEs

Regionally and locally, the New England and Mid Atlantic Fishery Management Councils have implemented deep-sea coral habitat protection, particularly for the submarine canyons and the Gulf of Maine. In January of 2017, the Frank R. Lautenberg Deep-Sea Coral Protection Area was established by the MAFMC in Amendment 16 to the Atlantic Mackerel, Squid, and Butterfish FMP (81 FR 90246; December 14, 2016) as described in § 648.372. This action led to the creation of the 99,000 km^2 protected area in the Mid-Atlantic and was a major factor behind the creation of the Northeast Canyons and Seamounts Marine National Monument. In June of 2021, the NEFMC signed the final rule prohibiting the use of certain bottom-tending gears in the Georges Bank Deep-Sea Coral Protection Area, an area extending along the outer continental shelf in waters no shallower than 600 m to the outer limit of U.S. Exclusive Economic Zone boundary to the east and north, and south to the Franklin R. Lautenberg Deep Sea Coral Protection.

Information

Between fall 2007 and spring 2010 the NEFMC Habitat Plan Development Team (PDT) developed the SASI approach, which supported the development of the Omnibus EFH Amendment 2. The SASI model provides a framework to satisfy requirements of the MSA for FMPs to minimize adverse effects of fishing on fish habitats, enabling managers to better understand: (1) the nature of fishing gear impacts on benthic habitats, (2) the spatial distribution of benthic habitat vulnerability to particular fishing gears, and (3) the spatial and temporal distribution of realized adverse effects from fishing activities on benthic habitats.

Ongoing work toward an improved understanding and integration of habitat-centered management includes the Northeast Regional Marine Fish Habitat Assessment (NRHA). This collaborative effort is being led by a Steering Committee composed of leadership from the major habitat conservation, restoration, and science organizations in the region and is expected to occur between July 2019 - July 2022. Work outcomes are intended to describe and characterize estuarine, coastal, and offshore fish habitat distribution, abundance, and quality in the Northeast to support the following overarching goals:

- **Abundance and trends in habitat types in the inshore area.** This action will map the location and extent of habitat types utilized by the focus species and quantify the areal coverage, status and trends of these habitats. It will also compile metrics that may inform an assessment of habitat quality.

- **Habitat vulnerability.** This action will involve Council and Commission staff coordination with, and participation in, the NOAA Habitat Climate Vulnerability Assessment (HCVA). That assessment will use habitat experts to examine fish habitat vulnerability to climate and non-climate stressors.

- **Spatial descriptions of species habitat use in the offshore area.** This action will use model-based and empirical approaches to identify, predict, and map habitat use for each of the focus species and track and quantify changes in habitat use over time (e.g. seasonal, annual, and future predicted use).

- **Habitat data visualization and decision support tool.** Habitat information will be incorporated into a publicly accessible decision support tool, making this information available to partners to visualize habitat location, extent, and use throughout the region, and provide access to relevant data and habitat metrics developed by the assessment.

Summary

In summary, while the impacts of the hydraulic calm dredge are substantial, the overall adverse impacts of the hydraulic clam dredge fishery may be considered localized, depending on the size of the swept area of UoA vessels. Further, the coral habitats identified in the managed area of the UoA are beyond the operating depth of the UoA. Suitable sponge habitats throughout the northeast US have yet to be mapped as well, but the low amounts of sponge identified by observers suggests that the UoA is not encountering them. Management systems in place ensure that vulnerable and important habitats are identified, and that impacts are considered on a fishery-specific and cumulative basis within federal FMPs. Every federally managed fishery is required to identify EFH and evaluate all potential adverse effects of fishing on EFH designated within the FMP as well as all other EFH of federally managed fisheries, including consideration of cumulative impacts. The EFH Regulatory Guidelines further require each FMP to minimize such adverse effects to the extent practicable, as is being implemented by habitat area closures. Finally, information to inform habitat management has been bolstered by the Omnibus Essential Fish Habitat Amendment 2, which assessed seabed vulnerability to fishing gear impacts using the Swept Area Seabed Impact (SASI) approach (NEFMC 2016). It is noted that with the closure of certain areas to bottom tending gears such as hydraulic dredges, intensification of dredging in alternate areas could be a concern in future assessments.

7.3.1.8 Ecosystem Impacts

Outcome

Key ecosystem elements considered as being “most crucial to giving the ecosystem its characteristic nature and dynamics” (MSC SA3.16.3) and which the fishery has the most potential to impact. Further MSC guidance states that “key ecosystem elements may include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g., upwelling or spring bloom, abyssal, etc.), and characteristics of biodiversity” (GSA3.18.1). For this re-

assessment, the ecosystem element is defined as the Northeast U.S. Continental Shelf Large Marine Ecosystem, including the substrate and associated abiotic and biotic features.

The impact (direct and indirect/associate) of the UoA Surfclam and Ocean Quahog dredge fishery on the wider marine ecosystem structure and function of the Northwest Atlantic are known. Bivalves provide a variety of ecosystem services, playing a role in nutrient and geochemical cycling, creating and modifying habitat, and affecting food webs both directly (i.e., as prey) and indirectly (i.e., by transferring nutrients and energy) (Vaughn and Hoellein 2018). Sustainable fisheries often depend on productive benthic communities and experimental studies have shown that up to 20% of the variability in the macrofauna composition of some benthic communities may be attributed to fishing effects (Greene et al. 2010). The impacts of the UoA fishing on benthic communities may include a decrease in the density of functional groups including deposit feeders, echinoderms, long-lived surface dwellers, and large epifauna, as well as a general decrease in species abundance and diversity. Long-term trends in benthic ecosystems impacted by hydraulic dredge activities may include a shift from benthic communities dominated by long-lived, k-selected species to those dominated by r-selected, opportunistic, short-lived species, (e.g., some polychaetes) (Gaspar and Chícharo 2007).

In general, benthic invertebrates play an important role in energy transfer within marine systems. Suspension-feeding bivalves, such as such as Surfclams and Ocean Quahogs, filter particles (e.g., phytoplankton, particulate organic and inorganic matter) from the water column and discharge biodeposits into the sediment, and thus affect nutrient and biogeohemical cycles in the marine environment (Vaughn and Hoellein 2018). Subsequent to hydraulic dredge activities, benthic invertebrates may become prey items for fish and other upper trophic level animals. Predators include certain species of crabs, sea stars, snails, and other crustaceans, as well as fish predators such as cod and haddock. As such, these animals serve as important links to both pelagic and benthic habitats. In total, over two thousand species of benthic invertebrates have been identified on the Northeast Continental shelf, although most are relatively rare (Greene et al. 2010). Some of the more prominent benthic biomass trends throughout the NES LME include increases in American lobster, Sea Scallop, and sea star populations, and decreases in Ocean Quahog and Atlantic Surfclam populations in recent years (Ecosystem Assessment Program 2012).

Because of the nature of the fishery (species prosecuted, gear deployed, areas fished) the impacts to the Northeast U.S. Continental Shelf Large Marine Ecosystem are expected to be minimal, as there are very low levels of bycatch in these fisheries and habitat damage is considered to be relatively temporary and localized. The fishery is at least highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm (defined by MSC “in relation to the capacity of the ecosystem to deliver ecosystem services”). Neither Surfclams nor Ocean Quahogs are considered “keystone species” or to function substantially in the transfer of energy through the trophic web as described by the MSC low-trophic-level species requirements. Because of the nature of hydraulic

dredging as a towed, bottom fishing activity, the impact of the fishery is focused on the seabed, and there are no known impacts on the pelagic environment.

Management

NOAA, in cooperation with the regional Fishery Management Councils, promotes the adoption of an ecosystem-based approach throughout its broad-ocean and coastal stewardship, science, and service programs. Because these fisheries are primarily managed according to a federal FMP in compliance with the MSA, there is a broad management framework available that manages ecosystem impacts of fishing as a whole. Management policies such as the NEFMC's Omnibus Essential Fish Habitat (EFH) Amendment 2, as well as the NRHA plan currently underway, focus strongly on ecosystem-based approaches to understanding and managing fisheries in the Mid-Atlantic and New England, helping to ensure that ecosystem functions remain intact.

Information

Information is available to broadly understand the key elements of the ecosystem and the main functions of the components in the ecosystem are known. The NEFSC produces annual State of the Ecosystem reports for the Northeast Shelf Large Marine Ecosystem, for both the Mid-Atlantic and New England, and this is updated regularly (see https://www.fisheries.noaa.gov/new-england-mid-atlantic/ecosystems/northeast-us-shelf-regional-ecosystem. This report summarizes the status of important abiotic and biotic aspects of the ecosystem, which are monitored regularly or can be estimated from available data. These include sea surface temperature, stratification, the CPR color index of phytoplankton abundance, zooplankton biovolume, total fish biomass, the ratio of pelagic to demersal fish biomass, mean length of the NEFSC survey catch, invertebrate landings, fish landings, and the mean trophic level of the catch.

Ongoing information from scheduled; NMFS multi-species bottom trawl survey, NEFOB and bycatch reports, VTR, VMS, marine mammals and turtle surveys, recreational fishery surveys, oceanographic surveys, and ad hoc Environmental Impact Statement (EIA), all together provide important information for better understanding and managing the ecosystem components of ecoregion according the EBFM approaches.

7.3.2 Principle 2 Performance Indicator scores and rationales

PI 2.1.1 – Primary species outcome

PI 2.1.1		The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI		
Scoring Issue		SG 60	SG 80	SG 100
a	Main primary species stock status			
	Guide post	Main primary species are likely to be above the PRI. OR If the species is below the PRI, the UoA has measures in place that are expected to ensure that the UoA does not hinder recovery and rebuilding.	Main primary species are highly likely to be above the PRI. OR If the species is below the PRI, there is either evidence of recovery or a demonstrably effective strategy in place between all MSC UoAs which categorise this species as main, to ensure that they collectively do not hinder recovery and rebuilding.	There is a high degree of certainty that main primary species are above the PRI and are fluctuating around a level consistent with MSY.
	Met?	NA	NA	NA
Rationale				
Based on the information available to the assessment team, and as described in Section 7.3.1.4, there are no main primary species in the Surfclam and Ocean Quahog fisheries. Therefore, SIa does not need to be scored.				
b	Minor primary species stock status			
	Guide post			Minor primary species are highly likely to be above the PRI. OR If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species.
	Met?			UoA#1: **No –** Horseshoe Crabs, Monkfish;

				Yes – Spiny Dogfish, Sea Scallop, Skates, Summer Flounder, Smooth Dogfish, American Lobster UoA#2: **No –** Monkfish; **Yes –** Spiny Dogfish, Sea Scallop, Skates

Rationale

No main primary species were identified in the NEFOP dataset used to assess bycatch in the Surfclam and Ocean Quahog fisheries. Minor primary species are considered under the SG100 scoring issues and scoring rationales for these species are described below.

Surfclam (UoA#1)

Primary minor species identified in the Surfclam fishery that represented at least 0.01% of the total UoA catch include Winter Skate, Spiny Dogfish, Horseshoe Crab, Little Skate, Monkfish, Sea Scallop, Smooth Skate, Summer Flounder, Smooth Dogfish, Clearnose Skate, and American Lobster (Table 15). Based on recent stock assessments and surveys described in 7.3.1.4 above, Winter Skate, Spiny Dogfish, Little Skate, Sea Scallop, Smooth Skate, Summer Flounder, Smooth Dogfish, and Clearnose Skate are highly likely to be above the PRI, meeting SG 100. Rationales for other species are included below:

Horseshoe Crabs are assessed using survey-based indices, similar to the Skates noted above. According to index-based probabilities of abundance relative to prior years' abundance, Horseshoe Crabs in all survey regions are at least holding at a "neutral level" of abundance except off the coast of the New York region, which has seen notable declines in abundance recently (see description in Section 7.3.1.4). Thus, SG100 is not met for this species.

Monkfish is a managed species and has been assessed in the past, with the most recent stock assessment indicating that according to the 2016 stock assessment, it was not overfished nor experiencing overfishing, relative to its reference points. However, due to recent (NEFSC 2019) invalidation of the growth curve, Biological Reference Points used in previous assessments are no longer considered relevant for assessing the status of the species. Thus, there is no basis for the assessment team to conclude that this species is above the PRI or that the UoA would not hinder the recovery and rebuilding of the species, if necessary.

Skates caught by UoA 1 vessels (Winter Skate, Little Skate, Smooth Skate, and Clearnose Skate) are included within the Northeast Skate Complex and are assessed using a survey-based index, which introduces significant uncertainty in the true status of skate species. Management efforts are underway to improve identification at the species level to enhance data for more rigorous assessments. Acknowledging these necessary improvements for data improvement efforts across fisheries in the Northwest Atlantic, the assessment team considers the NEFSC conclusion of the skates noted above being not overfished and not undergoing overfishing to be a reliable basis for meeting the requirements of SG100.

The Southern New England stock of American Lobster, which is considered to be severely depleted due to environmental factors and fishing pressure. However, the very low level of this species caught in the Surfclam fishery (only 178 pounds over three years) provides evidence that the UoA is not hindering the recovery and rebuilding of this species. Therefore, the Surfclam fishery meets the requirements of the SG 100 level for SIb.

Ocean Quahog (UoA#2)

Primary minor species identified in the Ocean Quahog fishery that represented at least 0.01% of the total UoA catch include Sea Scallop, Monkfish, Little Skate, Winter Skate, Spiny Dogfish, and Summer Flounder (Table 17). Based on recent stock assessments and surveys described in 7.3.1.4 above, Sea Scallop, Winter Skate, Spiny Dogfish, Little Skate, and Summer Flounder are highly likely to be above the PRI, meeting SG 100. Rationales for other species are included below:

Monkfish is a managed species and has been assessed in the past, with the most recent stock assessment indicating that according to the 2016 stock assessment, it was not overfished nor experiencing overfishing, relative to its reference points. However, due to recent (NEFSC 2019) invalidation of the growth curve, Biological Reference Points used in previous assessments are no longer considered relevant for assessing the status of the species. Thus, there is no basis for the assessment team to conclude that this species is above the PRI or that the UoA would not hinder the recovery and rebuilding of the species, if necessary.

Skates caught by UoA 2 vessels (Winter Skate, Little Skate, Smooth Skate, and Clearnose Skate) are included within the Northeast Skate Complex and are assessed using a survey-based index, which introduces significant uncertainty in the true status of skate species. Management efforts are underway to improve identification at the species level to enhance data for more rigorous assessments. Acknowledging these necessary improvements for data improvement efforts across fisheries in the Northwest Atlantic, the assessment team considers the NEFSC conclusion of the skates noted above being not overfished and not undergoing overfishing to be a reliable basis for meeting the requirements of SG100.

References

[NEFSC] Northeast Fisheries Science Center. 2018. 65th Northeast Regional Stock Assessment Workshop (65th SAW) Assessment Report for Atlantic Sea Scallop. US Department of Commerce, Northeast Fisheries Science Center Reference Document. 659 p. Available from: http://www.nefsc.noaa.gov/publications/

[NEFSC] Northeast Fisheries Science Center. 2019. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Summary Report for Summer Flounder. US Department of Commerce, Northeast Fisheries Science Center Reference Document. 45 p. Available from: http://www.nefsc.noaa.gov/publications/

[NEFSC] Northeast Fisheries Science Center. 2019. Monkfish Operational Assessment for 2019. US Department of Commerce, Northeast Fisheries Science Center Reference Document. 659 p. Available from: https://s3.amazonaws.com/nefmc.org/7_Monk_OpAssess2019_a.pdf

[NEFMC] 2020. Northeast Skate Complex Fishery Management Plan. Annual Monitoring Report for Fishing Year 2019. Available at: https://s3.amazonaws.com/nefmc.org/2020-Skate-Annual-Monitoring-Report_200921_100052.pdf

NOAA Fisheries. 2021. Stock Assessment of Spiny Dogfish. Stock SMART data records. Retrieved from www.st.nmfs.noaa.gov/stocksmart. 07/13/2021.

[ASFMC] 1998. Fishery Management Report No. 32. Interstate Fishery Management Plan for Horseshoe Crab. 67 p.

[ASMFC] 2019. Horseshoe Crab Benchmark Stock Assessment Peer Review Report. ASMFC Horseshoe Crab Stock Assessment Review Panel. 316 p.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

P2.1.1 Scoring calculations for UoA#1 (Surfclam)

Elements	SIa	SIb	PI score
Winter Skate	n/a	100	≥80
Spiny Dogfish	n/a	100	
Horseshoe Crab	n/a	80	
Little Skate	n/a	100	
Monkfish	n/a	80	
Sea Scallop	n/a	100	
Smooth Skate	n/a	100	
Summer Flounder	n/a	100	
Smooth Dogfish	n/a	100	
Clearnose Skate	n/a	100	
American Lobster	n/a	100	

P2.1.1 Scoring calculations for UoA#2 (Ocean Quahog)

Elements	SIa	SIb	PI score
Sea Scallop	n/a	100	≥80
Monkfish	n/a	80	
Little Skate	n/a	100	
Winter Skate	n/a	100	
Spiny Dogfish	n/a	100	
Summer Flounder	n/a	100	

PI 2.1.2 – Primary species management strategy

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to be above the PRI.	There is a partial strategy in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the PRI.	There is a strategy in place for the UoA for managing main and minor primary species.
	Met?	NA	NA	Both UoAs – Yes for all

Rationale

There are no main primary species identified in the Surfclam and Ocean Quahog fisheries. Therefore, following the explanation of the term 'if necessary' in Table GSA3, a management strategy is not required at SG60 or SG80 and no specific rationale is needed to meet the SG60 and SG80 levels.

As described in detail in Section 7.3.1.4 and in SIa above, there are a number of measures in place to contribute to the management of the primary species identified in the UoA, in alignment with the national strategy for bycatch management in US fisheries. The Surfclam and Ocean Quahog Fishery Management Plan (FMP) examines bycatch effects of existing and planned conservation and management measures, meeting the U.S. National Standard Guidelines requirements for FMP to include efforts to minimize bycatch. The Northeast Skate Complex FMP and Monkfish FMP , and have primary objectives to minimize bycatch and discard mortality rates for skates caught in both directed and non-directed fisheries through the promotion and encouragement of experimentation, conservation engineering, and gear development. Horseshoe crabs are managed under the Interstate Fishery Management Plan for Horseshoe Crab (1998) and its subsequent addenda and regular surveys inform management efforts to minimize catch levels. American Lobster is cooperatively managed by the states (under the ASMFC) and the NOAA Fisheries under Amendment 3 to the Interstate Fishery Management Plan (FMP) and its Addenda (1997).

The Northeast Fisheries Observer Program allocated observers for Surfclam and Ocean Quahog trips to collect information on discards from 2018-2020. Onboard observers are required to document catch composition and present annual discard reports to the Fishery Management Councils. Bycatch reports allow Councils to review the effectiveness of the SBRM and also serve to inform management issues or actions via the various FMPs in place for Surfclam and Ocean Quahog, as well as for the bycatch species designated as primary for this UoA. The FMPs, the use of selective gear, and bycatch reporting are considered measures working cohesively within the Greater Atlantic Region Council system to ensure FMPs meet the U.S. National Standard Guidelines for sustainable and responsible management of the designated primary species.

Additionally, the employment of highly selective hydraulic dredge gear to prevent undersized and non-target species from being caught in the Surfclam and Ocean Quahog fisheries has been developed over the years, resulting in relatively low levels of bycatch. Progressive improvements in gear efficiency and harvesting practices

have reduced fishing effort, minimized the area fished, and reduced bycatch. Data collection and evaluations on the effects of dredges that have been conducted confirm there is minimal bycatch in this fishery.

Based on the information above, there is a strategy in place for managing minor primary species caught by the UoA vessels, meeting the requirements of the SG100 levels for SIa.

b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Both UoAs – Yes for all	Both UoAs – Yes for all	Both UoAs – No for all

Rationale

Both UoAs: The management strategies in place for primary species are regularly evaluated, via stock assessments or survey-based abundance indices and adjustments to harvest control rules, area closures, etc. are made accordingly by the relevant management body. The Northeast Fisheries Observer Program allocates observers for Surfclam and Ocean Quahog trips to collect information on discards. Onboard observers are required to document catch composition and present annual discard reports to the Fishery Management Councils. Observer reports allow Councils to review the effectiveness of the SBRM and serve to inform management issues or actions via the various FMPs in place for Surfclam and Ocean Quahog, as well as for the bycatch species designated as primary for this UoA. In addition, scientific assessments have evaluated hydraulic dredge gear to determine levels of bycatch, demonstrating that the gear is configured in such a way as to significantly reduce bycatch (and also unwanted debris), providing evidence that the primary strategy for managing/reducing impacts to primary species is effective.

Based on the history of management for each species and the evidence of low bycatch due to gear configuration, there is an objective basis for confidence that the strategies will be effective by incorporating information provided by the UoA fisheries, meeting SG60 and SG80. However, evaluation of gear configurations to maintain or not hinder rebuilding of primary species (should that be necessary) are not reviewed regularly, therefore, the requirements for SG100 are not met.

c	Management strategy implementation			
	Guide post		There is some evidence that the measures/partial strategy is being implemented successfully.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its overall objective as set out in scoring issue (a).
	Met?		Both UoAs – Yes for all	Both UoAs – Yes for all

Rationale

There are no main primary species and there are strategies being implemented for managing minor primary species as mentioned for SIa.

The FMP-directed maintenance of minor primary stocks at acceptable levels, with no indications of overfishing (described for each species in Section 7.3.1.4), provides evidence for successful implementation of the strategies noted in SIa. The publication of the annual SBRM "Annual Discard Reports" and "Discard Estimation, Precision, and Sample Size Analyses" is an indication that the onboard observer program is being successfully implemented.

Based on these sources of evidence that the strategies are being implemented successfully and achieving overall objective, the Surfclam and Ocean Quahog fisheries meet the requirements of the SG 80 and 100 levels for SIc.

d	Shark finning			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No

Rationale

Two species of shark were caught as bycatch in the Surfclam and Ocean Quahog fisheries included Spiny Dogfish and Smooth Dogfish and classified as primary minor species for this assessment. Spiny Dogfish represented 0.23% of the Surfclam catch and 0.06% of the Ocean Quahog catch, while Smooth Dogfish represented 0.01% of the total UoA catch for the Surfclam fishery. 100% of the sharks reported by observers were discarded, however, no fate information was provided for these sharks. It is highly likely that shark finning is not taking place, as evidenced by the discard weights equalling the catch weights for all sharks. SG60 and SG80 are met.

U.S. federal law (the Shark Finning Prohibition Act of 2000) prohibits shark finning, where the fins are removed, and the carcass is discarded. This law prohibits any person under U.S. jurisdiction from engaging in shark finning, possessing onboard or landing shark fins without the corresponding carcass. The Shark Conservation Act, signed into law in 2010, requires that all sharks in the United States, with one exception (commercial fisheries for smooth dogfish), be brought to shore with their fins naturally attached. Without fate information for each shark interaction, we cannot state with absolute certainty that shark finning is not taking place. SG100 is not met.

e	Review of alternative measures			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No

Rationale

There are no main primary species, and there is minimal catch of minor primary species. The Surfclam fishery has developed gear that is highly selective at capturing only Surfclams and Ocean Quahogs of marketable size, while minimizing the bycatch of other species. There are regular annual reports of bycatch and discards in all fisheries managed by NMFS (e.g., SBRM 2020), in addition to bycatch and EFH considerations in all FMPs. As referenced in

SIa, National Standard Guidelines require that proposed conservation and management measures prioritize minimization of bycatch to the extent practicable (based on net benefit). SG60 and SG80 are met. However, these is no formal biennial review that directly evaluates the practicality of alternative measures to minimize UoA-related mortality of unwanted catch. Therefore, SG100 is not met.
References
Wigley, SE and Tholke, C., 2018, 2018 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum **NMFS-NE-254**. Available at: https://doi.org/10.25923/96fr-zg53 Wigley, SE and Tholke, C., 2019, 2019 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-254. Available at: https://doi.org/10.25923/96fr-zg53 Wigley, SE and Tholke, C., 2020, 2020 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-261. Available at: https://doi.org/10.25923/z0mw-9t57 Wallace, D.H. and T.B. Hoff. 2004. Minimal bycatch in the Northeast Atlantic Surfclam and Ocean Quahog fishery. In: Bycatch in Northeast Fisheries: Moving Forwards. National Marine Fisheries Service, Gloucester, MA. Page 83. ASMFC 1997. Atlantic States Marine Fisheries Commission. Fishery Management Report No. 29. Amendment 3 to the Interstate Fishery Management Plan for Lobster

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.1.3 – Primary species information

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impact on main primary species			
	Guide post	Qualitative information is adequate to estimate the impact of the UoA on the main primary species with respect to status. OR If RBF is used to score PI 2.1.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is adequate to assess the impact of the UoA on the main primary species with respect to status. OR If RBF is used to score PI 2.1.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for main primary species.	Quantitative information is available and is adequate to assess with a high degree of certainty the impact of the UoA on main primary species with respect to status.
	Met?	NA	NA	Both UoAs – Yes
Rationale				
There are no main primary species but following SA3.3.1, this scoring issue is still required to be scored. The database used to assess catch characteristics and discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. The quantitative data used in this assessment was provided by Gina Shield of the NMFS NEFSC. There were only a limited number of observations between 2018-2020 (55 observed trips for the Surfclam fishery, 36 for the Ocean Quahog fishery). This relatively low coverage is due to the NEFOP allocating fewer sea days to fleets that have the smallest fraction of discards and the smallest fraction of total mortality due to discards. Although low, this coverage meets the SBRM requirement of providing discard estimates with a required CV for federally managed species, as this UoA has proven to be highly selective for the target species, with very little bycatch. Observer coverage is available and is adequate to assess, with a high degree of certainty, the impact of the UoA on main primary species with respect to status. Requirements for SG100 is met for both UoAs.				
b	Information adequacy for assessment of impact on minor primary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.

	Met?			Both UoAs – Yes
Rationale				
Minor primary species were identified in the Surfclam and Ocean Quahog fisheries, according to the observer data obtained between 2018-2020. For the reasons stated in SIa, these data are considered adequate to estimate the impact of the UoA on minor primary species with respect to status. Therefore, the Surfclam and Quahog fisheries meet the SG100 requirements for both fisheries.				
c	Information adequacy for management strategy			
	Guide post	Information is adequate to support measures to manage main primary species.	Information is adequate to support a partial strategy to manage main primary species.	Information is adequate to support a strategy to manage all primary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No to Monkfish, Skates Both UoAs – Yes to all others
Rationale				
There are no main secondary species but following SA3.3.1, this scoring issue is still required to be scored. The observer data and information from other scientific surveys evaluating hydraulic clam dredge fisheries are adequate to support a partial strategy to manage main primary species, meeting SG80 for all primary species. As noted in SIa above, although the observer coverage is relatively low for these fisheries, it meets the SBRM requirement of providing discard estimates with a required CV for federally managed species, as this UoA has proven to be highly selective for the target species. With the exception of Monkfish and skates (see rationales below), the stock assessments and survey information available for primary species caught by both UoAs in the Surfclam and Ocean Quahog fisheries is considered adequate to support a strategy to manage all primary species, and to evaluate with a high degree of certainty whether the strategy is achieving its objective. SG100 is met for all (excluding Monkfish and Skates). **Northeast Skate Complex:** Efforts are underway to ensure the accurate identification of skates caught A primary objective of the FMP is to "collect information critical for substantially improving knowledge of skate fisheries by species and for monitoring: (a) the status of skate fisheries, resources, and related markets and (b) the effectiveness of skate management approaches." There is a need to improve identification and reporting of all skate species in the Northeast Skate Complex. SG100 is not met for any of the skate species identified as minor primary species for the UoAs in this assessment. **Monkfish**: Due to recent (NEFSC 2019) invalidation of the growth curve, Biological Reference Points used in previous assessments are no longer considered relevant for assessing the status of the species. There is a need for age and growth information to set BRPs for this species. SG100 is not met for Monkfish caught by UoA s in this assessment.				
References				
NEFSC 2019				

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

P2.1.1 Scoring calculations for UoA#1 (Surfclam)

Elements	SIa	SIb	SIc	PI score
Winter Skate	100	100	80	≥80
Spiny Dogfish	100	100	100	
Horseshoe Crab	100	100	100	
Little Skate	100	100	80	
Monkfish	100	100	80	
Sea Scallop	100	100	100	
Smooth Skate	100	100	80	
Summer Flounder	100	100	100	
Smooth Dogfish	100	100	100	
Clearnose Skate	100	100	80	
American Lobster	100	100	100	

P2.1.1 Scoring calculations for UoA#2 (Ocean Quahog)

Elements	SIa	SIb	SIc	PI score
Sea Scallop	100	100	100	≥80
Monkfish	100	100	80	
Little Skate	100	100	80	
Winter Skate	100	100	80	
Spiny Dogfish	100	100	100	
Summer Flounder	100	100	100	

PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit		
Scoring Issue		SG 60	SG 80	SG 100
a	Main secondary species stock status			
	Guide post	Main secondary species are likely to be above biologically based limits. OR If below biologically based limits, there are measures in place expected to ensure that the UoA does not hinder recovery and rebuilding.	Main secondary species are highly likely to be above biologically based limits. OR If below biologically based limits, there is either evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are considerable, there is either evidence of recovery or a, demonstrably effective strategy in place between those MSC UoAs that have considerable catches of the species, to ensure that they collectively do not hinder recovery and rebuilding.	There is a high degree of certainty that main secondary species are above biologically based limits.
	Met?	NA	NA	NA
Rationale				
Based on the information available to the assessment team, and as described in 7.3.1.5, there are no main secondary species in the Surfclam and Ocean Quahog fisheries. Therefore, SIa does not need to be scored.				
b	Minor secondary species stock status			
	Guide post			Minor secondary species are highly likely to be above biologically based limits. OR

				If below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species
	Met?			Yes

Rationale
Based on current information, there are no minor secondary species below biologically based limits. The Jonah Crab is managed by NOAA and the ASMFC, but there are no stock assessments or established biological reference points for the stock. As such, it is not known whether this species is overfished or whether overfishing is occurring. In addition mussels (family Mytilidae) are caught in the Surfclam fishery, which are of commercial importance and may have implications associated with their incidental catch. However, mussels were not reported at the species level, so conclusions about their outcome are not included in this assessment. Other secondary minor species include organisms that were not identified to the species level or that have limited or no biological data on which to base any recovery or rebuilding plan, should that be necessary. Therefore, the Surfclam and Ocean Quahog fisheries meet the requirements of the SG100 for SIb.

References
Jonah Crab status available at: https://www.fisheries.noaa.gov/species/jonah-crab

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.2.2 – Secondary species management strategy

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a partial strategy in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a strategy in place for the UoA for managing main and minor secondary species.
	Met?	NA	NA	Yes

Rationale

There are no main secondary species identified in the Surfclam and Ocean Quahog fisheries. Therefore, following the explanation of the term 'if necessary' in Table GSA3, a management strategy is not required at SG60 or SG80 and no specific rationale is needed to meet the SG60 and SG80 levels.

There are a number of measures in place to contribute to the management of the secondary species identified in the UoA, in alignment with the national strategy for bycatch management in US fisheries. The Surfclam and Ocean Quahog Fishery Management Plan (FMP) examines bycatch effects of existing and planned conservation and management measures, meeting the U.S. National Standard Guidelines requirements for FMP to include considerations to reduce bycatch. A primary strategy employed to prevent undersized and non-target species from being caught in the Surfclam and Ocean Quahog fisheries is the use of the highly selective hydraulic dredge gear. This gear type results in very low levels of bycatch, hence, no main secondary species. Progressive improvements in gear efficiency and harvesting practices have reduced fishing effort, limited harvest area and reduced bycatch. Data collection and evaluations on the effects of dredges that have been conducted confirm there is minimal bycatch in this fishery.

The Northeast Fisheries Observer Program allocated observers for the Surfclam and Ocean Quahog trips to collect information on discards from 2018-2020. According to the data used in the 2019, 2020, and 2021 SBRM reports, observer coverage for Surfclam & Quahog trips ranged from 0.5% - 2% during the data collection period of July, 2018 through June, 2020. Onboard observers are required to document catch composition and present annual discard reports to the Fishery Management Councils. Bycatch reports allow Councils to review the effectiveness of the SBRM and also serve to inform management issues or actions via the various FMPs in place for Surfclam and Ocean Quahog, as well as for the bycatch species designated as secondary for this UoA. The FMPs, the use of selective gear, and bycatch reporting are considered a strategy working cohesively within the Greater Atlantic Region Council system to ensure FMPs meet the U.S. National Standard Guidelines for sustainable and responsible management of the designated secondary species. SG100 is considered met.

b	Management strategy evaluation

	Guide post	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	Yes	Yes	No

Rationale

As mentioned previously, a primary strategy employed to prevent undersized and non-target species from being caught in the Surfclam and Ocean Quahog fisheries is the use of the highly selective hydraulic dredge gear. Observer reports have repeatedly demonstrated low levels of bycatch, providing an objective basis for confidence that this strategy will be effective. This satisfies the requirements of both SG60 and SG80.

Scientific assessments have evaluated hydraulic dredge gear to determine levels of bycatch, demonstrating that the gear is configured in such a way as to significantly reduce bycatch (and unwanted debris), providing evidence that the primary strategy for managing/reducing impacts to secondary species is effective. However, because these strategies to maintain or not hinder rebuilding of secondary species (should that be necessary) are not reviewed regularly, the requirements for SG100 are not met.

c	Management strategy implementation			
	Guide post		There is some evidence that the measures/partial strategy is being implemented successfully.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a).
	Met?		Yes	Yes

Rationale

There are no main secondary species, and there are strategies being implemented for managing minor secondary species as mentioned for SIa.

Evidence of implementation of the strategy for managing secondary species mentioned in SIa includes the demonstrated selectivity of fishing gear, as shown by the reports generated from observer data collected between 2018-2020. This indicates that the strategy is being implemented successfully, therefore, SG80 is met. The publication of the "2020 SBRM Annual Discard Report" and the "2020 Discard Estimation, Precision, and Sample Size Analyses" provides clear evidence that the onboard observer program is being successfully implemented. Therefore, the Surfclam and Ocean Quahog fisheries meet the requirements of the SG100 levels for SIc.

d	Shark finning			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not Scored	Not Scored	Not Scored

Rationale				
Two species of shark were caught as bycatch in the Surfclam and Ocean Quahog fisheries included Spiny Dogfish and Smooth Dogfish and classified as **primary** minor species for this assessment, and as such will not be scored in 2.2.2 Sid.				
e	Review of alternative measures to minimise mortality of unwanted catch			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all secondary species, and they are implemented, as appropriate.
	Met?	Yes	Yes	No
Rationale				
Based on the available observer data, no main secondary species were identified and catch of minor secondary species was minimal. The Surfclam fishery has developed gear that is highly selective at capturing only Surfclams and Ocean Quahogs of marketable size, while minimizing the bycatch of other species. There are regular annual reports of bycatch and discards in all fisheries managed by NMFS (e.g., SBRM 2020), in addition to bycatch and EFH considerations in all FMPs. As referenced in SIa, National Standard Guidelines require that proposed conservation and management measures prioritize minimization of bycatch to the extent practicable (based on net benefit). SG60 and SG80 are met. However, these is no formal biennial review that directly evaluates the practicality of alternative measures to minimize UoA-related mortality of unwanted catch. Therefore, SG100 is not met.				
References				
Atlantic Surfclam and Ocean Quahog Management Plan Wigley, SE and Tholke, C., 2018, 2018 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum **NMFS-NE-254**. Available at: https://doi.org/10.25923/96fr-zg53 Wigley, SE and Tholke, C., 2019, 2019 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-254. Available at: https://doi.org/10.25923/96fr-zg53 Wigley, SE and Tholke, C., 2020, 2020 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-261. Available at: https://doi.org/10.25923/z0mw-9t57				
Draft scoring range and information gap indicator added at Announcement Comment Draft Report				

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.2.3 – Secondary species information

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts on main secondary species			
	Guide post	Qualitative information is adequate to estimate the impact of the UoA on the main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and adequate to assess the impact of the UoA on main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and adequate to assess with a high degree of certainty the impact of the UoA on main secondary species with respect to status.
	Met?	NA	NA	Yes

Rationale

There are no main secondary species but following SA3.3.1, this scoring issue is still required to be scored.

The database used to assess catch characteristics and discarding is the NMFS Observer Program database, which includes data from trips that had trained observers onboard to document discards. The quantitative data used in this assessment was provided by Gina Shield of the NMFS NEFSC. There were only a limited number of observations between 2018-2020 (55 observed trips for the Surfclam fishery, 36 for the Ocean Quahog fishery). This relatively low coverage is due to the NEFOP allocating fewer sea days to fleets that have the smallest fraction of discards and the smallest fraction of total mortality due to discards. Although low, this coverage meets the SBRM requirement of providing discard estimates with a required CV for federally managed species, as this UoA has proven to be highly selective for the target species, with very little bycatch. Observer coverage is available and is adequate to assess, with a high degree of certainty, the impact of the UoA on main secondary species with respect to status. Requirements for SG100 is met.

b	Information adequacy for assessment of impacts on minor secondary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.

	Met?			Yes
Rationale				
Minor secondary species were identified in the Surfclam and Ocean Quahog fisheries, according to the observer data summarized in Table 15 and Table 17, respectively. For the reasons stated in SIa, these data are considered adequate to estimate the impact of the UoA on minor secondary species with respect to status. Therefore, the Surfclam and Ocean Quahog fisheries meet the SG100 requirements.				
c	Information adequacy for management strategy			
	Guide post	Information is adequate to support measures to manage main secondary species.	Information is adequate to support a partial strategy to manage main secondary species.	Information is adequate to support a strategy to manage all secondary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	NA	NA	Yes
Rationale				
There are no main secondary species but following SA3.3.1, this scoring issue is still required to be scored. The observer data and information from other scientific surveys evaluating hydraulic clam dredge fisheries are adequate to support a partial strategy to manage main primary species, meeting SG80. As noted in SIa above, although the observer coverage is relatively low for these fisheries, it meets the SBRM requirement of providing discard estimates with a required CV for federally managed species, as this UoA has proven to be highly selective for the target species. Moreover, the observer data for 2018-2020 did not demonstrate a significant departure from the quantitative information provided for the previous assessment (observer data for years 2004-2006), indicating the data is reflective of the highly selective nature of these fisheries. Therefore, the information for Surfclam and Ocean Quahog fisheries is considered adequate to support a strategy to manage all secondary species, and to evaluate with a high degree of certainty whether the strategy is achieving its objective. The requirements of SG100 are considered to be met.				
References				
Northeast Fisheries Observer Program (NEFOP)				

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.3.1 – ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guide post	Where national and/or international requirements set limits for ETP species, the effects of the UoA on the population/ stock are known and likely to be within these limits.	Where national and/or international requirements set limits for ETP species, the combined effects of the MSC UoAs on the population /stock are known and highly likely to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a high degree of certainty that the combined effects of the MSC UoAs are within these limits.
	Met?	NA	NA	NA

Rationale

There are no quantitative limits applied to the UoA via national or international requirements. There are no ESA-listed species affected by the fishery and the MMPA does not apply quantitative limits to this fishery.

Therefore, because of the following, SIa is not scored: (1) no bycatch species in the Surfclam and Ocean Quahog fisheries have been assigned PBRs as strategic stocks (2) the interpretations of the MSC indicate that, in this case, PBRs would not be defined as clear "national or international limits" and (3) there are no quantitative limits (https://mscportal.force.com/interpret/s/article/ETP-and-limits-PI-2-3-1-1527262007441). Thus PI 2.3.1 SIa is not scored.

b	Direct effects			
	Guide post	Known direct effects of the UoA are likely to not hinder recovery of ETP species.	Direct effects of the UoA are highly likely to not hinder recovery of ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP species.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes

Rationale

Direct effects have been considered and the hydraulic dredge is not known to impact marine mammals, marine turtles, seabirds, or other ETP species, as classified by the MSC. The Surfclam and Ocean Quahog fisheries are required to comply with all federal regulations regarding ETP species, which are explicitly designed to ensure fisheries do not hinder recovery of protected species.

The U.S. Office of Protected Resources List of Fisheries (LOF) classifies U.S. commercial fisheries into one of three Categories according to the level of incidental mortality or serious injury of marine mammals: I. frequent incidental mortality or serious injury of marine mammals; II. occasional incidental mortality or serious injury of marine mammals; and III. remote likelihood of/no known incidental mortality or serious injury of marine mammals. These fisheries in the Mid-Atlantic are classified as Category III fisheries, with no known injury or

mortality to marine mammals recorded. The current List of Fisheries is available at: New England and Mid-Atlantic Offshore Surf Clam and Quahog Dredge Fishery - MMPA List of Fisheries

Potential Biological Removal (PBR) Level is defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. The PBR level is the product of the following factors: the minimum population estimate of the stock; one-half the maximum theoretical or estimated net productivity rate of the stock at a small population size; and a recovery factor of between 0.1 and 1.0. PBR is designed as a metric to be used when comparing all estimated annual, anthropogenic mortalities, to decide if a marine mammal stock should be considered a strategic stock. A strategic stock is defined by the MMPA *"as a marine mammal stock--for which the level of direct human-caused mortality exceeds the potential biological removal level; which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; or which is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA."* So, while there is considerable analysis that goes into estimating PBR, in fact it is not a limit as compared to fishery-based limits (target and threshold). The MSC has clarified in the interpretations log that *"limits that are part of binding regulatory requirements that the fishery needs to comply with (e.g. similar to harvest control rules) should always be considered as 'limits of national and international requirements' by assessment teams." (*https://mscportal.force.com/interpret/s/article/ETP-limits-and-use-of-Potential-Biological-Removal-PI-2-3-1-1527262007440).

The fisheries do not interact with seabirds because the hydraulic dredge gear is not capable of capturing them. There have been no reported interactions between and hydraulic clam dredges ETP species such as marine turtles, as consistently evidence by observer data.

Moreover, there are regular scientific surveys of Surfclam and Ocean Quahog that use chartered commercial vessels equipped with hydraulic dredges, and they would also report any gear interactions with ETP species; this has never occurred.

Given the evidence described above, there is a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP species. Therefore, both the Surfclam and Ocean Quahog fisheries meet the requirements of the SG 60, 80 and 100 levels for SIb.

c	Indirect effects			
	Guide post		Indirect effects have been considered for the UoA and are thought to be highly likely to not create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the UoA on ETP species.
	Met?		Both UoAs – Yes	Both UoAs – No

Rationale

Indirect effects on ETP species may include destruction of habitat for ETP species, reductions in prey available for ETP species, and/or increases in predators on ETP species. Indirect effects in the form of seabed disturbance by the dredge and the ecosystem impact of the disturbance have been considered, and based on inference of existing information, the hydraulic dredge is not known to indirectly impact marine mammals, turtles, seabirds, or other protected species. Similarly, the principal known predators feeding on Surfclams and Ocean Quahogs, do not include ETP species (NOAA, 2021). Effects of the fishery on habitat and ecosystem are further evaluated in PI 2.41 and 2.5.1, respectively.

Both UoAs: There are no known interactions with ETP species with vessels and there are no known indirect impacts. However, as far as the assessment team is aware, indirect effects have not been studied sufficiently.

Therefore, both the Surfclam and Ocean Quahog fisheries meet the requirements of the SG 80, but not the SG100 levels for SIc, as indirect effects are not known with a high degree of certainty.
References
NMFS List of Fisheries: New England and Mid-Atlantic Offshore Surf Clam and Quahog Dredge Fishery - MMPA List of Fisheries NOAA. 2021. Ecosystem Status Report for the Northeast Shelf Large Marine Ecosystem Available at https://www.fisheries.noaa.gov/new-england-mid-atlantic/ecosystems/northeast-us-shelf-regional-ecosystem

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.3.2 – ETP species management strategy

PI 2.3.2		The UoA has in place precautionary management strategies designed to: - meet national and international requirements; - ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guide post	There are measures in place that minimise the UoA-related mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a comprehensive strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.
	Met?	NA	NA	NA
Rationale				
There are no quantitative limits applied to the UoA via national or international requirements. There are no ESA-listed species affected by the fishery and the MMPA does not apply quantitative limits to this fishery. Therefore, this Scoring Issue is not scored.				
b	Management strategy in place (alternative)			
	Guide post	There are measures in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a strategy in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a comprehensive strategy in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes
Rationale				
No ETP interactions were identified in the Surfclam and Ocean Quahog fisheries and, should such interactions arise in the future, the comprehensive strategy outlined below can identify unacceptable impacts and responding with appropriate measures to minimize impacts (see the MSC interpretation of Scoring PI 2.3.2 when no interactions). Through the Northeast Fisheries Observer Program, observers are required to document catch composition and present annual discard reports to the Fishery Management Councils. Bycatch reports allow Councils to review the				

effectiveness of the SBRM and serve to inform management issues or actions via the various FMPs in place for Surfclam and Ocean Quahog, as well as for the bycatch species for this UoA.

The U.S. Office of Protected Resources List of Fisheries (LOF) classifies U.S. commercial fisheries into one of three Categories according to the level of incidental mortality or serious injury of marine mammals: I. frequent incidental mortality or serious injury of marine mammals; II. occasional incidental mortality or serious injury of marine mammals; and III. remote likelihood of/no known incidental mortality or serious injury of marine mammals. These fisheries in the Mid-Atlantic are classified as Category III fisheries, meaning there is no known injury or mortality to marine mammals. Moreover, the U.S. Office of Protected Resources requires regular monitoring of the status of all federally listed ETP species and, where applicable, management measures (e.g. careful handling, gear modifications, fishery closures) and limits are put in place to ensure requirements for protection and rebuilding are met. These cohesive and strategic arrangements are intended to manage the impacts to ETP species and allows for the modification fishing practices if unacceptable impacts are identified. The Surfclam and Ocean Quahog fisheries are required to comply with all federal regulations regarding ETP species, and these measures represent a strategy that is in place that is expected to ensure the UoA does not hinder the recovery of ETP species, thus meeting SG80.

For both UoAs, the above criteria also meet the MSC definition of 'comprehensive strategy' in that monitoring, analysis, and management measures, and responses are linked and continually evaluated to ensure the UoAs do not hinder the recovery of ETP species. The SG100 levels for SIa are considered met.

c	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is an objective basis for confidence that the measures/strategy will work, based on information directly about the fishery and/or the species involved.	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes

Rationale

As detailed in SIb, the FMPs, the use of selective gear, bycatch reporting, and regular review are considered measures working cohesively within the Greater Atlantic Region Council system to ensure FMPs meet the U.S. National Standard Guidelines for sustainable and responsible management ETP species. Through the Northeast Fisheries Observer Program, observers are required to document catch composition and present annual discard reports to the Fishery Management Councils. Bycatch reports allow Councils to review the effectiveness of the SBRM and serve to inform management issues or actions via the various FMPs in place for Surfclam and Ocean Quahog, as well as for the bycatch species associated with both UoAs. Individually, general experience has demonstrated that these measures are likely to be effective in managing ETP interactions, meeting SG60. The regular reporting of bycatch information by UoA vessels provides an objective basis for confidence that the strategy employed is effective in managing ETP impacts. As a result, there is an objective basis for confidence that the strategy will work, based on information directly about the fishery and/or the species involved, thus meeting SG60. Collectively, these measures function as a comprehensive strategy and quantitative analysis of information about the fishery and species involved supports high confidence that the strategy will work. SG100 is considered met for both UoAs.

d	Management strategy implementation

	Guide post		There is some evidence that the measures/strategy is being implemented successfully.	There is clear evidence that the strategy/comprehensive strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a) or (b).
	Met?		Both UoAs – Yes	Both UoAs – Yes
Rationale				
As there are no reported ETP interactions in the Surfclam and Ocean Quahog hydraulic dredge fisheries. The evidence that supports this is the combination of a lack of observed fishery interactions with ETP species in the limited at sea observer coverage, the scientific surveys for the resource, in logbook reports, and finally in stranding observations. The overall NMFS strategy for addressing ETP interactions in fisheries in general is clearly working to minimize the mortality of ETP species. In the Surfclam and Ocean Quahog fisheries, there is clear evidence that the strategy has been successfully implemented and is achieving its objective. Therefore, the Surfclam and Ocean Quahog fisheries both meet the requirements of the SG 80 and 100 levels for SId.				
e	Review of alternative measures to minimize mortality of ETP species			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality ETP species, and they are implemented, as appropriate.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes
Rationale				
Alternative measures to minimize the impact of hydraulic dredge gear to ETP species include the of gear being designed specifically to increase the species and size selectivity for the target species. Quantitative information collected through the Northeast Fisheries Observer Program documents catch composition and is presented annually as discard reports to the Fishery Management Councils. This constitutes regular review of the potential effectiveness and practicality of the selectivity of hydraulic dredge gear to minimise UoA-related mortality of ETP species, meeting both SG60 and SG80. Bycatch reports allow Councils to review the effectiveness of the SBRM and serve to inform management issues or actions via the various FMPs in place for Surfclam and Ocean Quahog, as well as for the bycatch species for this UoA. The U.S. Office of Protected Resources List of Fisheries (LOF) is reviewed annually and considers the classification of U.S. commercial fisheries into one of three Categories according to the level of incidental mortality or serious injury of marine mammals. The categorization in the LOF determines whether participants in that fishery are subject to certain provisions of the MMPA such as registration, observer coverage, and take reduction plan requirements. Therefore, the Surfclam and Ocean Quahog fisheries both meet the requirements of the SG 100 for SIe.				
References				

NMFS List of Fisheries: New England and Mid-Atlantic Offshore Surf Clam and Quahog Dredge Fishery - MMPA List of Fisheries

NOAA (National Oceanic and Atmospheric Administration). 2021a. Standardized Bycatch Reporting Methodology 3-year Review Report, 2020: Reviewing SBRM Years 2018, 2019, and 2020. NOAA Technical Memorandum NMFS-NE-266. Online at: Standardized Bycatch Reporting Methodology 3-year Review Report - 2020 (noaa.gov).

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.3.3 – ETP species information

PI 2.3.3		Relevant information is collected to support the management of UoA impacts on ETP species, including: - Information for the development of the management strategy; - Information to assess the effectiveness of the management strategy; and - Information to determine the outcome status of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts			
	Guide post	Qualitative information is adequate to estimate the UoA related mortality on ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species.	Some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.	Quantitative information is available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes
Rationale				
Quantitative information, in the form of observer data spanning the years 2018-2020, has demonstrated that hydraulic dredging activities by the UoA have not impacted marine mammals, turtles, seabirds, or other protected species. Therefore, the Surfclam and Ocean Quahog fisheries both meet the requirements of the SG 60, 80, and 100 levels for SIa are considered met.				
b	Information adequacy for management strategy			
	Guide post	Information is adequate to support measures to manage the impacts on ETP species.	Information is adequate to measure trends and support a strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.

	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes
Rationale				
Concerning measuring trends and supporting a strategy for ETP impacts management, the U.S. Office of Protected Resources requires regular monitoring of the status of all federally listed ETP species and, where applicable, management measures (e.g. careful handling or gear modifications) and limits are put in place to ensure requirements for protection and rebuilding are met. Given that these fisheries do not appear to interact with ETP species (as indicated by observer data provided between 2018-2020), this overarching work of the OPR should be sufficient to be considered able to support a strategy to manage the impacts of these fisheries on ETP species. Therefore, both the Surfclam and Ocean Quahog fisheries meet the requirements of the SG60 and SG80. For both UoAs, the criteria outlined in PI 2.3.2 SIb meet the MSC definition of 'comprehensive strategy' in that monitoring, analysis, and management measures, and responses are linked and continually evaluated to ensure the UoAs do not hinder the recovery of ETP species. The SG100 levels for SIa are considered met for both UoAs.				
References				
NMFS List of Fisheries: New England and Mid-Atlantic Offshore Surf Clam and Quahog Dredge Fishery - MMPA List of Fisheries				
Draft scoring range and information gap indicator added at Announcement Comment Draft Report				
Draft scoring range		≥80		
Information gap indicator		Information sufficient to score PI		
Overall Performance Indicator scores added from Client and Peer Review Draft Report				
Overall Performance Indicator score				
Condition number (if relevant)				

PI 2.4.1 – Habitats outcome

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly encountered habitat status			
	Guide post	The UoA is unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is evidence that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No

Rationale

Of the commonly encountered habitats identified, the impact of hydraulic clam dredge gear is dependent on factors including fishing effort, habitat type, and recovery time.

As part of a broad analysis of the impacts of fishing to habitats in the U.S. Northeast, hydraulic dredge gear was found to significantly impact geological and biological components (NEFMC 2018, Appendix D). While the impacts of the hydraulic clam dredge are substantial, as indicated by the SASI vulnerability assessment, biological and geological components recover within # and #, respectively. Additionally, the overall adverse impacts of the hydraulic clam dredge fishery are relatively small, due to the relatively small area swept. Management systems in place ensure that vulnerable and important habitats are identified, and that impacts are considered on a fishery-specific and cumulative basis within federal FMPs. Every federally managed fishery is required to identify EFH and evaluate all potential adverse effects of fishing on EFH designated within the FMP as well as all other EFH of federally managed fisheries, including consideration of cumulative impacts. The EFH Regulatory Guidelines further require each FMP to minimize such adverse effects to the extent practicable, as is being implemented by habitat area closures. Finally, information to inform habitat management has been bolstered by the Omnibus Essential Fish Habitat Amendment 2, which assessed seabed vulnerability to fishing gear impacts using the Swept Area Seabed Impact (SASI) approach (NEFMC 2018).

Based on the above, the Surfclam and Ocean Quahog fisheries appear at least highly unlikely to reduce habitat structure and function such that the habitat would be unable to recover to at least 80% of its unimpacted structure, biological diversity, and function within 5-20 years, if fishing were to cease entirely. SG60 and SG80 are considered met.

More information about the areas fished by UoA vessels is required to verify the level of interaction of UoA vessels with the habitat areas indicated as “vulnerable” within the SASI model, and to confirm that hydraulic dredge gear is not used on habitats other than sand/mud substrate. Because there is limited direct evidence to support the argument that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm, SG 100 is not met.

b	VME habitat status

	Guide post	The UoA is unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is evidence that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No

Rationale

Deep water corals and sponges are considered VME habitat for both UoAs, as the distribution of both Surfclams and Ocean Quahogs overlaps with suitable coral and sponge habitat.

However, as mentioned in Section 7.3.1.7 above, the depth operating range of the Surfclam and Ocean Quahog fisheries is less than 60 m, with the restriction based on hose length and operating pump pressures. The deep water coral protection zone starts at the 450 m depth contour in the New England and mid-Atlantic region. The depth limitations of hydraulic dredge gear ensures these fisheries do not impact protected habitats or other closed areas on the U.S. continental shelf. Sponge catches were minimal, indicating a low-level of interaction of the UoA with sponge habitats. Therefore, the Surfclam and Ocean Quahog fisheries meet the requirements of the SG60 and SG80 levels for SIb. However, due to the lack of clear evidence that the UoA does not reduce structure and function of coral and sponge habitats, SG 100 is not met.

c	Minor habitat status			
	Guide post			There is evidence that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.
	Met?			Yes

Rationale

Minor habitat are defined as all other habitats, as compared to vulnerable marine ecosystems or potential vulnerable marine ecosystems, and commonly encountered habitats. As stated previously for SIa in this PI, according to the SASI model, the hydraulic clam dredge is highly unlikely to reduce structure and function of both minor habitats and the commonly encountered habitats to a point where there would be serious or irreversible harm. The fishery meets the requirements of the SG 100 level for SIc.

References

Clam Dredge Framework Adjustment (2020)

NEFMC 2018

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	≥80
Information gap indicator	More information required to confirm the fisheries' minimal footprint and verify that UoA vessels are highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.4.2 – Habitats management strategy

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes
Rationale				
The overall NMFS strategy to protect essential fish habitat has been encompassed in the Omnibus EFH amendment developed by the NEFMC and applied to all managed fisheries in the region. This amendment was initially enacted in 1998 and was designed to establish and protect EFH for 18 different managed species. More recently, the NEFMC submitted an updated version of the Omnibus Essential Fish Habitat Amendment 2, and it included an assessment of seabed vulnerability to fishing gear impacts using the Swept Area Seabed Impact (SASI) approach (NEFMC, 2016). SASI was developed by the Council's Habitat Plan Development Team to assist them in evaluating adverse effects across FMPs, developing measures to minimize those effects, and analysing the impacts of those measures. In response to the SASI-based assessment, habitat closure areas have been established to minimize impacts to areas identified as especially vulnerable to fishing activities, specifically the use of bottom tending gears, such as the hydraulic dredge. Within this habitat protection framework, research will be conducted to improve understanding of dredging impacts on habitat. As exemplified by the Omnibus EFH amendment 2, there is a strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats, thus meeting the requirements for the SG100.				
b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some objective basis for confidence that the measures/partial strategy will work, based on information directly about the UoA and/or habitats involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or habitats involved.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No
Rationale				
As detailed in SIa, NMFS and the management councils have implemented an overall strategy designed to ensure that the UoAs do not pose a risk of serious or irreversible harm to habitats, with specific focus on creating restricted access areas, such as the Great South Channel HMA. Based on general theory, the adoption of habitat closures is considered likely to be effective in minimizing damage of habitats by UoA vessels, meeting SG60.				

Vessels returning to harvest the same areas after clams have resettled and grown provides a demonstrates that the habitat recovers sufficiently to support the return of the key indicator species (Surfclam and Ocean Quahog). Additionally, closure areas are continually monitored via VMS systems required on all fishing vessels to ensure fishing is not occurring in closed or protected habitat areas. These provide an objective basis for confidence that the habitat management strategy will work, based on information directly about the UoA and/or habitats involved, thus meeting SG80.

However, there has not been specific evaluation with respect to the UoA vessels to provide high confidence the strategy is working. Thus, SG100 is not met.

c	Management strategy implementation			
	Guide post		There is some quantitative evidence that the measures/partial strategy is being implemented successfully.	There is clear quantitative evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		Both UoAs – Yes	Both UoAs – No

Rationale

SIc requires that there be some quantitative evidence that the strategy outlined in SIa is being implemented successfully. This evidence includes VMS data that tracks fishing vessels to ensure that they are not fishing in closed or protected habitat areas, in addition to the qualitative evidence that the vessels are able to return to the same areas to harvest after the clams have resettled and grown in the area. This provides both quantitative and qualitative evidence that the strategy is being implemented successfully, meeting both the SG60 and SG80. However, SG100 is not met, as there is not yet clear quantitative evidence that that the strategy is being implemented successfully and is achieving its objective.

d	Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs			
	Guide post	There is qualitative evidence that the UoA complies with its management requirements to protect VMEs.	There is some quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is clear quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes

Rationale

There are protections afforded to the VMEs via amendments to other fishery federal FMPs (MSB and Tilefish) that prohibit use of bottom trawling gear in the designated deep coral (MSB FMP Amendment 9) and the four canyons with HACP designations for Tilefish (FMP Amendment 1). The protections apply to all relevant MSC and non-MSC UoAs because they apply to all federally managed fisheries (and therefore all UoAs in the "managed area").

The VMEs identified in the management area all lay beyond the footprint of the fishery, as the fishery gear is unable to operate at the depths at which the VMEs are found (see Vulnerable Marine Ecosystems (VME) section for more detail). This documented depth limitation provides qualitative and quantitative evidence that the UoA complies with management requirements and VME protection measures for other MSC and non-MSC fisheries, meeting SG60 and SG80. The VMS system that records where fishing effort occurs in the UoA, and enforcement records demonstrating monitoring of VMS tracks, are together considered to provide clear quantitative evidence of the effective implementation of management requirements and protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries SG100 is met.
References
[NEFMC] New England Fishery Management Council. 2016, Ominbus Essential Fish habitat Amendment 2. Draft released 16 Jan 2016

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.4.3 – Habitats information

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	The types and distribution of the main habitats are broadly understood. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the types and distribution of the main habitats.	The nature, distribution and vulnerability of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No
Rationale				
There is at least a basic understanding of the types and distribution of main habitats encountered by the fishery, and information is adequate to broadly understand the nature of the main impacts of gear use on these habitats, including spatial overlap of habitat with fishing gear, meeting SG60 requirements. Based on the results of the SASI vulnerability assessment conducted for Omnibus EFH habitat amendment 2, the impacts of the hydraulic dredge to the commonly encountered habitat are understood. As the nature, distribution, and vulnerability of the main habitats have been quantified and mapped, this fishery meets the SG80 requirements. At the SG100 level, this scoring guidepost requires that distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats. Essentially, there is not sufficient mapping of the seabed to be able to support the SG100 level.				
b	Information adequacy for assessment of impacts			
	Guide post	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.	Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and	The physical impacts of the gear on all habitats have been quantified fully.

		OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	location of use of the fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No

Rationale

Based on the results of the SASI vulnerability assessment conducted for Omnibus EFH habitat amendment 2, the impacts of the hydraulic dredge to the commonly encountered habitat are understood (NEFMC 2016). As the nature, distribution, and vulnerability of the main habitats have been quantified and mapped, this fishery meets the SG 60 and 80 requirements. As this scoring guidepost requires that distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats. Essentially, there is not sufficient mapping of the seabed to be able to support the SG100 level.

c	Monitoring			
	Guide post		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in all habitat distributions over time are measured.
	Met?		Both UoAs – Yes	Both UoAs – No

Rationale

As noted in the discussions above, adequate information continues to be collected to detect any increase in risk to the main habitats, thus meeting the SG80 level. Ongoing work toward an improved understanding and integration of habitat-centered management includes the Northeast Regional Marine Fish Habitat Assessment (NRHA). This collaborative effort is being led by a Steering Committee composed of leadership from the major habitat conservation, restoration, and science organizations in the region and is expected to occur between July 2019 - July 2022. Work outcomes are intended to describe and characterize estuarine, coastal, and offshore fish habitat distribution, abundance, and quality in the Northeast. However, at this time, changes in habitat distributions over time have not been measured, therefore the fishery does not meet the SG100 level for SIc.

[NEFMC] New England Fishery Management Council. 2016, Ominbus Essential Fish habitat Amendment 2. Draft released 16 Jan 2016

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	≥80

Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Ecosystem status			
	Guide post	The UoA is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No

Rationale

Key ecosystem elements considered as being "most crucial to giving the ecosystem its characteristic nature and dynamics" (MSC SA3.16.3) and which the fishery has the most potential to impact. Further MSC guidance states that "key ecosystem elements may include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g., upwelling or spring bloom, abyssal, etc.), and characteristics of biodiversity" (GSA3.18.1). For this re-assessment, the ecosystem element is defined as the Northeast U.S. Continental Shelf Large Marine Ecosystem, including the substrate and associated abiotic and biotic features. The annual State of the Ecosystem Reports (https://www.integratedecosystemassessment.noaa.gov/regions/northeast/reports) summarize and analyse the key ecosystem elements, including those directly impacted by the UoA, namely productivity and trophic interactions.

Noting the importance of the ecosystem components associated with habitats encountered by UoA vessels, because of the nature of the fishery (species prosecuted, gear deployed, areas fished), the associated impacts to these elements are expected to be minimal, as there are very low levels of bycatch in these fisheries and habitat damage is considered relatively temporary and localized. Neither Surfclams nor Ocean Quahog are considered "keystone species" or to function substantially in the transfer of energy through the trophic web as described by the MSC low-trophic-level species requirements. Moreover, because of the nature of hydraulic dredging as a towed, bottom fishing activity, the impact of the fishery is focused on the seabed, and there are no known impacts on the pelagic environment. The fishery is at least highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm (defined by MSC "in relation to the capacity of the ecosystem to deliver ecosystem services"). SG60 and SG80 are considered met.

However, given the lack of clear evidence that the key ecosystem elements are not seriously disrupted by fishing operations carried out by the UoA, SG 100 is not met.

References

NOAA (National Oceanic and Atmospheric Administration). The 2021b. State of the Ecosystem Reports for Mid-Atlantic and New England. Online at: (https://www.integratedecosystemassessment.noaa.gov/regions/northeast/reports).

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.5.2 – Ecosystem management strategy

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary which take into account the potential impacts of the UoA on key elements of the ecosystem.	There is a partial strategy in place, if necessary, which takes into account available information and is expected to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a strategy that consists of a plan, in place which contains measures to address all main impacts of the UoA on the ecosystem, and at least some of these measures are in place.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes
Rationale				
A management strategy is in place for the Surfclam and Ocean Quahog fisheries, which incorporates impacts of the UoA vessels on elements of the ecosystem. The MAFMC Atlantic Surfclam and Ocean Quahog FMP is regularly updated when evidence of fishery interactions with ecosystems elements are identified, meeting the SG60 and SG80 requirements. The fishery is managed using various measures to reduce bycatch, including quota allocation, commercial fishing permit/license, closed and rotational access areas options and reporting of catch interactions through VTR, and dealer reported landings (sales/trade) record reconciliation with VTR, as well as at-sea observer program (Wigley and Tholke 2018-2020). Habitat management areas (HMAs) are designated across Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic for protection of vulnerable benthic communities (EFH/HAPC). Combined, these measures constitute a strategy to address main impacts of the UoA on the ecosystem. SG 100 is met.				
b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems).	There is some objective basis for confidence that the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved.	Testing supports high confidence that the partial strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – No
Rationale				
Observer data provides opportunities for evaluation of catch composition and NEFMC Atlantic Surfclam and Ocean Quahog FMP is regularly updated when evidence of fishery interactions with ecosystems elements are identified. VMS track monitoring allows for robust evaluation of spatial and temporal fishing patterns and provides confidence that UoA vessels are abiding by habitat area restrictions. In addition, information from stock				

assessments for managed species serves as an objective basis for confidence that the measures in place are functioning effectively. These provide an objective basis for confidence that the strategy will be effective, meeting SG60 and SG80.

Evidence of empirical testing, simulation, or methods to evaluate the uncertainty of the effectiveness of the strategy described in SIa would be required to meet SG 100.

c	Management strategy implementation			
	Guide post		There is some evidence that the measures/partial strategy is being implemented successfully.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a).
	Met?		Both UoAs – Yes	Both UoAs – No

Rationale

SIc requires that there be some quantitative evidence that the measures/partial strategy is being implemented successfully. This evidence includes VMS data that tracks fishing vessels to ensure that they are not fishing in closed or protected habitat areas, in addition to the qualitative evidence that the vessels are able to return to the same areas to harvest after the clams have resettled and grown in the area. This provides both quantitative and qualitative evidence that the measures/partial strategy is being implemented successfully. Therefore the fishery meets the SG80 level, but does not meet the requirements of the SG100 level, as there is not clear quantitative evidence that that the partial strategy/strategy is being implemented successfully and is achieving its objective.

References

Wigley, SE and Tholke, C., 2018, 2018 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum **NMFS-NE-254**. Available at: https://doi.org/10.25923/96fr-zg53

Wigley, SE and Tholke, C., 2019, 2019 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-254. Available at: https://doi.org/10.25923/96fr-zg53

Wigley, SE and Tholke, C., 2020, 2020 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-261. Available at: https://doi.org/10.25923/z0mw-9t57

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	Information is adequate to identify the key elements of the ecosystem.	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Both UoAs – Yes	Both UoAs – Yes	

Rationale

Surfclams and Ocean Quahog (kept and discarded) are the dominant catch in the fishery and considered the key element of the fishery interaction with ecosystem. Incidental bycatch included Winter Skate, Spiny Dogfish, Horseshoe Crab, Little Skate, Monkfish, Sea Scallop, Smooth Skate, Summer Flounder, and Smooth Dogfish. These are considered the key elements of the ecosystem interacting with the UoA fishery.

Information is available to broadly understand the key elements of the ecosystem and the main functions of the components in the ecosystem are known. The NEFSC produces an Ecosystem Status report for the Northeast Shelf Large Marine Ecosystem, for both the Mid-Atlantic and New England, and this is updated regularly (see https://www.fisheries.noaa.gov/new-england-mid-atlantic/ecosystems/northeast-us-shelf-regional-ecosystem. This report summarizes the key ecosystem elements, both abiotic and biotic, which are monitored regularly, or can be estimated from data available over time. These include sea surface temperature, stratification, the CPR color index of phytoplankton abundance, zooplankton biovolume, total fish biomass, the ratio of pelagic to demersal fish biomass, mean length of the NEFSC survey catch, invertebrate landings, fish landings, and the mean trophic level of the catch.

Ongoing information from scheduled; NMFS multi-species bottom trawl survey, NEFOB and bycatch reports, VTR, VMS, marine mammals, and turtle surveys, recreational fishery surveys, oceanographic surveys, and ad hoc Environmental Impact Statement (EIA), all together provide important information for better understanding and managing the ecosystem components of ecoregion according the EBFM approaches.

Combined, these sources of information are adequate to understand key elements of the ecosystem**.** SG 80 is met.

b	Investigation of UoA impacts			
	Guide post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and some have been investigated in detail.	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and have been investigated in detail.
	Met?	Both UoAs – Yes	Both UoAs – Yes	Both UoAs – Yes

Rationale

Main interactions between the fishery and the key ecosystem elements can be inferred from existing information and have been investigated. SBRM reports and observer coverage program provide identification and quantification of species caught (kept and discarded) in the fishery, as well as any interaction with species listed under the ESA. MMPA, or VME designation. VMS, implemented on all vessels in the UoA fleet provides identification of the fleet operational areas as well as compliance with rotational closed-access areas options, including HMA and EFH/HAPC, which are key ecosystem elements containing

benthic habitat important for life stages of various species. Seabed habitat characterization and communities are known at sufficient resolution throughout the ecoregion (Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic) (Greene et. al., 2010). As part of the NEFMC development of the Omnibus Essential Fish Habitat Amendment 2, seabed vulnerability to fishing gear impacts was evaluated using the Swept Area Seabed Impact (SASI) approach (NEFMC, 2016). The vulnerability assessment provides quantitative information relevant to the Northeast U.S. regarding seabed features (e.g. sponges, biogenic burrows, bed forms, etc.) and their susceptibility to fishing activities by the UoA.

The main interactions between the UoAs and key ecosystem elements have been investigated and are well understood. SG 100 is met.

c	Understanding of component functions			
	Guide post		The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are known.	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are understood.
	Met?		Both UoAs – Yes	Both UoAs – Yes

Rationale

SBRM reports and the observer coverage program provide identification and quantification of species caught (kept and discarded) in the fishery, as well as any interaction with species listed under the ESA. MMPA, or VME designation. VMS, implemented on all vessels in the UoA fleet provides identification of the fleet operational areas as well as compliance with rotational closed-access areas options, including HMA and EFH/HAPC, which are key ecosystem elements containing benthic habitat important for life stages of various species. Seabed habitat characterization and communities are known at sufficient resolution throughout the ecoregion (Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic) (Greene et. al., 2010). As part of the NEFMC development of the Omnibus Essential Fish Habitat Amendment 2, seabed vulnerability to fishing gear impacts was evaluated using the Swept Area Seabed Impact (SASI) approach (NEFMC, 2016). The vulnerability assessment provides quantitative information relevant to the Northeast U.S. regarding seabed features (e.g. sponges, biogenic burrows, bed forms, etc.) and their susceptibility to fishing activities by the UoA.

The main interactions between the UoA and key ecosystem elements has been investigated and is well understood. SG 100 is met.

d	Information relevance			
	Guide post		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?		Both UoAs – Yes	Both UoAs – Yes

Rationale

SBRM reports and observer coverage program provide identification and quantification of species caught (kept and discarded) in the fishery, as well as any interaction with species listed under the ESA. MMPA, or VME designation. VMS, implemented on all vessels in the UoA fleet provides identification of the fleet operational areas as well as compliance with rotational closed-

access areas options, including HMA and EFH/HAPC, which are key ecosystem elements containing benthic habitat important for life stages of various species. Seabed habitat characterization and communities are known at sufficient resolution throughout the ecoregion (Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic) (Greene et. al., 2010). As part of the NEFMC development of the Omnibus Essential Fish Habitat Amendment 2, seabed vulnerability to fishing gear impacts was evaluated using the Swept Area Seabed Impact (SASI) approach (NEFMC, 2016). The vulnerability assessment provides quantitative information relevant to the Northeast U.S. regarding seabed features (e.g. sponges, biogenic burrows, bed forms, etc.) and their susceptibility to fishing activities by the UoA.

The main interactions between the UoA and key ecosystem elements has been investigated and is well understood. SG 100 is met.

e	Monitoring			
	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		Both UoAs – Yes	Both UoAs – Yes

Rationale

Information is adequate to support the development of strategies to manage ecosystem impacts.

There is substantial information available on the key elements of the ecosystem, primarily available from the annual State of the Ecosystem Reports (available by year at https://www.integratedecosystemassessment.noaa.gov/regions/northeast/reports). These reports summarize and analyse the key ecosystem elements, including those directly impacted by the UoA, namely productivity and trophic interactions. SBRM reports and observer coverage program provide identification and quantification of species caught (kept and discarded) in the fishery, as well as any interaction with species listed under the ESA (NOAA . MMPA, or VME designation. VMS, implemented on all vessels in the UoA fleet provides identification of the fleet operational areas as well as compliance with rotational closed-access areas options, including HMA and EFH/HAPC, which are key ecosystem elements containing benthic habitat important for life stages of various species. Seabed habitat characterization and communities are known at sufficient resolution throughout the ecoregion (Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic) (Greene et. al., 2010). As part of the NEFMC development of the Omnibus Essential Fish Habitat Amendment 2, seabed vulnerability to fishing gear impacts was evaluated using the Swept Area Seabed Impact (SASI) approach (NEFMC, 2016). The vulnerability assessment provides quantitative information relevant to the Northeast U.S. regarding seabed features (e.g. sponges, biogenic burrows, bed forms, etc.) and their susceptibility to fishing activities by the UoA.

The main interactions between the UoA and key ecosystem elements has been investigated and is well understood. SG 100 is met.

References

Wigley, SE and Tholke, C., 2018, 2018 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum **NMFS-NE-254**. Available at: https://doi.org/10.25923/96fr-zg53

Wigley, SE and Tholke, C., 2019, 2019 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-254. Available at: https://doi.org/10.25923/96fr-zg53

Wigley, SE and Tholke, C., 2020, 2020 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-261. Available at: https://doi.org/10.25923/z0mw-9t57

New England Fishery Management Council. 2016, Ominbus Essential Fish habitat Amendment 2. Draft released 16 Jan 2016

NOAA (National Oceanic and Atmospheric Administration). The 2021b. State of the Ecosystem Reports for Mid-Atlantic and New England. Online at: (https://www.integratedecosystemassessment.noaa.gov/regions/northeast/reports).

Greene, J.K., M.G. Anderson, J. Odell, and N. Steinberg, eds. 2010. The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One. The Nature Conservancy, Eastern U.S. Division, Boston, MA

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

7.4 Principle 3

7.4.1 Principle 3 background

7.4.1.1 National Level Management

Decision Making Processes

Federal fisheries in the United States are managed under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), which includes 10 national standards. These can be considered as explicit and clear long term objectives that guide decision-making and are consistent with the MSC Principles and Criteria and the precautionary approach. The 10 national standards under MSFCMA are as follows:

Conservation and management measures shall:

The MSFCMA also created eight regional fishery management councils (councils) responsible for the fisheries that require conservation and management in their region. The councils are composed of both voting and non-voting members representing the commercial fishing, recreational fishing, environmental, academic, and government interests. Under the MSFCMA, councils are required to:

Consultation, Roles & Responsibilities, and Decision Making Processes

Both the surfclam and ocean quahog fisheries are managed primarily through the Surfclam and Ocean Quahog Fishery Management Plan (FMP) developed by the MAFMC under the MSFCMA. The small fisheries managed separately in state-waters are not part of the Unit of Certification (other than with respect to P1 target stock issues).

Under the MSFCMA, fisheries management plans contain legal requirements that are codified in the Code of Federal Regulations (USOFR 2016). NMFS has legal responsibility for implementing FMPs developed under the MSFCMA, and can be subject to lawsuits, during which the public “administrative record” (the basis for decision making—including everything in the public record on all fisheries related issues) is used to demonstrate how NMFS made its decisions. NMFS also has legal responsibility for reviewing and approving (or not) FMPs, implementing and enforcing regulations, and administering supporting programs. This legal framework requires decision-makers to consider a range of alternatives and their impacts as well as their compliance with the ten National Standards. As part of the process, NMFS publishes a "Notice of Proposed Rule-making" that invites comments from the public. When a final rule is published, NMFS routinely includes all comments received on proposed rules and the NMFS response to those comments.

The Council process is fully public and there are regular opportunities for public involvement. The roles and responsibilities of the respective Councils, their committees and staff, and the regional NMFS science centers are clear and understood by all relevant parties. Key roles and functions for surfclam and ocean quahog are as follows:

Decisions about management of the surfclam and ocean quahog fisheries are driven by two main processes:

1. Annual decision-making processes that may result in measures to meet the short-term fishery objectives are driven by the control rules contained in the FMP; and
2. Longer-term decision-making processes, such as amendments or framework actions, that result in new measures and/or strategies to achieve the long-term fishery objectives (i.e. changes to the management system).

7.4.1.2 Fishery-Specific Management

Objectives for the Fishery

The surfclam and ocean quahog fisheries have explicit short and long term objectives which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2.

Since 1977 the Atlantic surfclam and ocean quahog FMP has been amended 16 times through 15 amendments and 1 framework action. The original FMP had three objectives:

Amendment 8 adopted four objectives (MAFMC 1988) that continue to guide management of the fishery today. They are:

1. Conserve and rebuild Atlantic surfclam and ocean quahog resources by stabilizing annual harvest rates throughout the management unit in a way that minimizes short term economic dislocations.
2. Simplify to the maximum extent the regulatory requirement of surfclam and ocean quahog management to minimize the government and private cost of administering and complying with regulatory, reporting, enforcement, and research requirements of surfclam and ocean quahog management.
3. Provide the opportunity for industry to operate efficiently, consistent with the conservation of surfclam and ocean quahog resources, which will bring harvesting capacity in balance with processing and biological capacity and allow industry participants to achieve economic efficiency including efficient utilization of capital resources by the industry.
4. Provide a management regime and regulatory framework which is flexible and adaptive to unanticipated short term events or circumstances and consistent with overall plan objectives and long term industry planning and investment needs.

History of the Fishery Management Plan

The Original FMP (1977) (http://www.mafmc.org/surfclams-quahogs/) included the objectives listed above and the following management provisions:

- Established management of surfclam and ocean quahog fisheries through September 1979
- Established quarterly quotas for surfclams
- Established annual quotas for ocean quahogs
- Established effort limitation, permit, and logbook provisions
- Instituted a moratorium on entry into the surfclam fishery for one year to allow time for the development of an alternative limited entry system such as a "stock certificate" program
- The FMP has been amended as follows:
- Amendment 1 (1979)
    - Extended management authority through December 31, 1979
    - Maintained the moratorium
- Amendment 2 (1979)
    - Extended the FMP through the end of 1981
    - Divided the surfclam portion of the management unit into the New England and Mid-Atlantic Area
    - Introduced a "bad weather make up day"
    - Maintained the moratorium in the Mid-Atlantic Area
- Amendment 3 (1981)
    - Extended the FMP indefinitely
    - Imposed a 5.5" surfclam minimum size limit in the Mid-Atlantic Area (Note that the minimum size limit has been suspended by the Regional Administrator in recent years as provided for in the FMP)
    - Expanded the surfclam fishing week in the Mid-Atlantic Area to Sunday - Thursday from Monday – Thursday
    - Established a framework basis for quota setting
    - Proposed a permit limitation system to replace the moratorium which was disapproved by NMFS
    - NMFS extended the moratorium

- Amendment 4 (1984)
    - Provided that any unharvested portion of a bimonthly allocation be added to the immediately following bimonthly allocation rather than being prorated over all remaining bimonthly periods and that trip and weekly limits be by vessel classes based on relative fishing power
    - Amendment 4 was implemented on an emergency basis for 180 days beginning 1 July 1984
    - NMFS subsequently determined that the document was not structurally complete for review
- Amendment 5 (1985)
    - Allowed for revision of the surfclam minimum size limit provision (The minimum size limit has been suspended annually in recent years.)
    - Extended the size limit throughout the entire fishery
    - Instituted a requirement that cages be tagged
- Amendment 6 (1986)
    - Divided the New England Area into the Nantucket Shoals and Georges Bank Areas, the dividing line being 69° N Longitude
    - Combined the provisions of Amendment 4 with the Mid-Atlantic Council's Amendment 6 into one document
    - Replaced the bimonthly quotas with quarterly quotas
    - Eliminate the weekly landing limits for the Nantucket Shoals Area
    - Clarified the quota adjustment provisions for the Nantucket Shoals and Georges Bank Areas
    - Established one landing per trip provision
- Amendment 7 (1987)
    - Changed the quota distribution on Georges Bank to equal quarterly quotas
    - Revised the roll over provisions
- Amendment 8 (1988)
    - Replaced the regulated fishing time system in the surfclam and ocean quahog fisheries with an individual transferable quota (ITQ) system
    - Established new objectives for the FMP
- Amendment 9 (1996)

- Revised the overfishing definitions for surfclams and ocean quahogs in response to a scientific review by NMFS

- Amendment 10 (1998)
  - Provided management measures for the small artisanal fishery for ocean quahogs (mahogany clams) off the northeast coast of Maine
- Amendment 11 (1998)
  - Achieved consistency among Mid-Atlantic and New England FMPs on vessel replacement and upgrade provisions, permit history transfer and splitting and renewal regulations for fishing vessels issued Northeast Limited Access Federal Fishery permits
- Amendment 12 (1998)
  - Brought the FMP into compliance with the new and revised National Standards and other requirements of the 1996 Sustainable Fisheries Act
  - Established a framework adjustment process
  - Implemented an Operator Permit requirement for fishermen that did not already have them for other fisheries
  - The Regional Administrator partially approved Amendment 12 with the exceptions of the proposed surfclam overfishing definition and the fishing gear impacts to EFH section.
- Amendment 13 (2003)
- Appendices
  - Addressed various disapproved sections of Amendment 12
- Amendment 14 (2007)
  - Standardized bycatch reporting methodology
- Framework 1 (2007)
  - Addressed issues related to Vessel Monitoring Systems (VMS) and enforcement
- Amendment 16 (2011)
- Established Annual Catch Limits (ACLs) and Accountability Measures (AMs)
- Amendment 15 (2015)
  - Standardized Bycatch Reporting Methodology
- Amendment 18 (2015)

- Eliminated the requirement for vessel owners to submit "did not fish" reports for the months or weeks when their vessel was not fishing
- Removed some of the restrictions for upgrading vessels listed on Federal fishing permits

- Amendment 17 (2016)
  - Establishes a cost recovery program for the individual transferable quota (ITQ) fishery, as required by the Magnuson-Stevens Act.
  - Contains provisions to remove the optimum yield ranges from the management plan and to change how biological reference points are incorporated into the plan.

Fisheries Regulations to Meet Objectives

(This summary of the surfclam and ocean quahog regulations is taken from https://ecfr.federalregister.gov/current/title-50/chapter-VI/part-648#subpart-E, and provides a broad overview of restrictions and requirements of NOAA's National Marine Fisheries Service (NMFS). Citations to the relevant sections of Title 50 part 648, subpart E of the Code of Federal Regulations are provided throughout this summary.)

Permits

There are three categories of permits in the fishery. Two are open access permits, one for surfclam and one for ocean quahog. These two permits, although open access, are ITQ permits for their respective species. To fish under these open access ITQ permits, a permit holder must have previously received an allocation or must obtain allocation through an allocation transfer. The third permit category is a limited access permit, and is only for harvesting Maine mahogany quahogs north of 43°50' N. latitude. This portion of the fishery is not included in the UoA.

ITQ Allocations (§ 648.70)

Each fishing year (FY), NMFS determines the initial allocations of surfclams and ocean quahogs for the next FY by multiplying the total quota by each allocation holder's allocation percentage. Each allocation is then converted to a number of clam cage tags (1 tag = 32 bushels or 60 ft^3). The procedures used to make initial allocations are described under "Access Rights," below.

Cage Tag Transfer Program (§ 648.77)

An ITQ permit holder who owns an allocation may transfer part or all of his/her allocation to any qualified entity. There are two types of transfers available: Permanent ITQ allocation transfers and temporary cage tag transfers. There is no limit on the number of transfers permitted per year. An application for transfer

may not be made between October 15 and December 31 of each year for administrative reasons. The cage tag transfer form can be obtained from NMFS.

Cage Tags (§ 648.77)

At the beginning of each FY, NMFS publishes a notice in the Federal Register announcing an approved vendor for cage tags. Each allocation permit comes with instructions for ordering the appropriate cage tags. The number of tags authorized is based on the owner's initial allocation and any allocation received through transfers. Each tag represents 32 bushels of clams.

Tags expire at the end of the FY for which they are issued. If tags are lost or stolen, the owner must notify NMFS, with the number s of the lost/stolen tags, by telephone as soon as the loss or theft is discovered and in writing within 24 hours. Thereafter, the reported tags are no longer valid for use. Lost or stolen tags may be replaced if the proper notice was provided. Replacement tags may be purchased from the vendor with a written authorization from NMFS.

Before offloading, all cages that contain surfclams or ocean quahogs must be tagged with a valid tag. It must be fixed on or as near as possible to the upper crossbar of the cage. The tag or tags must not be removed until the cage is emptied by the processor, at which time the processor must promptly remove and retain the tag(s) for 60 days beyond the end of the calendar year, unless otherwise directed by authorized law enforcement agents.

If a vessel fishing under an IFQ allocation is not a capable of carrying cages, it must offload unshucked surfclams or ocean quahogs into properly tagged cages.

Minimum Size (§ 648.75)

The minimum length for surfclams is 4.75 inches. Length is measured at the longest dimension of the surfclam shell. No more than 50 surfclams in any cage may be less than the minimum size limit. If more than 50 surfclams in any inspected cage of surfclams are less than 4.75 inches in length, all cages landed on that trip are deemed to be in violation of the minimum size restriction and may be seized and the operator may be subject to additional penalties. However, the minimum size limit is considered, and may be suspended, on an annual basis. The minimum size for surfclams has been suspended each year in recent years. There is no Federal minimum size limit for ocean quahogs.

Maine Mahogoney Quahog Zone Requirements (§ 648.78)

A vessel issued a limited access Maine mahogany quahog permit and fishing for or possessing ocean quahogs within the Maine mahogany quahog zone (north of 43°50' N. latitude) must land its catch in the State of Maine. The annual quota for harvest of mahogany quahogs from within the Maine mahogany quahog zone is 100,000 Maine bushels (1 Maine bushel = 1.2445 ft^3). The quota may be revised annually.

Catch from vessels with IFQ permits fishing in the Maine mahogany quahog zone will be counted against their respective surfclam or ocean quahog allocation.

All mahogany quahogs landed for sale in Maine by vessels issued a Maine mahogany quahog permit and not fishing for an IFQ allocation are applied against the Maine mahogany quahog quota, regardless of where the mahogany quahogs are harvested.

Shucking At Sea (§ 648.75)

A vessel owner may apply to NMFS to shuck surfclams or ocean quahogs at sea. If approved, NMFS will determine whether such trips will require an at-sea observer. Additionally, NMFS will publish notification in the Federal Register to determine a conversion factor for shucked meats to accurately calculate the amount of surfclams or ocean quahogs harvested in the shell. No vessels covered by the UoA are currently shucking surfclams or ocean quahogs at sea.

Reporting Requirements

Any vessel issued a surfclam or ocean quahog permit is required to have an operational vessel monitoring system (VMS). Also, the owner or operator of any vessel issued an ocean quahog/surfclam permit must maintain on board the vessel and submit to NMFS an accurate surfclam/ocean quahog report for all fishing trips. Surfclam/ocean quahog reports must be postmarked or received within 3 days after the end of each reporting week.

Additionally, if species other than surfclam or ocean quahog are being retained, an additional fishing vessel trip report (VTR) must be submitted to NMFS as well.

Sale/Purchase Requirements

Surfclams or ocean quahogs may be sold only to persons possessing a valid surfclam/ocean quahog dealer permit obtained from NMFS. Surfclams or ocean quahogs must be purchased only from vessel owners possessing a valid surfclam or ocean quahog vessel permit.

All federally permitted seafood dealers are required to report all purchases of fish to NMFS via computer, using one of the approved electronic means, unless otherwise directed by NMFS.

Closed Areas (§ 648.73)

There are a number of areas closed to the harvesting of surfclams/ocean quahogs. Such areas are closed either due to environmental degradation, concentrations of undersized surfclams, or due to toxins that cause paralytic shellfish poisoning (PSP).

A portion of the Georges Bank Closed Area has been reopened for Atlantic surfclam and ocean quahog harvesting provided a vessel abides by the following regulations in addition to the traditional surfclam and ocean quahog regulations:

I. Obtain a letter of authorization (LOA) from the National Marine Fisheries Service (NMFS). The LOA must be carried onboard for all trips into the area. The LOA application will be sent out annually in your permit renewal package or it can be obtained by calling the Permits Division at (978) 282-8438; and

II. The vessel must adhere to the terms and conditions of the testing protocol as adopted into the National Shellfish Sanitation Program by the Interstate Shellfish Sanitation Conference. All surfclams and ocean quahogs harvested from the area must be handled in accordance with the terms and conditions of the protocol from the first point of harvest through completion of testing and release by the State Shellfish Control Authority (SSCA). and

III. Submit to NMFS a document from the SSCA detailing that the state will accept your vessel's landings. Please note that the SSCA may also require you to develop an agreement of understanding with the state, outlining any additional requirements the state may have; and

IV. Develop and submit to NMFS a written onboard lot segregation plan. The SSCA in the intended state of landing and the U.S. Food and Drug Administration (FDA) must approve the proposed lot segregation plan. The plan must also be maintained onboard the vessel conducting the harvesting; and

V. Prior to leaving port at the start of a fishing trip, the vessels' owner or operator must declare its intent to fish in the area by calling the Northeast Vessel Monitoring System (VMS) Team at (978) 281-9274. The vessels' owner or operator must also declare either an Atlantic surfclam or ocean quahog trip through the vessel's VMS unit.

Access Rights

Amendment 8 to the Surfclam and Ocean Quahog FMP was approved in March 1990 and replaced the previous moratorium on vessel permits and limits on fishing days with an individual transferable quota system. Any U.S. vessel can obtain a vessel permit to fish for surfclams and ocean quahogs, but can only fish under an allocation permit that authorizes a specific harvest quantity. Amendment 8 specifies that:

Amendment 8 specified the procedure that was used in awarding initial allocation permits:

Within two calendar quarters following implementation of this Amendment, allocation permits will be issued to owners or operators of permitted vessels which harvested surfclams or ocean quahogs (based on logbook reports) between 1 January 1979 and 31 December 1988. The amount of the initial distribution (that is, the percentages shown on the individual allocation permit) of surfclams will be based on the following formula. For vessels with permits to fish for surfclams and ocean quahogs in any Area (that is, vessels with permits issued pursuant to the moratorium; permits designated by NMFS as SF-1) the initial surfclam distribution will be based on the following formula: a. The surfclam catch (in bushels) that each

permitted vessel caught (based on logbook reports) for calendar years 1979, 1980, 1981, 1982, 1983, 1984, 1985 (counted twice), 1986 (counted twice), 1987 (counted twice), and 1988 (counted twice) will be determined. b. The worst two years will be deleted from each vessel's history. The resulting number (in bushels) will be summed for the entire fleet and each vessel's ratio of the total calculated. c. The cost factor {vessel length X width x depth) of each vessel will be calculated, summed for the fleet, and each vessel's ratio to the total calculated. The vessel's historical ratio contributes 80% to the vessel's initial allocation. The cost factor contributes 20% to the vessel's initial allocation.

For vessels with permits to fish for surfclams in only the New England Area {permits designated by NMFS as SF-7) the surfclam catch will be the average of the catch for the years actually fished between 1979 and 1988, inclusive. The lowest catch year will be deleted from each vessel's history. This number (in bushels) will be included in the total for the total surfclam fleet (moratorium and New England Area only) to calculate the individual vessel's ratios. They will then be included with the moratorium vessels in the above allocation.

For purposes of calculating historical participation, vessels that have replaced other vessels will be credited with the catch of the vessels they replaced. The amount of the initial distribution (that is, the percentages shown on the individual allocation) for ocean quahogs will be based on the following formula:

Review and Audit of the Management Plan

The management system is regularly reviewed and amended if necessary through the MAFMC council process. The following entities have relevant roles:

Some parts of the management system, such as the stock assessments used to set annual TACs and quotas, are subject to external review, and the management system as a whole is part of the federal regional fisheries management system that was established under the MSA. As such, MAFMC council staff and officers participate in periodic meetings of the Council Coordination Committee (CCC). The CCC consists of the chairs, vice chairs, and executive directors from each regional fishery management council (council), or other staff, as appropriate. This committee meets twice each year to discuss issues relevant to all councils, including issues related to the implementation of the MSA. NOAA Fisheries is committed to the timely implementation of all provisions of the MSA. Regular face-to-face meetings or conferences between NOAA Fisheries and the leadership of the eight councils are critical to ensure administrative and MSA priorities are met.

In addition, according to MSC guidance, external review for SG80 and SG100 could be by another department within an agency or by another agency or organization within the country. Considering this, the Council structure wherein NMFS and NOAA GC (other departments or agencies) review alternatives for management changes presented for Council decision-making can likely also be considered as “external review” of the management system for these purposes. A variety of agencies and interest groups outside the fishery management system regularly review the system with regards to their particular field of interest. These include ETP Take Reduction Teams, the Department of Commerce Inspector General and

others. On occasion, the U.S. Congress will direct the National Research Council to investigate some fishery management issues. The Congressional Research Service also reviews council actions pertaining to issues of interest to Members of Congress. There is a great deal of oversight of the management system, but the management system is not subject to regular, formal, external review.

7.4.1.3 Area of Operation and Relevant Jurisdictions

The Unit of Assessment includes two species (surfclams and ocean quahogs), both harvested by hydraulic dredges in federal waters (3-200 miles) off the coast of the United States from Cape Hatteras to the U.S.-Canada offshore boundary. Each species is considered a single stock throughout its range in U.S. waters (MAFMC 1977). The surfclam and ocean quahog fisheries in the U.S. Exclusive Economic Zone fall under a single, U.S. federal jurisdiction and are managed by the National Marine Fisheries Service (NMFS) and the Mid-Atlantic Fishery Management Council (MAFMC). The fishery is also regulated by the New England Fishery Management Council (NEFMC) with regard to habitat protection in areas under the jurisdiction of the NEFMC. Legislative authority and requirements are provided by Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), the National Environmental Policy Act (NEPA), the Administrative Procedures Act (APA), and various U.S. Executive Orders. Individual states manage the surfclam and ocean quahog fisheries within 3 miles of shore. Those fisheries are not part of this assessment. States also have memoranda of understanding (MOUs) with the National Marine Fisheries Service and other federal agencies that authorize them to enforce federal fishery and shellfish sanitation program regulations.

Since 1977 the Atlantic surfclam and ocean quahog fisheries have been managed under a single Fishery Management Plan (FMP). The FMP was developed by the MAFMC and approved, implemented, and enforced by the National Marine Fisheries Service, an agency of the U.S. Department of Commerce. The FMP established the management unit as all Atlantic surfclams and ocean quahogs in the U.S. Atlantic EEZ. The FMP has been amended 23 times through 19 amendments and 4 framework actions.

7.4.1.4 Monitoring, Control and Surveillance

The National Marine Fisheries Service (NMFS) and the United States Coast Guard (USCG) share responsibility for the enforcement of fishing laws and regulations by U.S. vessels. These agencies have land-based and seagoing enforcement officers and a complete system of monitoring, control and surveillance (MCS) for the surfclam and ocean quahog fisheries, including:

There is an explicit and statutory sanction framework that is applied for violations of fishery regulations. Sanctions for violations in the Northeast Region of the U.S. are listed in 50 CFR 600.740:

> *"The Magnuson-Stevens Act provides four basic enforcement remedies for violations, in ascending order of severity, as follows:*
>
> *(1) Issuance of a citation (a type of warning), usually at the scene of the offense (see 15 CFR part 904, subpart E).*

(2) Assessment by the Administrator of a civil money penalty.

(3) For certain violations, judicial forfeiture action against the vessel and its catch.

(4) Criminal prosecution of the owner or operator for some offenses. It shall be the policy of NMFS to enforce vigorously and equitably the provisions of the Magnuson-Stevens Act by utilizing that form or combination of authorized remedies best suited in a particular case to this end.

Other than assaults on fishery officers, violations of federal fishery regulations are treated as civil cases, using a "preponderance of the evidence" rule. Cases are adjudicated by administrative law judges."

In a 1990 review of ITQ fisheries, Eugene Buck of the Congressional Research Service wrote that:

> *"Before the ITQ program, enforcement costs in this fishery were exceptionally high because unusually stringent management regulations were in effect -- the Coast Guard closely monitored the number of trips and fishing hours of each individual vessel. Now extensive monitoring is no longer necessary; dockside monitoring alone is considered adequate." (Buck 1995)*

Starting in 2015, surfclam and ocean quahog vessels have been required to carry onboard observers who document the catch composition. This requirement resulted from changes in the MSFCMA that required all fishery management plans (FMP) to "establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery." Under the new standardized bycatch reporting Methodology (SBRM) requirements, observer seadays for the Ocean Quahog/Surfclam dredge fishery were commenced in April 2015. In the period July 2017 to June 2018, 26 and 53 days of observer coverage were conducted in the mid-Atlantic and New England fishing areas, respectively (Wigley and Tholke, 2019). in the period July 2019 to June 2020, 38 and 107 days of observer coverage were conducted in the mid-Atlantic and new England fishing areas (Wigley and Tholke, 2020).

MAFMC and NMFS staff have reported that the surfclam and ocean quahog fisheries have not had any serious compliance issues and there is no evidence of systematic non-compliance. To verify this via records, the assessment team, with the help of the client group, submitted a Freedom of Information Act (FOIA) request to NOAA OLE. This process began in April of 2016, with records released in July of 2016. The assessment team requested the following information:

1. All documents that constitute or quantify dockside inspections under the authority of NMFS of surfclam and ocean quahog landings for each of the years 2010 through 2015.
2. All documents that constitute or quantify all citations issued by NMFS or NOAA for violations of surfclam and ocean quahog regulations for each of the years 2010 through 2015.

3. All documents that constitute or quantify permit sanctions resulting from violations of federal surfclam and ocean quahog regulations, imposed on surfclam and ocean quahog ITQ permit holders, for each of the years 2010 through 2015.
4. All documents that constitute or quantify the total amount of fines resulting from violations of federal surfclam and ocean quahog regulations, assessed on surfclam and ocean quahog ITQ permit holders or operators, for each of the years 2010 through 2015.

The FOIA records included 210 pages pertaining to 10 incident reports, and no significant violations or pattern of violations were observed. Prior to the site visit for this re-assessment of this Surfclam / Ocean quahog fishery, the re-assessment team will submit a another request to NOAA OLE to better understand the current situation with regard to violations of regulations.

7.4.1.5 Recognized Interest Groups

Table 23. Identified stakeholders in the U.S. Atlantic Surfclam and Quahog fisheries.

Stakeholder Category	Stakeholder and special interest
Government agencies with fishery management / research responsibility	National Marine Fisheries Service ("NMFS") (NOAA) – final approving authority for the SCOQ Fishery Management Plan ("FMP") and amendments thereto; final approving authority for annual quotas; authority for issuance of administrative rules implementing management decisions. Northeast Fisheries Science Center (NEFSC/Woods Hole) – responsible for at sea surveys of both clam species, estimating volume of biomass, age/length relationships, recruitment, etc.; responsible for periodic formal (peer reviewed) stock assessments, evaluating all characteristics of the biomass, based on the at sea surveys, and providing projections of future volume of biomass under varying hypothetical harvest scenarios, all for the use of regulators in setting quotas. Mid-Atlantic Fishery Management Council ("MAFMC") – entity with jurisdiction under the Magnuson Act for operational management of the surfclam/quahog fishery, including development, review and approval of all amendments to the FMP, as well as the setting of annual quotas for both species (see website www.mafmc.org). Scientific and Statistical Committee ("SSC") of the MAFMC – a group of up to 20 scientists and academics required by the Magnuson Act to review annual reports from the MAFMC staff and NEFSC regarding the status of the

Stakeholder Category	Stakeholder and special interest
	stocks, and then to set the ABC ("Acceptable Biological Catch") for each species. The ABC is the maximum level at which the MAFMC may set the harvest quota each year. The SSC additionally recommends improvements for the assessments and notes parameters – such as biological reference points – that they believe need further study. Surfclam and Ocean Quahog Committee of the MAFMC – committee comprised of MAFMC members charged with initial responsibility for interacting with industry, and for recommending to full Council proposed changes in FMP/management regs and proposed annual quotas.
International Governmental Bodies	No international bodies have oversight regarding the surfclam / quahog resource; all of the resource is harvested within U.S. territorial waters, or within state waters that are not part of this assessment.
Non-Governmental Conservation/Public Interest Organizations	The voting membership of the MAFMC and its committees and advisory panels includes representatives of ENGO's. Beyond that, ENGO's have shown little interest in the surfclam/quahog resource and, with rare exceptions, have not participated in management and/or quota decision-making by the MAFMC or NMFS.
The Fishing Industry and Associated Supply Chains	Atlantic Capes and LaMonica Fine Foods Truex Kelleher. Cape Cod Fisheries Preservation Trust MAFMC Surfclam and Ocean Quahog Advisory Committee Members
Adjacent or Potentially Affected Fisheries	Massachusetts Lobstermen's Association Rhode Island Lobstermen's Association Atlantic Offshore Lobstermen's Association Monkfish fishery representatives Eastern New England Scallop Association Fisheries Survival Fund
Community or Tribal Entities or Individuals	**None**
Consumers	Individual consumers access products from the surfclam and ocean quahog fisheries through major food service suppliers such as Sysco, Heinz, and Darden; and retail stores carrying clam products.

7.4.1.6 Arrangements for On-going Consultations

The fishery conservation and management system created by the MSFCMA s consultative by nature. Membership on the regional fishery management councils includes representatives of state fishery agencies and members of the public who are nominated by governors and appointed by the Secretary of Commerce (MSFCMA). The councils also establish advisory panels consisting of industry participants and other interested parties. All council actions must comply with the National Environmental Policy Act (NEPA), which requires that individual citizens, members of organized groups, or representatives of Tribal, State, or local government agencies be given an opportunity to participate in the assessment of environmental impacts conducted by Federal agencies (A Citizen's Guide to the NEPA, December 2007). NEPA requires assessment of impacts on social, cultural, and economic resources as well as natural resources.

All council meetings, including meetings of Council committees and advisory panels are open to the public and include opportunities for public comment either at the meetings or through formal public comment procedures. Councils maintain extensive mailing lists that are used to notify interested parties of upcoming meetings and issues. All councils maintain a web site through which the public can access information on past, present, and future council activities.

7.4.1.7 Planned Education and Training for Interest Groups

No education and training for interest groups is contemplated.

7.4.1.8 Non-fishery Uses or Activities and Arrangements for Liaison and Coordination

The UoA faces continual needs for liaison and co-ordination with other fishery and non-fishery ocean users. Various formal and informal venues are utilized to deal with these issues.

According to the Fishery Performance Report for 2021, the Advisory Panel (AP) members identified a several critical issues that are facing the industry and management (MAFMC, 2021, available at: https://www.mafmc.org/s/c_FPR_for2021_SurfclamOceanQuahog.pdf)

> *COVID-19*: Sales to restaurants (foodservice) was very low year-on-year for 2020 and the first quarter of 2021; with the expectation that the effects of this may be ongoing and/or longer lasting. Seventy-five (75) percent of all seafood is sold in restaurants in the U.S. Because of the pandemic landings and sales have been reduced. All processors are continuing to operate to protect jobs within their organizations, causing inventories to rise dramatically. Inventory is being built without much in additional sales. This causes additional storage costs as well as other expenses, which cannot continue in perpetuity without increased demand and sales. If this continues, it will continue to result in lower/reduced landings. If retail starts opening back up this will help relieve some of these added expenses. Distribution is starting to increase in anticipation of the opening up, and many are preparing for improved sales, but at this point it hasn't helped the bottom line.

Research: It is important that the Mid-Atlantic Council, and their representatives on the Habitat Committee and Habitat Plan Development Team (PDT), continue to support any research projects that would increase harvest opportunities within the Great South Channel Habitat Management Area (GSCHMA). Research should support a structure of ongoing Essential Fish Habitat (EFH)/HMA review that is responsive to new data collection, regardless of the source, and climate-driven species distributional changes. The development of a question driven process to periodically review EFH/HMA status is needed and is not presently in place.
The SCOQ AP recommends the NEFMC and MAFMC pursue a cross Council workshop to, 1) review the management process in the GSCHMA, 2) better understand what research is being conducted in the area, 3) describe the process for ongoing management of these areas (as things change related to climate), and 4) develop a common understanding what this means for the process of managing these clam access areas in the GSCHMA. It is unclear what is essential in these areas and what data might be needed to address modifications to these clam access/HMA areas going forward. One of the areas that is presently allowed to be fished by clam vessels in the GSCHMA is called the Fishing Rip. This area, although open to fishing, is not a viable location due to the how hard the bottom structure is with boulders; it destroys gear. This highlights the critical nature of collecting and analyzing accurate data to identify effective areas for clam vessels to harvest surfclam. In terms of MSA reauthorization, stronger requirements to review the EFH designations and any associated management measures (e.g., gear restricted areas, habitat closures) should be included in the statute to ensure these provisions are more responsive to the climate-related changes to the quality of the fish habitat, as well as changing conditions in the clam fisheries and other fisheries the Council manages.

Access to Fishing Grounds: The development of wind energy and aquaculture areas, protected marine areas and historic monuments, and other offshore ocean uses have become a critical issue for our industry. All of these activities have the potential to reduce safe access to historically used fishing ground resulting in a greater concentration of fishing effort in smaller areas.

7.4.2 Principle 3 Performance Indicator scores and rationales

There are two UoAs under consideration in this re-assessment, UoA #1 is surfclams and UoA #2 is ocean quahogs. The scoring tables have been partitioned to separate each UoA when there is separate information unique to each UoA , or when there is the potential that each UoA might have a different score for an individual PI or SI. All the P3 scoring tables consider the UoAs in a combined evaluation, as all management, legal and enforcement applies to both UoAs. Therefore, each UoA has the same score for each PI and SI.

PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: - Is capable of delivering sustainability in the UoA(s); - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and - Incorporates an appropriate dispute resolution framework		
Scoring Issue		SG 60	SG 80	SG 100
a	Compatibility of laws or standards with effective management			
	Guide post	There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and binding procedures governing cooperation with other parties which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Yes	Yes	Yes
Rationale				
The U.S. federal fishery management system operates under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), the National Environmental Protection Act, the Administrative Procedures Act, and various executive orders. Each of these governing statutes create binding procedures regarding cooperating between the branches and levels of government, stakeholders, and the public. The National Standard Guidelines for National Standard 3 in the MSFCMA speaks directly to cooperation with other parties where necessary to deliver appropriate management outcomes: “Cooperation and understanding among entities concerned with the fishery (e.g., Councils, states, Federal Government, international commissions, foreign nations) are vital to effective management. Where management of a fishery involves multiple jurisdictions, coordination among the several entities should be sought in the development of an FMP. Where a range overlaps Council areas, one FMP to cover the entire range is preferred. The Secretary designates which Council(s) will prepare the FMP, under section 304(f) of the Magnuson-Stevens Act.” This system has proven to be effective at maintaining and re-establishing healthy populations of targeted species and maintaining the integrity of ecosystems. Therefore, the surfclam and ocean quahog fisheries meet the requirements for SG 60, 80 100 for SIa.				
b	Resolution of disputes			
	Guide post	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and

			most issues and that is appropriate to the context of the UoA.	has been tested and proven to be effective.
	Met?	Yes	Yes	Yes

Rationale

U.S. law, including the MSFMCA, provides a transparent mechanism for the resolution of legal disputes. NMFS has legal responsibility for implementing MSA, and can be subject to lawsuits, during which the public "administrative record" (the basis for decision making—including everything in the public record on all fisheries related issues) is used to demonstrate how NMFS made its decisions. NMFS also has legal responsibility for reviewing and approving (or not) FMPs, implementing and enforcing regulations, and administering supporting programs. This system has been tested and proven to be effective in multiple instances, including legal challenges to the surfclam and ocean quahog fishery management plan.

Therefore, the surfclam and ocean quahog fisheries meet the requirements for SG 60, 80 and 100 for SIb.

c	Respect for rights			
	Guide post	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	Yes	Yes	Yes

Rationale

The MSFCMA contains ten national standards that guide the development of fishery management plans in the U.S. The Act also requires NMFS to develop National Standard Guidelines that further interpret the National Standards and give guidance to the regional fishery management councils on how to comply with the National Standards.

National standard Number 8 states that: "Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities."

The National Standard Guidelines state that: "All other things being equal, where two alternatives achieve similar conservation goals, the alternative that provides the greater potential for sustained participation of such communities and minimizes the adverse economic impacts on such communities would be the preferred alternative." The guidelines also say that "The term ''sustained participation'' means continued access to the fishery within the constraints of the condition of the resource."

The MSFCMA requires a provision in all fishery management plans to: "… assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for—

(A) participants in the fisheries and fishing communities affected by the plan or amendment;

(B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;…"

Fishery management plans that establish a limited access system for the fishery in order to achieve optimum yield require the Council and the Secretary of Commerce to take into account—

(A) present participation in the fishery;

(B) historical fishing practices in, and dependence on, the fishery;

(C) the economics of the fishery;

(D) the capability of fishing vessels used in the fishery to engage in other fisheries;

(E) the cultural and social framework relevant to the fishery and any affected fishing communities;

(F) the fair and equitable distribution of access privileges in the fishery; and

(G) any other relevant considerations.

The make-up of the regional fishery management councils and their advisory panels, together with public meetings in the region, assure that existing arrangements will be taken into account in the development of fishery management plans. These provisions of the law do not guarantee that existing legal or customary rights will be incorporated into a management plan but fishery management plans can formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2. Any failure to recognize existing legal rights would be subject to challenge in the courts and the law is written so as to encourage consideration of customary rights. The nature of the consultative process of FMP development insures that customary rights will be given consideration.

The surfclam and ocean quahog fishery therefore has the formal commitment mechanism necessary to meet the requirement of SG 60, 80 and 100 for SIc.

References
MSFCMA http://www.nmfs.noaa.gov/sfa/laws_policies/national_standards/index.html Administrative Procedure Act (5 U.S.C. Subchapter II) Available at: http://www.archives.gov/federal-register/laws/administrative-procedure/ (March 2016)

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	

Condition number (if relevant)	

PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guide post	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
	Met?	Yes	Yes	Yes

Rationale

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) created eight regional fishery management councils (councils) responsible for the fisheries that require conservation and management in their region. The councils are composed of both voting and non-voting members representing the commercial and recreational fishing sectors in addition to environmental, academic, and government interests. The roles and responsibilities of the respective Councils, their committees and staff, and the regional NMFS science centers are clear and understood by all relevant parties. Key roles and functions for surfclam and ocean quahog are as follows:

- National Marine Fisheries Service ("NMFS") (NOAA) – final approving authority for the SCOQ Fishery Management Plan ("FMP") and amendments thereto; final approving authority for annual quotas; authority for issuance of administrative rules implementing management decisions.
- Northeast Fisheries Science Center (NEFSC/Woods Hole) – responsible for at sea surveys of both clam species, estimating volume of biomass, age/length relationships, recruitment, etc.; responsible for periodic formal (peer reviewed) stock assessments, evaluating all characteristics of the biomass, based on the at sea surveys, and providing projections of future volume of biomass under varying hypothetical harvest scenarios, all for the use of regulators in setting quotas.
- Mid-Atlantic Fishery Management Council ("MAFMC") – entity with jurisdiction under the Magnuson Act for the development of management measures for the surfclam/quahog fishery through the initiation, development, and approval of all amendments to the FMP, as well as the setting of annual quotas for both species (see website www.mafmc.org).
- Scientific and Statistical Committee ("SSC") of the MAFMC – a group of approximately 15 scientists and academics required by the Magnuson Act to review annual reports from the MAFMC staff and NEFSC regarding the status of the stocks, and then to set the ABC ("Acceptable Biological Catch") for each species. The ABC is the maximum level at which the MAFMC may set the harvest quota each year. The

SSC additionally recommends improvements for the assessments and notes parameters – such as biological reference points – that they believe need further study.

- Surfclam and Ocean Quahog Committee of the MAFMC – committee comprised of eight MAFMC members charged with initial responsibility for interacting with industry, and for recommending to the full Council proposed changes in FMP/management regs and proposed annual quotas.

The surfclam and ocean quahog fishery meets the requirements for SG 60, 80 and 100 for SIa for explicitly defined and well understood roles and responsibilities for all areas of action.

b	Consultation processes			
	Guide post	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used.
	Met?	Yes	Yes	Yes

Rationale

The Council process is fully public and there are regular opportunities for public involvement. Public notification procedures are specified by law and all meetings must be open to the public. The consultation process includes a formal advisory panel that meets regularly and provides an opportunity for relevant information, including local knowledge, to be brought forth and considered in the development and adjustment of fishery management plans. Council committee meetings and council meetings provide opportunities for input of relevant information. Open council discussions inform the public how their input is being used. Additionally, before adopting any fishery management plan or regulation, NMFS notifies the public through the Federal Register op proposed actions and provides an opportunity for public comment. Final rules include responses to public comments, explaining how input was used.

The surfclam and ocean quahog fishery therefore meets the requirements of SG 60, 80 and100 for SIb.

c	Participation			
	Guide post		The consultation process provides opportunity for all interested and affected parties to be involved.	The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.
	Met?		Yes	Yes

Rationale

The fishery management councils maintain web sites that provide information to the public on all council activities and meetings. In addition, the councils maintain contact lists of interested parties to whom they send notices of meetings and information relevant to upcoming actions. Interested and affected parties can attend council meetings in person or by way of conference calls and webinars. Members of council advisory panels have their meeting expenses paid by the councils.

The surfclam and ocean quahog fishery meets the requirements of SG 80 and100, as the established consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement

References
MSFCMA. Magnuson-Stevens Fishery Conservation and Management Act of 2007. available at: https://www.fisheries.noaa.gov/resource/document/magnuson-stevens-fishery-conservation-and-management-act MAFMC Statement of Organization, Practices, and Procedures Revised December 2015

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Fisheries Standard, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach, are implicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are explicit within and required by management policy.
	Met?	Yes	Yes	Yes

Rationale

The MSFCMA established clear long-term objectives to guide the development of fishery management plans by the regional fishery management councils. The National Standards for fishery management and the National Standard Guidelines require that: "The fishing mortality rate does not jeopardize the capacity of a stock or stock complex to produce MSY." The national standards are further interpreted through the National Standard Guidelines, required by the MSFCMA and developed and published by NMFS. The National Standard Guidelines for National Standard 1 require that: "when specifying limits and accountability measures intended to avoid overfishing and achieve sustainable fisheries, Councils must take an approach that considers uncertainty in scientific information and management control of the fishery. These guidelines describe how to address uncertainty such that there is a low risk that limits are exceeded." Since 2007, the MSFCMA has required that all FMPs include catch limits and accountability measures that are intended to insure that overfishing can't reduce a stock below the level that will produce MSY on a continuing basis.

These provisions of law and policy are consistent with the MSC fisheries standard and the precautionary approach. They are explicit and required by management policy.

Therefore, the surfclam and ocean quahog fishery meets the requirements of SG 60, 80 and 100, as there are clear long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are explicit within and required by management policy.

References

MSFCMA, 2007. available at: https://www.fisheries.noaa.gov/resource/document/magnuson-stevens-fishery-conservation-and-management-act

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.2.1 – Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery-specific management system.	Short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system.	Well defined and measurable short and long-term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system.
	Met?	Yes	Yes	Yes

Rationale

Amendment 8 to the Surfclam and Ocean Quahog FMP adopted four objectives to meet this overarching goal (MAFMC 1988) that continue to guide management of the fishery today. They are:

Regular periodic stock assessments ([NEFSC] Northeast Fisheries Science Center 2013, 2016, 2017) provide measurable outcomes for the management of the surfclam and ocean quahog fisheries.

Therefore, the surfclam and ocean quahog fishery meets the requirements of SG 60, 80 and 100, as there are certainly well defined and measurable short and long-term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system

References

[MAFMC] Mid-Atlantic Fishery Management Council. 1988. Amendment 8 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan. June 1990. Mid-Atlantic Fishery Management Council, Dover, DE. Available at: http://static.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/51894db5e4b08224df27d0a7/1367952821683/SCOQ_Amend_8.pdf

[NEFSC] Northeast Fisheries Science Center. 2013. 56th Northeast Regional Stock Assessment Workshop (56th SAW) Assessment Report. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-10; 868 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/

[NEFSC] Northeast Fisheries Science Center. 2016. 61st Northeast Regional Stock Assessment Workshop (61st SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-13; 26 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.

[NEFSC] Northeast Fisheries Science Center. 2017. 63rd Northeast Regional Stock Assessment Workshop (63rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-09; 28 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.	
Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.2.2 – Decision-making processes

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Yes	Yes	

Rationale

Federal fisheries in the U.S. are managed under the MSFCMA, which sets out the decision-making process to be used by regional fishery management councils in the development of fishery management plans. FMPs contain measures and strategies to achieve the fishery-specific objectives.

The surfclam and ocean quahog fishery meets the requirements of SG 60 and 80, as there are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.

b	Responsiveness of decision-making processes			
	Guide post	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	Yes	Yes	Yes

Rationale

The MAFMC and the NMFS have in place processes to respond to all issues identified in relevant research, monitoring, evaluation and consultation. The process is transparent and is timely to the extent that taking into account the wider implications of decisions allows.

Amendment 17 to the FMP was implemented on June 15, 2016 for the purpose of allowing the incorporation of advancements in the best scientific information as it becomes available (MAFMC, 2017).

The surfclam and ocean quahog fishery meets the requirements of SG 60, 80 and 100 as the established decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and

consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions				
c	Use of precautionary approach			
	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Yes	
Rationale				
The regional fishery management councils and NMFS operate under the MSFCMA and the National Standard Guidelines. National Standard 2 requires that: "conservation and management measures shall be based upon the best scientific information available." The National Standard Guidelines specify that: "Scientific information that is used to inform decision making should include an evaluation of its uncertainty and identify gaps in the information. Management decisions should recognize the biological (e.g., overfishing), ecological, sociological, and economic (e.g., loss of fishery benefits) risks associated with the sources of uncertainty and gaps in the scientific information." The councils' Statistical and Scientific Committees (SSCs) are responsible for developing acceptable biological catch (ABC) recommendations for the councils. The National Standard Guidelines for National Standard 2 state that: "The SSC is expected to take scientific uncertainty into account when making its ABC recommendation (§600.310(f)(4))." The MAFMC formally incorporated the precautionary approach into the surfclam and ocean quahog FMP through Amendment 16, adopted in July 2011 (MAFMC, 2011). The surfclam and ocean quahog fishery meets the requirements of SG 80 as the decision-making processes use the precautionary approach and are based on best available information				
d	Accountability and transparency of management system and decision-making process			
	Guide post	Some information on the fishery's performance and management action is generally available on request to stakeholders.	Information on the fishery's performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Formal reporting to all interested stakeholders provides comprehensive information on the fishery's performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	Yes	Yes	Yes
Rationale				
Accountability and transparency of the management system is required by multiple laws and Executive Orders. The National Standard Guidelines for National Standard 2 specifically require transparency in the provision of scientific information for fishery management. Under the heading "Transparency and openness," the NS				

Guidelines state that: “The Magnuson-Stevens Act provides broad public and stakeholder access to the fishery conservation and management process, including access to the scientific information upon which the process and management measures are based. Public comment should be solicited at appropriate times during the review of scientific information. Communication with the public should be structured to foster understanding of the scientific process.” They further require that: “Scientific information products should describe data collection methods, report sources of uncertainty or statistical error, and acknowledge other data limitations. Such products should explain any decisions to exclude data from analysis. Scientific products should identify major assumptions and uncertainties of analytical models. Finally, such products should openly acknowledge gaps in scientific information.”

The management system provides comprehensive information on the fishery’s performance and management actions through open meetings, mailed and emailed notices, written copies of relevant documents, and a comprehensive web site through which interested parties can obtain almost every document associated with the management of the fishery. Where research, monitoring, evaluation and review activity result in management actions, interested parties are informed of proposed rules and provided an opportunity to comment. Final rules include explanations of how the agency responded to comments.

The surfclam and ocean quahog fishery meets the requirements of SG 100 as there is the formal reporting to all interested stakeholders provides comprehensive information on the fishery’s performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.

e	Approach to disputes			
	Guide post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	Yes	Yes	Yes

Rationale

The management system for surfclams and ocean quahogs has not been subject to continuing court challenges. The ITQ system was challenged when the system was first implemented but the decision favored the fishery management system. The fishery management system is legally obliged to comply with judicial decisions and does so. The fishery management system receives continuing legal advice and acts proactively to avoid legal disputes and rapidly implements judicial decisions arising from legal challenges.

The surfclam and ocean quahog fishery meets the requirements for SG 60, 80 and 100, as the management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges

References

[MAFMC] Mid-Atlantic Fishery Management Council. 2011. Amendment 16 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan. July 2011. Mid-Atlantic Fishery Management Council, Dover, DE. Available at: http://www.nero.noaa.gov/nero/regs/frdoc/11/11OmnibusAmendmentEA&Comments Final.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 2016. Amendment 17 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan. June 2016. Mid-Atlantic Fishery Management Council, Dover, DE. Available at: https://www.gpo.gov/fdsys/pkg/FR-2016-06-15/pdf/2016-14087.pdf

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guide post	Monitoring, control and surveillance mechanisms exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Yes	Yes	No

Rationale

The National Marine Fisheries Service (NMFS) and the United States Coast Guard (USCG) share responsibility for the enforcement of fishing laws and regulations by U.S. vessels. These agencies have land-based and seagoing enforcement officers and a complete system of monitoring, control and surveillance (MCS) for the surfclam and ocean quahog fisheries, including:

- At-sea surveillance by patrol vessels and fixed-wing aircraft;
- Prescribed on-board observer coverage with protocols to monitor catch, species, etc;
- Unannounced dockside monitoring of landings;
- Submission of vessel fishing log books;
- Catch and Effort database to track catch against allocations;
- Electronic vessel monitoring systems (VMS) on each vessel; and
- Potential catch seizure and significant fines and loss of fishing privileges for violations of regulations.

In a 1995 review of ITQ fisheries, Eugene Buck of the Congressional Research Service wrote that: “Before the ITQ program, enforcement costs in this fishery were exceptionally high because unusually stringent management regulations were in effect -- the Coast Guard closely monitored the number of trips and fishing hours of each individual vessel (Buck 1995).

Now extensive monitoring is no longer necessary; dockside monitoring alone is considered adequate according to the MAFMC. Whereas no existing documents demonstrated the ability of the monitoring, control and surveillance system to enforce relevant management measures, strategies, and/or rules, in 2016 the assessment team for the initial MSC assessment of this fishery filed a Freedom of Information Act Request (FOIA) with the NMFS Office of Law Enforcement (OLE) seeking records related to enforcement actions in the surfclam/ocean quahog fishery for the years 2010 through 2015. OLE provided documents related to ten incidents, including five inspections in which no violations were found. All of the incidents occurred during the years 2010-2013. No records for 2014 or 2015 were provided. The records provided by OLE via the FOIA request demonstrated that there was a monitoring, control and surveillance system in place during 2010-2013. Incident reports showed that VMS, Coast Guard boardings, and dockside inspections were all utilized to enforce the relevant

management measures. The records do not provide any information regarding the monitoring, control and surveillance system in the years 2014-2015. At the First Annual surveillance audit of the surfclam / ocean quahog fishery in 2018, the assessment/audit team further explored the issue of monitoring, control and surveillance system for this fishery, and gained sufficient insight to close the condition related to SIb of this PI, and rescore the fishery at 80 for the PI.

The re-assessment team will again address this issue at the upcoming site visit in September 2021.

The surfclam and ocean quahog fishery meets the requirements for SG 80, but not the SG 100 as a comprehensive monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules. Based on discussions at the site visit, this SI may be rescored.

b	Sanctions			
	Guide post	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	Yes	Yes	No

Rationale

There is an explicit and statutory sanction framework that is applied for violations of fishery regulations. Sanctions to deal with non-compliance are listed in the Code of Federal Regulations and can be severe, consisting of:

- Significant monetary penalties;
- Confiscation of catch;
- Permit cancellations or suspensions; and
- Permanent prohibitions on participation in the fishery.

Other than assaults on fishery officers, violations of federal fishery regulations are treated as civil cases, using a “preponderance of the evidence” rule. Cases are adjudicated by a limited number of administrative law judges who have expertise in fishery laws, providing consistency in approach.

A condition related to this issue was placed on the fishery relative to SIb of PI 3.2.3 in the initial assessment of this fishery in 2016, and that condition was closed at the 1st Annual surveillance audit of the fishery in Feb 2018. and PI 3.2.3 SIb was rescored to 80.

Based on discussions with OLE at GARFO the surfclam and ocean quahog fishery is characterized as being generally compliant with the rules. Staff noted that there is little incentive to cheat on the quota rules because there is an excess of quota available compared to what is landed each year. The number of dockside inspections carried out by OLE officers is guided by priorities established on the basis of OLE knowledge of the fishery and the level of compliance. NMFS employs a multitude of cross-checking systems to ensure that all reporting requirements are being met. The Analysis and Program Support Division of GARFO cross checks various components of the system, as does the Information Resource Management Office. To determine whether sanctions are consistently applied and providing effective deterrence it is critical to understand the level of enforcement relative to the number and types of violations. This issue will be further explored with NMFS OLE in the September 2021 site visit for this re-assessment.

Based on the information available at this time the fishery meet the requirements of the SG80 level, that is sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence., but not the SG100 as there is not sufficient evidence that anctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence. However, SIb may be rescored after the site visit in September 2021.

c	Compliance			
	Guide post	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Yes	Yes	No

Rationale

Anecdotal information from both MAFMC staff and GAFFO OLE indicates that fishers comply with the management system under assessment and provide information of importance to the effective management of the fishery, as there is little incentive to violate regulations due to the highly regulated ITQ system with cage tags, etc.

The surfclam and ocean quahog fishery meets the requirements of SG 60 and 80 as some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery. However, the lack of clarity in records provided on enforcement actions and penalties in recent years does not allow the assessment team to say that there is a "high degree of confidence that fishers comply with the management system," which is a requirement for SG 100. This SI may be rescored after the site visit.

d	Systematic non-compliance			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		Yes	

Rationale

On the basis of information available for the re-assessment, there is no evidence of systematic non-compliance. The surfclam and ocean quahog fishery meets the requirements of SG 80.

References

USOFR (U.S. Office of the Federal Register). 1998. Enforcement Policy. Code of Federal Regulations, Title 50, Part 600.740. U.S. Government Printing Office, Washington

NOAA NMFS OLE 2018. Response to FOIA Request DOC-NOAA-2018-000124. Accessed January 2018 at: https://foiaonline.regulations.gov/foia/action/public/view/request?objectId=090004d2816777d6

NOAA OGC 2018. Enforcement Charging Information. Accessed January 2018 at: http://www.gc.noaa.gov/enforce-office7.html.

NOAA OGC 2018 b. Enforcement Decisions and Orders (March 18, 2010 Through September 29, 2017). Accessed January 2018 at: http://www.gc.noaa.gov/enforce-office6.html.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	More information is required to possibly rescore some SI to 100. This will be collected at the site visit in September 2021.
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives There is effective and timely review of the fishery-specific management system		
Scoring Issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate some parts of the fishery-specific management system.	There are mechanisms in place to evaluate key parts of the fishery-specific management system.	There are mechanisms in place to evaluate all parts of the fishery-specific management system.
	Met?	Yes	Yes	Yes
Rationale				
The management system is regularly reviewed and amended if necessary through the MAFMC council process. The following entities continually evaluate all parts of the fishery-specific management system and initiate changes when required: The surfclam and ocean quahog fisheries meet the requirements for SG 100.				
b	Internal and/or external review			
	Guide post	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
	Met?	Yes	Yes	No
Rationale				
The management system is designed and organized to provide regular internal and external review. Many of the participants in the system do not work for the government and represent a wide range of interests and competencies. Stock assessments are always peer-reviewed by outside experts. MAFMC council staff and officers participate in periodic meetings of the Council Coordination Committee (CCC). The CCC consists of the chairs, vice chairs, and executive directors from each regional fishery management council, or other staff, as appropriate. This committee meets twice each year to discuss issues relevant to all councils, including issues related to the implementation of the MSA. NOAA Fisheries is committed to the timely implementation of all provisions of the MSA. Regular face-to-face meetings or conferences between NOAA Fisheries and the leadership of the eight councils are critical to ensure administrative and MSA priorities are met. In addition, according to MSC guidance, external review for SG80 and SG100 could be by another department within an agency or by another agency or organization within the country (GSA4.10.1). Considering this, the Council structure wherein NMFS and NOAA GC (other departments or agencies) review alternatives for management changes presented for Council decision-making might also be considered as “external review” of the management system for these purposes. A variety of agencies and interest groups outside the fishery management system regularly review the system with regards to their particular field of interest. These include				

ETP Take Reduction Teams, the Department of Commerce Inspector General and others. On occasion, the U.S. Congress will direct the National Research Council to investigate some fishery management issue. The Congressional Research Service also reviews council actions pertaining to issues of interest to Members of Congress. The management system is clearly subject to a high degree of oversight, but there is no regular, formal external review of the overall management system. The surfclam and ocean quahog fisheries meet the requirements for SG 80, but does not quite meet the requirements for SG 100 because there is no regular external review.
References
Marine Stewardship Council (MSC). 2014. MSC Fisheries Certification –Requirements v2.0. Marine Stewardship Council. London
Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	
Condition number (if relevant)	

8 References

Administrative Procedures Act. 2016. U.S. Code, volume 5, Subchapter II. Available at: http://www.archives.gov/federal-register/laws/administrative-procedure/ (March 2016)

[ASMFC] Atlantic States Marine Fisheries Commission. 1997. Fishery Management Report No. 29. Amendment 3 to the Interstate Fishery Management Plan for Lobster.

[ASFMC] Atlantic States Marine Fisheries Commission. 2019. Fishery Management Report No. 32. Interstate Fishery Management Plan for Horseshoe Crab. 67 p.

[ASMFC] Atlantic States Marine Fisheries Commission. 2019. Horseshoe Crab Benchmark Stock Assessment Peer Review Report. ASMFC Horseshoe Crab Stock Assessment Review Panel. 316 p.

Allen, R.D. 1951. The use of Spisula solidissima eggs in cell research. J. Cell. Comp. Physiol. 37: 504-505.

Allen, R.D. 1953. Fertilization and artificial activation in the egg of the surf-clam, Spisula solidissima. Biol. Bull. (Woods Hole) 105: 213-239.

Ambrose, W.G. Jr., D.S. Jones, and I. Thompson. 1980. Distance from shore and growth rate of the suspension feeding bivalve, Spisula solidissima. Proc. Nat. Shellfish. Assoc. 70: 207-215.

Beal, B.F. and M.G. Kraus. 1989. Effects of intraspecific density on the growth of *Arctica islandica* Linné inside field enclosures located in eastern Maine, USA. J. Shellfish Res. 8: 462.

Boesch, D.F. 1979. Benthic ecological studies: macrobenthos. Special Report in Applied Marine Science and Ocean Engineering No. 194. Virginia Inst. Mar. Sci., Gloucester Point, VA.

Botton, M.L. and H.H. Haskin. 1984. Distribution and feeding of the horseshoe crab, Limulus polyphemus, on the continental shelf off New Jersey. Fish. Bull. (U.S.) 82: 383-389.

Brand, A.R. and A.C. Taylor. 1974. Pumping activity of *Arctica islandica* (L.) and some other marine bivalves. Mar. Behav. Physiol. 3: 1-15.

Brey, T., W.E. Arntz, D. Pauly, and H. Rumohr. 1990. *Arctica* (Cyprina) *islandica* in Kiel Bay (western Baltic): growth, production and ecological significance. J. Exp. Mar. Biol. Ecol. 136: 217-235.

Buck, Eugene. 1995. Individual Transferable Quotas in Fishery Management, CRS Report 95-849. Congressional Research Service, Washington, DC

Cargnelli, L., S. Griesbach, D. Packer, and E. Weissberger. 1999. Essential Fish Habitat Source Document: Atlantic Surfclam, Spisula solidissima, Life History and Habitat Characteristics. NOAA Tech. Memo. NMFS-NE-142

Castagna, M. and P. Chanley 1973. Salinity tolerance of some marine bivalves from inshore and estuarine environments in Virginia waters on the western Mid-Atlantic coast. Malacologia 12: 47-96.

Cerrato, R.M. and D.L. Keith. 1992. Age structure, growth, and morphometric variations in the Atlantic surfclam, Spisula solidissima, from estuarine and inshore waters. Mar. Biol. 114: 581-593.

Chintala, M.M. 1997. Population biology of surfclams (Spisula solidissima) in inshore New Jersey waters. M.S. thesis, Rutgers University. New Brunswick, NJ. 109 p.

Chintala, M.M. and J.P. Grassle. 1995. Early gametogenesis and spawning in "juvenile" Atlantic surfclams, Spisula solidissima (Dillwyn, 1819). J. Shellfish Res. 14: 301-306.

Chute A., Hennen D., Russell R. and Jacobson L. 2013. Stock assessment update for ocean quahogs (Arctica islandica) through 2011. U.S. Dept Commerce, Northeast Fish Sci Cent Ref Doc.

Clarke, A.H. 1954. Shell bearing marine mollusks of Cape Ann, Massachusetts. Nautilus 67: 112-120.

Clotteau, G. and F. Dubé. 1993. Optimization of fertilization parameters for rearing surfclams (Spisula solidissima). Aquaculture 114: 339-353.

Dames and Moore. 1993. Benthic animal-sediment assessment of potential beachfill borrow source for the Rehoboth/Dewey Beach, Delaware interim feasibility study. Report to U.S. Army Corps of Engineers, Philadelphia District. Contract No. DACW61-93-D-0001.

Davis, C.V., K.C. Scully, and S.E. Shumway. 1997. Juvenile and yearling growth of Atlantic surfclams Spisula solidissima (Dillwyn, 1817) in Maine. J. Shellfish Res. 16: 161-168.

DeAlteris, 2005. Alternative paradigm for the protection of essential fish habitat based on availability and vulnerability. In: Benthic Habitats and the Effects of Fishing, Barnes and Thomas Eds., pp. 785-795, American Fisheries Society, Md.

DeAlteris, Skrobe, Lipsky, 1999. Seabed disturbance by mobile fishing gear relative to: a case study in Narragansett Bay, R.I. Ed. L. Benaka, American Fisheries Society Symposium Series 22:224-239, Washington, D.C.

DeAlteris, J. and R. Allen. 2016. U.S. Atlantic Surfclam and Ocean Quahog MSC Fishery Assessment Report. Available at:XXXXXX.

deFur, P.L. and C.P. Mangum. 1979. The effects of environmental variables on the heart rates of invertebrates. Comp. Biochem. Physiol. 62A: 283-294.

Dietl, G.P. and R.R. Alexander. 1997. Predator-prey interactions between the naticids Euspira heros (Say) and Neverita duplicata (Say) and the Atlantic surfclam Spisula solidissima (Dillwyn) from Long Island to Delaware. J. Shellfish Res. 16: 413-422.

Fay, C.W., R.J. Neves, and G.B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Mid-Atlantic): surfclam. U.S. Fish Wildl. Serv., Div. Biol. Serv., FWS/OBS-82/11.13.23 p.

Fogarty, M.J. and S.A. Murawski. 1986. Population dynamics and assessment of exploited invertebrate stocks. In G.S. Jamieson and N. Bourne eds. North Pacific workshop on stock assessment and management of invertebrates. p. 228-244. Can. Spec. Pub. Fish. Aquat. Sci. 92: 228-244.

Fogarty, M.J. 1981. Distribution and relative abundance of the ocean quahog *Arctica islandica* in Rhode Is-land Sound and off Martha's Vineyard, Massachu-setts. J. Shellfish Res. 1: 33-39.

Franz, D.R. 1976. Distribution and abundance of inshore populations of the surfclam Spisula solidissima. In M.G. Gross ed. Middle Atlantic continental shelf and the New York Bight: Proceedings of the symposium. p. 404-413. American Society of Limnology and Oceanography Special Symposium Vol. 2. Lawrence, KS.

Franz, D.R. 1977. Size and age-specific predation by Lunatia heros (Say, 1822) on the surfclam Spisula solidissima (Dillwyn, 1817) off western Long Island, New York. Veliger 20: 144-150.

Garlo, E.V. 1980. Abundance and distribution of benthic macroinvertebrates near Little Egg Inlet, New Jersey, from 1972-1974. Int. Rev. Gesamten Hydrobiol. 65: 345-356.

Garlo, E.V. 1982. Increase in a surfclam population after hypoxic water conditions off Little Egg Inlet, New Jersey. J. Shellfish Res. 2: 59-64.

Garlo, E.V., C.B. Milstein and A.E. Jahn. 1979. Impact of hypoxic conditions in the vicinity of Little Egg Inlet, New Jersey in summer 1976. Estuarine Coastal Mar. Sci. 8: 421-432.

Gaspar, M. B., L. M. Chícharo. 2007. Modifying Dredges to reduce by-catch and impacts on the benthos. In S. J. Kennelly (Ed.), Reviews: Methods and Technologies in Fish Biology and Fisheries (Vol. 7, pp. 141-180). Springer, Netherlands.

Goldberg, R. and R.L. Walker. 1990. Cage culture of yearling surfclams, Spisula solidissima (Dillwyn, 1817), in coastal Georgia. J. Shellfish Res. 9: 187-193.

Golikov, A.N. and O.A. Scarlato. 1973. Method for indirectly defining optimum temperatures of inhabitancy for marine cold-blooded animals. Mar. Biol. 20: 1-5.

Goode, G.B. 1884. The fisheries and fishery industries of the United States. Section I: Natural history of useful aquatic animals. Govt. Print. Office, Washington, DC. Plates.

Grabowski,J., M. Bachman, C. Demarest, S. Eayrs, B. Harris, V. Malkoski, D. Packer, D. Stevenson. 2014. Assessing the Vulnerability of Marine Benthos to Fishing Gear Impacts, Reviews in Fisheries Science & Aquaculture, 22:2, 142-155.

Greene, J.K., M.G. Anderson, J. Odell, and N. Steinberg, eds. 2010. The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One. The Nature Conservancy, Eastern U.S. Division, Boston, MA

Hiddink, J.G., S. Jennings, M.J. Kaiser, A. M. Queirós, D.E. Duplisea, and G.J. Piet. 2006. Cumulative impacts of seabed trawl disturbance on benthic biomass, production and species richness in different habitats. Can J Fish Aquat Sci 63: 721–736.

Howe, S., D. Maurer, and W. Leathem. 1988. Secondary production of benthic mollusks from the Delaware Bay and coastal area. Estuarine Coastal Shelf Sci. 26: 81-94.

Jacobson and Hennen. 2019. Improving the NEFSC Clam Survey for Atlantic Surfclams and Ocean Quahogs. Northeast Fisheries Science Center Reference Document 19-06. 94 p.

Jennings, S. and M.J. Kaiser. 1998. The effects of fishing on marine ecosystems. Advances in Marine Biology, Volume 34 (eds J.H.S. Blaxter, A.J. Southward & P.A. Tyler), pp. 203-354. Academic Press, London.

Jones, D.S. 1980. Annual cycle of shell growth increment formation in two continental shelf bivalves and its paleoecologic significance. Paleobiology 6: 331-340.

Jones, D.S. 1981a. Annual growth increments in shells of Spisula solidissima record marine temperature variability. Science 211: 165-167.

Jones, D.S. 1981b. Reproductive cycles of the Atlantic surfclam Spisula solidissima, and the ocean quahog, Arctica islandica off New Jersey. J. Shellfish Res. 1: 23-32.

Jones, D.S., I. Thompson, and W. Ambrose. 1978. Age and growth rate determinations for the Atlantic surfclam *Spisula solidissima* (Bivalvia: Mactracea), based on internal growth lines in shell cross-sections. Mar. Biol. 47: 63-70.

Jones, D.S., D.F. Williams and M.A. Arthur. 1983. Growth history and ecology of the Atlantic surfclam, *Spisula solidissima* (Dillwyn), as revealed by stable isotopes and annual shell increments. J. Exp. Mar. Biol. Ecol. 73: 225-242.

Kaiser, M.J., Collie, J.S., Hall, S.J., Jennings, S. and I.R. Poiner. 2002. Modification of marine habitats by trawling activities: prognosis and solutions. Fish and Fisheries, V. 3, pp. 114-136.

Kanti, A., P.B. Heffernan, and R.L. Walker. 1993. Gametogenic cycle of the southern surfclam, *Spisula solidissima similis* (Say, 1822), from St. Catherines Sound, Georgia. J. Shellfish Res. 12: 255-261.

Kennish, M.J. and R.A. Lutz. 1995. Assessment of the ocean quahog, *Arctica islandica* (Linnaeus, 1767), in the New Jersey fishery. J. Shellfish Res. 14: 45-52.

Kennish, M.J., R.A. Lutz, J.A. Dobarro, and L.W. Fritz. 1994. In situ growth rates of the ocean quahog, *Arctica islandica* (Linnaeus, 1767), in the Middle Atlantic Bight. J. Shellfish Res. 13: 473-478.

Kraus, M.G., B.F. Beal, and S.R. Chapman. 1989. Growth rate of *Arctica islandica* Linné: a comparison of wild and laboratory-reared individuals. J. Shellfish Res. 8: 463.

Kraus, M.G., B.F. Beal, S.R. Chapman, and L. McMartin. 1992. A comparison of growth rates in *Arctica islandica* (Linnaeus, 1767) between field and laboratory populations. J. Shellfish Res. 11: 289-294.

Kraus, M.G., B.F. Beal, and L. McMartin. 1991. Growth and survivorship of ocean quahogs, *Arctica islandica* (Linnaeus) in an intertidal mudflat in eastern Maine. J. Shellfish Res. 10: 290.

Landers, W.S. 1972. Early development in the ocean quahog, *Arctica islandica* (L.). Proc. Natl. Shellfish. Assoc. 63: 3.

Landers, W.S. 1976. Reproduction and early development of the ocean quahog, *Arctica islandica*, in the laboratory. Nautilus 90: 88-92.

Leidy, J. 1878. Remarks on *Mactra*. Proc. Acad. Nat. Sci. Phila. 1878: 332-333.

Loosanoff, V.L. and H.C. Davis. 1963. Rearing of bivalve mollusks. Adv. Mar. Biol. 1: 1-136.

Lutz, R.A., L.W. Fritz, J.A. Dobarro, A. Stickney, and M. Castagna. 1989. Growth patterns within the shell of the ocean quahog, *Arctica islandica*: a review and recent observations. J. Shellfish Res. 8: 463.

Lutz, R.A., J.G. Goodsell, R. Mann, and M. Castagna. 1981. Experimental culture of the ocean quahog, *Arctica islandica*. J. World Maricult. Soc. 12: 196-205.

Lutz, R.A., R. Mann, J.G. Goodsell, and M. Castagna. 1982. Larval and early post-larval development of *Arctica islandica*. J. Mar. Biol. Assoc. UK 62: 745-769.

Ma, H. 1997. Time series analyses of meroplankton in moored pump samples at LEO-15: the relationship between the abundance of surfclam larvae and nearshore upwelling events. M.S. thesis, Rutgers University. New Brunswick, NJ. 110 p.

MacKenzie, C.L. Jr., D.J. Radosh, and R.N. Reid. 1985. Densities, growth, and mortalities of juveniles of the surfclam (*Spisula solidissima*) (Dillwyn) in the New York Bight. J. Shellfish Res. 5: 81-84.

[MAFMC] Mid-Atlantic Fishery Management Council. 1977. Atlantic Surfclam and Ocean Quahog Fishery Management Plan. Nov 1977. Mid-Atlantic Fishery Management Council, Dover, DE. Available at: http://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/53e3c5f5e4b0ec0638164b8d/1407436277228/SCOQ__FMP.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 1988. Amendment 8 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan. June 1990. Mid-Atlantic Fishery Management Council, Dover, DE. Available at: http://static.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/51894db5e4b08224df27d0a7/1367952821683/SCOQ_Amend_8.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 1997. Amendment #10 to the Fishery Management Plan for Atlantic surfclam and ocean quahog fisheries. March 1997. MAFMC. [Dover, DE.] 58 p. + appendices.

[MAFMC] Mid-Atlantic Fishery Management Council. 2003. Amendment 13 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan. June 2003. Mid-Atlantic Fishery Management Council, Dover, DE. Available at: https://9cdedc76f7d6840febb4fb2f235ef75db8e16d9c.googledrive.com/host/0B7aKVuJOPoZVdzBuWndPMV82UFU/

[MAFMC] Mid-Atlantic Fishery Management Council. 2011. Amendment 16 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan. July 2011. Mid-Atlantic Fishery Management Council, Dover, DE. Available at: http://www.nero.noaa.gov/nero/regs/frdoc/11/11OmnibusAmendmentEA&CommentsFinal.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 2015. Statement of Organization, Practices, and Procedures, Revised December 2015. Mid-Atlantic Fishery Management Council, Dover, DE

[MAFMC] Mid-Atlantic Fishery Management Council. 2016. Amendment 17 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan. June 2016. Mid-Atlantic Fishery Management Council, Dover, DE. Available at: https://www.gpo.gov/fdsys/pkg/FR-2016-06-15/pdf/2016-14087.pdf

[MAFMC] Mid-Atlantic Fishery Management Council.. 2021, OMNIBUS Acceptable Biological Catch and Risk Policy Framework Adjustment, Framework 4 to the Surfclam / Ocean Quahog Fishery Management Plan (https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5fdcd5e542e81c390ad45974/1608308199619/Omnibus+Risk+Policy+EA_final+submission_10_2020.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 2021. Atlantic Surfclam and Ocean Quahog Fishery Performance Report. April 2021. Available at: https://www.mafmc.org/s/c_FPR_for2021_SurfclamOceanQuahog.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 2021. Atlantic Surfclam Fishery Information Document. April 2021. Available at: https://www.mafmc.org/s/d_2021_SC_FishInfoDoc_2021_04_13.pdf

[MAFMC] Mid-Atlantic Fishery Management Council. 2021. Ocean Quahog Fishery Information Document. April 2021. Available at: https://www.mafmc.org/s/d_2021_OQ_FishInfoDoc_2021_04_13.pdf

Magnuson-Stevens Fishery Conservation and Management Act of 2007. available at: https://www.fisheries.noaa.gov/resource/document/magnuson-stevens-fishery-conservation-and-management-act

Malchoff, M., ed. 1999. "Proceedings of the Sea Grant bycatch workshop." Sea Grant Bycatch Workshop, Danfords Inn, Port Jefferson, NY, March 19, 1999

Meyer, Thomas L.; Cooper, Richard A.; Pecci, Kenneth J. 1981. The Performance and Environmental Effects of a Hydraulic Clam Dredge. Marine Fisheries Review. September 1981 43(9).

Marine Stewardship Council (MSC). 2014. MSC Fisheries Certification –Requirements v2.0. Marine Stewardship Council. London

Mann, R. 1982. The seasonal cycle of gonadal development in *Arctica islandica* from the southern New England shelf. Fish. Bull. (U.S.) 80: 315-326.

Mann, R. 1985. Seasonal changes in the depth-distribution of bivalve larvae on the southern New England shelf. J. Shellfish Res. 5: 57-64.

Mann, R. 1989. Larval ecology of *Arctica islandica* on the inner continental shelf of the eastern United States. J. Shellfish Res. 8: 464.

Mann, R. and C.C. Wolf. 1983. Swimming behavior of larvae of the ocean quahog *Arctica islandica* in response to pressure and temperature. Mar. Ecol. Prog. Ser. 13: 211-218.

Medcof, J.C. and J.F. Caddy. 1971. Underwater observations on the performance of clam dredges of three types. ICES C.M. 1971/B: 10.

Merrill, A.S., J.L. Chamberlin, and J.W. Ropes. 1969. Ocean quahog fishery. *In* F.E. Firth ed. Encyclopedia of marine resources. p. 125-129. Van Nostrand Rein-hold Publishing Co., NY.

Merrill, A.S. and J.W. Ropes. 1969. The general distribution of the surfclam and ocean quahog. Proc. Nat. Shellfish. Assoc. 59: 40-45.

Meyer, T.L., R.A. Cooper, and K.J. Pecci. 1981. The performance and environmental effects of a hydraulic clam dredge. Mar. Fish. Rev. 43(9): 14-22.

Murawski, S. A. and F.M. Serchuk. 1979. Dynamics of Ocean Quahog, *Arctica islandica,* Populations off the Middle Atlantic Coast of the United States. Laboratory Reference No. 79-16. National Marine Fisheries Service, Northeast Fisheries Science Center. Woods Hole, MA.

Murawski, S.A. and F.M. Serchuk. 1989. Mechanized shellfish harvesting and its management: the offshore clam fishery of the eastern United States. *In* J.F. Caddy ed. Marine invertebrate fisheries: their assessment and management. p. 479-506. John Wiley & Sons, Inc., NY.

[NEFMC] Essential Fish Habitat (EFH) Omnibus Amendment. 2011. The Swept Area Seabed Impact (SASI) Model: A Tool For Analyzing The Effects Of Fishing On Essential Fish Habitat".

[NEFMC] New England Fishery Management Council. 2016, Ominbus Essential Fish habitat Amendment 2. Draft released 16 Jan 2016

[NEFMC] 2020. Northeast Skate Complex Fishery Management Plan. Annual Monitoring Report for Fishing Year 2019. Available at: https://s3.amazonaws.com/nefmc.org/2020-Skate-Annual-Monitoring-Report_200921_100052.pdf

[NEFSC] Northeast Fisheries Science Center. 1998. Report of the 26th Northeast Regional Stock Assessment Workshop (26th SAW): Stock Assessment Review Committee (SARC) consensus summary of assessments. Northeast Fish. Sci. Cent. Ref. Doc. 98-03. 283 p.

[NEFSC] Northeast Fisheries Science Center. 2002. Northeast Region Essential Fish Habitat Steering Committee (Northeast EFH Committee) Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern United States, October 23-25, 2001, Boston, Massachusetts. Northeast Fish. Sci. Cent. Ref. Doc. 02-01, 86 pp. Available at: http://www.nefsc.noaa.gov/publications/crd/crd0201/

[NEFSC] Northeast Fisheries Science Center. 2007. 44th Northeast Regional Stock Assessment Workshop (44th SAW): 44th SAW assessment report. U.S. Department of Commerce, Northeast Fish Sci Cent Ref Doc 07-10; 661 p.

[NEFSC] Northeast Fisheries Science Center. 2009. Northeast Regional Stock Assessment Workshop 48 (SAW 48) Assessment Report. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc. 09-10; pp. 26-33. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/ or https://repository.library.noaa.gov/view/noaa/3640

[NEFSC] Northeast Fisheries Science Center. 2013. 56th Northeast Regional Stock Assessment Workshop (56th SAW) Assessment Report. U.S. Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-10; 868 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/

[NEFSC] Northeast Fisheries Science Center. 2016. 61st Northeast Regional Stock Assessment Workshop (61st SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent

Ref Doc. 16-13; 26 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.

[NEFSC] Northeast Fisheries Science Center. 2017. 63rd Northeast Regional Stock Assessment Workshop (63rd SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-09; 28 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications.

[NEFSC] Northeast Fisheries Science Center. 2018. 65th Northeast Regional Stock Assessment Workshop (65th SAW) Assessment Report for Atlantic Sea Scallop. US Department of Commerce, Northeast Fisheries Science Center Reference Document. 659 p. Available from: http://www.nefsc.noaa.gov/publications/

[NEFSC] Northeast Fisheries Science Center. 2019. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Summary Report for Summer Flounder. US Department of Commerce, Northeast Fisheries Science Center Reference Document. 45 p. Available from: http://www.nefsc.noaa.gov/publications/

[NEFSC] Northeast Fisheries Science Center. 2019. Monkfish Operational Assessment for 2019. US Department of Commerce, Northeast Fisheries Science Center Reference Document. 659 p. Available from: https://s3.amazonaws.com/nefmc.org/7_Monk_OpAssess2019_a.pdf

[NMFS] National Marine Fisheries Service. 2000. 2001 Catch specifications for surfclam and ocean quahog: Regulatory impact review. National Marine Fisheries Service. Silver Spring, MD (October 24, 2000).

[NMFS] National Marine Fisheries Service. 2013. Northeast Region Bulletin: Atlantic Surfclam and Ocean Quahog Fishery. Available: http://www.greateratlantic.fisheries.noaa.gov/nr/doc/12/12scoqgeorgesbankareareopenphl.pdf (March 2016)

[NMFS] National Marine Fisheries Service. 2014. National Standard Guidelines. Accessed at: http://www.nmfs.noaa.gov/sfa/laws_policies/national_standards/index.html. February 2016.

NOAA NMFS OLE 2018. Response to FOIA Request DOC-NOAA-2018-000124. Accessed January 2018 at: https://foiaonline.regulations.gov/foia/action/public/view/request?objectId=090004d2816777d6

National Oceanic and Atmospheric Administration, Coral Reef Conservation Program. 2010. NOAA Strategic Plan for Deep-Sea Coral and Sponge Ecosystems: Research, Management, and International Cooperation. Silver Spring, MD: NOAA Coral Reef Conservation Program. NOAA Technical Memorandum CRCP 11. 67 pp https://www.coris.noaa.gov/activities/deepsea_coral/dsc_strategicplan.pdf

NOAA OGC 2018 b. Enforcement Decisions and Orders (March 18, 2010 Through September 29, 2017). Accessed January 2018 at: http://www.gc.noaa.gov/enforce-office6.html.

NOAA OGC 2018. Enforcement Charging Information. Accessed January 2018 at: http://www.gc.noaa.gov/enforce-office7.html.

NOAA (National Oceanic and Atmospheric Administration). 2021a. Standardized Bycatch Reporting Methodology 3-year Review Report, 2020: Reviewing SBRM Years 2018, 2019, and 2020. NOAA Technical Memorandum NMFS-NE-266. Online at: Standardized Bycatch Reporting Methodology 3-year Review Report - 2020 (noaa.gov).

NOAA (National Oceanic and Atmospheric Administration). 2021b. The 2021 State of the Ecosystem Report for the Mid Atlantic. Online at: (https://www.mafmc.org/s/1_2021-Mid-Atlantic-SOE-report.pdf).

NOAA (National Oceanic and Atmospheric Administration). 2021c. Stock Assessment of Spiny Dogfish. Stock SMART data records. Retrieved from www.st.nmfs.noaa.gov/stocksmart. 07/13/2021.

Nuckols III, W. 1998. Improving coastal management decisions using a GIS and NMFS survey data. University of Charleston. Charleston, SC.

Oeschger, R. 1990. Long-term anaerobiosis in sublittoral marine invertebrates from the western Baltic Sea: Halicryptus spinulosus (Priapulida), Astarte borealis and Arctica islandica (Bivalvia). Mar. Ecol. Prog. Ser. 59: 133-143.

Oeschger, R. and K.B. Storey. 1993. Impact of anoxia and hydrogen sulphide on the metabolism of Arctica islandica L. (Bivalvia). J. Exp. Mar. Bio. Ecol. 170: 213-226.

Ogren, L. and J. Chess. 1969. A marine kill on New Jersey wrecks. Underwater Nat. 6(2): 4-12.

OSPAR. Oslo and Paris Conventions List of Threatened and/or Declining Species and Habitats. OSPAR Commission, London, 2008

Packer, D.B. and R.W. Langton. In preparation. Food habits of the major groundfish species of Sheepscot Bay, Maine, U.S.A. U.S. Natl. Mar. Fish. Serv., Northeast Fish Sci. Cent., James J. Howard Mar. Sci. Lab., Highlands, NJ.

Reid, R., F. Almeida, and C. Zetlin. 1999. Essential fish habitat source document: Fishery independent surveys, data sources, and methods. NOAA Tech. Mem. NMFS-NE-122. 39 p.

Reid, R., F. Almeida, and C. Zetlin. 1999. Essential fish habitat source document: Fishery independent surveys, data sources, and methods. NOAA Tech. Mem. NMFS-NE-122. 39 p.

Riisgård, H.U. 1988. Efficiency of particle retention and filtration rate in 6 species of Northeast American bivalves. Mar. Ecol. Prog. Ser. 45: 217-223.

Robinson, W.E., W.E. Wehling, and M.P. Morse. 1984. The effect of suspended clay on feeding and digestive efficiency of the surfclam, Spisula solidissima (Dillwyn). J. Exp. Mar. Biol. Ecol. 74: 1-12.

Roosenberg, W.H., D.A. Wright, and M. Castagna. 1984. Thermal tolerance by embryos and larvae of the surfclam Spisula solidissima. Environ. Res. 34: 162-169.

Ropes, J.W. 1968a. Hermaphroditism in the surfclam, Spisula solidissima. Proc. Nat. Shellfish. Assoc. 58: 63-65.

Ropes, J.W. 1968b. Reproductive cycle of the surfclam, Spisula solidissima, in offshore New Jersey. Biol. Bull. (Woods Hole) 135: 349-365.

Ropes, J.W. 1978. Biology and distribution of surfclams (Spisula solidissima) and ocean quahogs (Arctica islandica) off the northeast coast of the United States. In Proceedings of northeast clam industries: management for the future. April 27-28, 1978, Hyannis, MA.

Ropes, J.W. 1979. Shell length at sexual maturity of surfclams, Spisula solidissima, from an inshore habitat. Proc. Nat. Shellfish. Assoc. 69: 85-91.

Ropes, J.W. 1980. Biological and fisheries data on the Atlantic surfclam, *Spisula solidissima* (Dillwyn). U.S. Natl. Mar. Fish. Serv., Northeast Fish. Cent. Sandy Hook Lab Tech. Ser. Rep. No. 24. 88 p.

Ropes, J.W. 1988. Ocean quahog, *Arctica islandica*. Woods Hole Laboratory, Northeast Fisheries Center, National Marine Fisheries Service, NOAA. Woods Hole, MA.

Ropes, J.W. and A.S. Merrill. 1966. The burrowing activities of the surfclam. Underwater Nat. 3(4): 11-17.

Ropes, J.W. and A.S. Merrill. 1970. Marking surfclams. Proc. Nat. Shellfish. Assoc. 60: 99-106.

Ropes, J.W. and A.S. Merrill. 1973. To what extent do surfclams move? Nautilus 87: 19-21.

Ropes, J.W. and S.A. Murawski. 1983. Maximum shell length and longevity in ocean quahogs, Arctica islandica Linné. ICES C.M. 1983/K: 32. 8 p.

Ropes, J.W. and D. Pyoas. 1982. Preliminary age and growth observations of ocean quahogs, Arctica islandica Linné, from Georges Bank. ICES C.M. 1982/K: 15. 6 p.

Rowell, T.W., D.R. Chaisson, and J.T. McLane. 1990. Size and age of sexual maturity and annual gametogenic cycle in the ocean quahog, Arctica islandica (Linnaeus, 1767), from coastal waters in Nova Scotia, Canada. J. Shellfish Res. 9: 195-203.

Schechter, V. 1956. The effect of water upon gametes, upon maturation, and upon fertilization and cleavage. Exp. Cell Res. 10: 619-630.

Sephton, T.W. 1987. The reproductive strategy of the Atlantic surfclam, *Spisula solidissima*, in Prince Edward Island, Canada. J. Shellfish Res. 6: 97-102.

Sephton, T.W. and C.F. Bryan. 1990. Age and growth rate determinations for the Atlantic surfclam, *Spisula solidissima* (Dillwyn, 1817) in Prince Edward Island, Canada. J. Shellfish Res. 9: 177-185.

Serchuk, F.M., S.A. Murawski, and J.W. Ropes. 1982. Ocean quahog Arctica islandica. In M.D. Grosslein and T.R. Azarovitz eds. Fish distribution. p. 144-146. MESA New York Bight Atlas Monograph 15. N.Y. Sea Grant Institute, Albany, NY.

Stehlik, L.L. 1993. Diets of the Brachyuran crabs *Cancer irroratus*, *C. borealis*, and *Ovalipes ocellatus* in the New York Bight. J. Crustac. Biol. 13: 723-735.

Taylor, A.C. 1976. Burrowing behavior and anaerobiosis in the bivalve Arctica islandica (L.). J. Mar. Biol. Assoc. UK 56: 95-109.

Taylor, A.C. and A.R. Brand. 1975. A comparative study of the respiratory responses of the bivalves Arctica islandica (L.) and Mytilus edulis (L.) to declining oxygen tension. Proc. R. Soc. London B. Biol. Sci. 190: 443-456.

Tarnowski, M.L. 1982. Temporal distribution of surfclam larvae off southern New Jersey. J. Shellfish Res. 2(1): 108.

Thompson, I., D.S. Jones, and J.W. Ropes. 1980b. Advanced age for sexual maturity in the ocean quahog Arctica islandica (Mollusca: Bivalvia). Mar. Biol. 57: 35-39.

Thorarinsdottir, G. G., L. Jacobson, S. A. Ragnarsson, E. G Garcia, and K. Gunnarsson. 2010. Capture efficiency and size selectivity of hydraulic clam dredges used in fishing for ocean quahogs (*Arctica islandica*): simultaneous estimation in the SELECT model. ICES Journal of Marine Science, 67: 345-354.

USOFR (US Office of the Federal Register). 2016b. Fisheries of the Northeastern United States: Amendment 17 to the Atlantic Surfclam and Ocean Quahog Fishery Management Plan, final rule. Federal Register 81: 115 (15 June 2016):38969–38974.

Vaughn, C. C. and T. J. Hoellein. 2018.b Annual Review of Ecology, Evolution, and Systematics 49:1, 183-208

Vecchione, M. and R.B. Griffis. 1996. How many species of surfclams? Oceanog. 9: 48-49.

Viscido, S.V. 1994. Seasonal and spatial variations in the marine epibenthic decapod crustacean community at Beach Haven Ridge, New Jersey. M.S. thesis, Rutgers University. Camden, NJ. 133 p.

Wagner, E.S. 1984. Growth rate and annual shell structure patterns in a single year class of surfclams *Spisula solidissima* off Atlantic City, New Jersey. M.S. thesis, Rutgers University. New Brunswick, NJ. 161 p.

Walker, R.L. and P.B. Heffernan. 1994. Age, growth rate, and size of the southern surfclam, *Spisula solidissima similis* (Say, 1822). J. Shellfish Res. 13: 433-441.

Walker, R.L. and P.B. Heffernan. 1990. The effects of cage mesh size and tidal level placement on the growth and survival of clams, *Mercenaria mercenaria* (L.) and *Spisula solidissima* (Dillwyn), in the coastal waters of Georgia. Northeast Gulf Sci. 11: 29-38.

Walker, R.L., D.H. Hurley, and M.L. Jansen. 1996. Fecundity estimates of the southern surfclam *Spisula solidissima similis*. J. Shellfish Res. 15: 531.

Wallace, D.H. and T.B. Hoff. 2004. Minimal bycatch in the Northeast Atlantic surfclam and ocean quahog fishery. In: Bycatch in Northeast Fisheries: Moving Forwards. National Marine Fisheries Service, Gloucester, MA. Page 83.

Wallace, D.H. and T.B. Hoff. 2005. Hydraulic clam dredge effects on benthic habitat off the Northeastern United States. American Fisheries Society Symposium 41: 691-69

Weinberg, J. 1995. Ocean quahog. In Conservation and Utilization Division, Northeast Fisheries Science Center eds. Status of the fishery resources off the northeastern United States for 1994. p. 121-122. NOAA Tech. Mem. NMFS-NE-108.

Weinberg, J. 1998. Ocean quahog. In S.H. Clark ed. Status of the fishery resources off the northeastern United States for 1998. p. 128-130. NOAA Tech. Mem. NMFS-NE-115.

Weinberg, J.R. 1998a. Atlantic surfclam. *In* S.H. Clark ed. Status of the fishery resources off the northeastern United States for 1998. p. 125-127. NOAA Tech. Mem. NMFS-NE-115.

Weinberg, J.R. 1998b. Density-dependent growth in the Atlantic surfclam, *Spisula solidissima*, off the coast of the Delmarva Peninsula, USA. Mar. Biol. 130: 621-630.

Weinberg, J.R. and T.E. Helser. 1996. Growth of the Atlantic surfclam, *Spisula solidissima*, from Georges Bank to the Delmarva Peninsula, USA. Mar. Biol. 126: 663-674.

Weinberg, J.R., Murawski, S.A. and F.M. Serchuk. 1997. History and management of the U.S. Atlantic surfclam fishery. Journal of Shellfish Research, vol. 16, no. 1, pp. 277-278.

[WHOI] Woods Hole Oceanographic Institution. 2016. Northeast PSP: New England Harmful Algal Bloom/Red Tide Information. Woods Hole Oceanographic Institution. Available: http://www.whoi.edu/page.do?pid=23997&print... (July 2016)

Weidman, C. R., Jones, G. A., and Lohmann, K. C. (1994). The long-lived mollusk Arctica islandica: A new paleoceanographic tool for the reconstruction of bottom temperatures for the continental shelves of the northern North Atlantic Ocean. Journal of Geophysical Research 99(C9), 18,305–18,314.

Wigley, SE and Tholke, C., 2018, 2018 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum **NMFS-NE-254**. Available at: https://doi.org/10.25923/96fr-zg53

Wigley, SE and Tholke, C., 2019, 2019 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-254. Available at: https://doi.org/10.25923/96fr-zg53

Wigley, SE and Tholke, C., 2020, 2020 Discard Estimation, Precision, and Sample Size Analyses for 14 Federally Managed Species Groups in the Waters off the Northeastern United States. NOAA Technical Memorandum NMFS-NE-261. Available at: https://doi.org/10.25923/z0mw-9t57

Winter, J.E. 1969. On the influence of food concentration and other factors on filtration rate and food utilization in the mussels Arctica islandica and Modiolus modiolus. Mar. Biol. 4: 87-135. (In German; English abstract).

Winter, J. 1970. Filter feeding and food utilization in Arctica islandica L. and Modiolus modiolus L. at different food concentrations. In J.H. Steele ed. Marine food chains. p. 196-206. Oliver and Boyd, Edinburgh, Scotland.

Witbaard, R., R. Franken, and B. Visser. 1997. Growth of juvenile Arctica islandica under experimental conditions. Helg. Meere. 51: 417-431.

9 Appendices

9.1 Assessment information

9.1.1 Small-scale fisheries

This fishery is not a small-scale fishery.

9.2 Evaluation processes and techniques

9.2.1 Site visits

Information will be included at the client and peer review draft report stage.

9.2.2 Evaluation techniques

Documentation and Information Gathering

One of the most critical aspects of the MSC certification process is ensuring that the assessment team gets a complete and thorough grounding in all aspects of the fishery under evaluation. In even the smallest fishery, the assessment team typically needs documentation in all areas of the fishery from the status of stocks, to ecosystem impacts, through management processes and procedures.

Under the MSC program, it is the responsibility of the applying organizations or individuals to provide the information required proving the fishery or fisheries comply with the MSC standards. It is also the responsibility of the applicants to ensure that the assessment team has access to any and all scientists, managers, and fishers that the assessment team identifies as necessary to interview in its effort to properly understand the functions associated with the management of the fishery. Last, it is the responsibility of the assessment team to make contact with stakeholders that are known to be interested or actively engaged in issues associated with fisheries in the same geographic location. No RBF was determined necessary for the assessment.

Scoring and Report Development Process

ACDR: The Announcement Comment Draft Report was completed on August 13, 2021. The client decided to continue with the full assessment.

Publication of ACDR: Publication of the Announcement Comment Draft Report was published on August 14, 2021.

Scoring Methodology

The assessment team followed guidelines in MSC FCP v2.2 Section 7.10 “Scoring the fishery”. Scoring in the MSC system occurs via an Analytical Hierarchy Process and uses decision rules and weighted averages to produce Principle Level scores. There are 28 Performance Indicators (PIs), each with one or more Scoring Issues (SIs). Each of the scoring issues is considered at the 60, 80, and 100 scoring guidepost levels. The decision rule described in Table 24 determines the Performance Indicator score, which must always be in an increment of 5. If there are multiple ‘elements[5]’ under consideration (e.g. multiple main primary

[5] MSC FCPV2.1 7.10.7: In Principle 1 or 2, the team shall score PIs comprised of differing scoring elements (species or habitats) that comprise part of a component affected by the UoA.

species), each element is scored individually for each relevant PI, then a single PI score is generated using the same set of decision rules described in Table 24.

Table 24. Decision Rule for Calculating Performance Indicator Scores based on Scoring Issues, and for Calculating Performance Indicator Scores in Cases of Multiple Scoring Elements. (Adapted from MSC FCPV2.2 Table 4)

Score	Combination of individual SIs at the PI level, and/or combining multiple element PI scores into a single PI score.
<60	Any scoring element/SI within a PI which fails to reach SG60 shall not be assigned a score as this is a pre-condition to certification.
60	All elements (as scored at the PI level) or SIs meet SG60 and only SG60.
65	All elements/SIs meet SG60; a few achieve higher performance, at or exceeding SG80, but most do not meet SG80.
70	All elements/SIs meet SG60; half* achieve higher performance, at or exceeding SG80, but some do not meet SG80 and require intervention action to make sure they get there.
75	All elements/SIs meet SG60; most achieve higher performance, at or exceeding SG80; only a few fail to achieve SG80 and require intervention action.
80	All elements/SIs meet SG80, and only SG80.
85	All elements/SIs meet SG80; a few achieve higher performance, but most do not meet SG100.
90	All elements/SIs meet SG80; half achieve higher performance at SG100, but some do not.
95	All elements/SIs meet SG80; most achieve higher performance at SG100, and only a few fail to achieve SG100.
100	All elements/SIs meet SG100.

**MSC FCPV2.2 uses the word 'some' instead of half. SCS considers 'half' a clearer description of the methodology utilized.*

When calculating the Principal Indicator scores based on the results of the Scoring Issues (SI), SCS interprets the terms in Table 2 as follows:

9.3 Peer Review reports

To be drafted at Public Comment Draft Report stage.

9.4 Stakeholder input

To be included at the Client and Peer Review Draft Stage. Stakeholder input at the ACDR stage will be posted on the MSC database.

No written or verbal stakeholder submissions were received during consultation opportunities listed in FCP 7.15.4.1.

Table 25. Summary of Stakeholder Submissions

9.5 Conditions

9.5.1 Summary of conditions closed under previous certificate

The CAB shall include a summary of conditions that were closed during the previous certificate.

9.5.2 Open Conditions at reassessment announcement

Table 26 Open conditions

Table 27 Condition X NEW

12.1 Client Action Plan

To be drafted at Public Comment Draft Report stage.

12.2 Surveillance

To be drafted at Client and Peer Review Draft Report stage.

Table 28. Fishery surveillance audit

Table 29. Timing of surveillance audit

Table 30. Surveillance level rationale

12.3 Harmonised fishery assessments

The assessment team identifies no other fisheries for harmonization under Principal 1 or Principal 2 at this time. There are fisheries, however, that are subject to harmonization under Principal 3.

12.3.1 Principal 3

Harmonisation requirements for PIs 3.1.1 – 3.1.3 is situation dependent. If both UoAs are part of the same larger fishery or fleet or have stocks in either P1 or P2 that are at least partially managed by the same jurisdiction(s) (nation states, RFMOs, or others) or under the same agreements, then the fisheries are required to be harmonized (FCP v2.1, Table GPB1). Harmonisation may sometimes be possible for those management arrangements that apply to both UoAs (noting the limitations accepted in GPB1.3). The MSC accepts that it may be impractical to attempt full harmonisation, due to the large number of fisheries that may be managed under the relevant policy framework, and the differences in application between them.

PI's 3.2.1 – 3.2.4, harmonization is also situation dependent and required when both UoAs have stocks within either P1 or P2 that are at least partially managed by the same jurisdiction(s) (nation states, RFMOs, or others) or under the same agreements. Harmonisation is needed for those management arrangements that apply to both UoAs e.g. at the RFMO level but not the national level in the case of 2 separate national fleets both fishing the same regional stock.

Included in this table are all US East Coast Fisheries identified. These will be updated after the site visit by the assessment team.

Table 31. Alignment of Scores for Harmonization

Fishery name	CAB	Latest Report Version	Group #	3.1.1	3.1.2	3.1.3	3.2.1	3.2.2	3.2.3	3.2.4	Comments
Standard v2.0/2.01											
U.S. Northeastern Coast Longfin Inshore Squid and Northern Shortfin Squid Bottom Trawl Fishery	SCS Global Services	ACDR Jan 2020	1								
US Northeast Squid Bottom Trawl Fishery	SCS Global Services										
US Gulf of Maine and Georges Bank haddock, pollock and redfish trawl	Lloyds Register										

US Atlantic spiny dogfish, winter skate and little skate	MRAG										
Scup Assessment	SCS Global Services										
U.S. Northeastern Coast Longfin Inshore Squid and Northern Shortfin Squid Bottom Trawl Fishery	SCS Global Services										

12.4 Certificate Sharing Mechanism

LAW OFFICES
THOMAS T. ALSPACH
295 BAY STREET
SUITE ONE
POST OFFICE BOX 1358
EASTON, MARYLAND 21601
(410) 822-9100

ADMITTED IN MARYLAND, FLORIDA
AND THE DISTRICT OF COLUMBIA

FACSIMILE: (410) 822-2550
talspach@goeaston.net

July 28, 2021

Ms. Gabriela Anhalzer
Program Director
SCS Global Services
2000 Powell Street, Ste. 600
Emeryville, CA 94608

RE: CERTIFICATE SHARING MECHANISM – MSC CERTIFICATION OF THE Atlantic Surfclam/Ocean Quahog Fishery

Dear Gabriela:

This office represents the MSC Certificate Holders identified below in connection with the current MSC assessment/audit of the Atlantic Surfclam/Ocean Quahog fishery for certification as to sustainability.

This letter serves as notice that only product caught by vessels in the UoA *and* landed at processors listed in certificate addendum (Sea Watch International, Ltd.; Bumble Bee Seafoods; Atlantic Capes Fisheries, Inc.; Lamonica Fine Foods, Inc.; and Surfside Foods, LLC) may be sold as MSC certified product. Product originating from the UoA and landed at processors that are not included in the certificate addendum, are considered 'other eligible fishers'. Other eligible fishers may sell their product as MSC certified product provided 'other eligible fishers' comply with the policies, terms, and conditions of, and the product is sold to the list of processors approved by, the Certificate Holders (namely Sea Watch International, Ltd.; Bumble Bee Seafoods; Atlantic Capes Fisheries, Inc.; Lamonica Fine Foods, Inc. and Surfside Foods, LLC).

Sincerely,

Thomas T. Alspach

cc: Sea Watch International, Ltd.
Bumble Bee Seafoods
Atlantic Capes Fisheries, Inc.
Lamonica Fine Foods, Inc.
Surfside Foods, LLC

12.5 Objection Procedure

To be added at Public Certification Report stage

13 Template information and copyright

This document was drafted using the 'MSC Reporting Template v1.2'.

Template version control

Version	Date of publication	Description of amendment
1.0	17 December 2018	Date of first release
1.1	29 March 2019	Minor document changes for usability
1.2	25 March 2020	Release alongside Fisheries Certification Process v2.2

A controlled document list of MSC program documents is available on the MSC website (msc.org).

Marine Stewardship Council
Marine House
1 Snow Hill
London EC1A 2DH
United Kingdom

Phone: + 44 (0) 20 7246 8900
Fax: + 44 (0) 20 7246 8901
Email: standards@msc.org