OPENING A PORTION OF THE GEORGES BANK CLOSED AREA TO SURFCLAM AND OCEAN QUAHOG HARVESTING

Programmatic Environmental Assessment
Regulatory Impact Review

National Marine Fisheries Service
Northeast Regional Office
55 Great Republic Drive
Gloucester, MA

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LIST OF ACRONYMS

CAW	Cape Wind Associates
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DMV	Delmarva
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EFP	Experimental Fishing Permit
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FDA	Food and Drug Administration
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FR	Federal Register
GB	Georges Bank
GOM	Gulf of Maine
HAB	Harmful Algal Bloom
ICES	International Council for the Exploration of the Sea
ITQ	Individual Transferable Quota
LI	Long Island
LNG	Liquefied Natural Gas
LOF	List of Fisheries
LUPE-	Landings Per Unit Effort
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
NEFMC	New England Fisheries Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NJ	New Jersey
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NAO	National Oceanic and Atmospheric Administration Administrative Order
NSSP	National Shellfish Sanitation Program
OQ	Ocean quahog

PEA	Programmatic Environmental Assessment
PSP	Paralytic Shellfish Poison
RIR	Regulatory Impact Review
SC	Surfclam
SNE	Southern New England
SVA	Southern Virginia
USDC	United States Department of Commerce
VEC	Valued Ecosystem Component
VMS	Vessel Monitoring System
VTR	Vessel Trip Report

1.0 INTRODUCTION

The following Programmatic Environmental Assessment (PEA) has been prepared in response to the request from the U.S. Food and Drug Administration (FDA) to open a portion of the Georges Bank (GB) Closed Area that has been closed to surfclam/ocean quahog (SC/OQ) harvesting since 1990 due to red tide blooms which cause Paralytic Shellfish Poisoning (PSP). In accordance with the National Environmental Policy Act of 1969 (NEPA) and the National Oceanic and Atmospheric Administration (NOAA) Administrative Order (NAO) 216-6, the environmental impacts of this action and the anticipated level of significance of these impacts are addressed in this PEA.

Since red tide events can vary inter-annually, the areas of closure can vary depending upon the severity of the event and the level of monitoring by the FDA to indicate safe consumption. For purposes of this PEA, it is anticipated that the FDA will request portions of the existing GB Closed Area to be opened and closed based upon future PSP-toxin monitoring results of SC/OQ. The impacts related to opening and closing areas within the GB Closed Area to harvesting SC/OQ are discussed in this PEA, and this analysis would be in compliance with NEPA for future related actions. However, the PEA would be supplemented if a change in conditions or circumstances were to occur over the next 5 years that have not been addressed or described in this PEA. If the FDA requests the opening of an area larger than or an area outside of what is described in this PEA, a new PEA or Environmental Assessment (EA) must be prepared.

It should be noted that in the case of an emergency, such as a public health concern, the Secretary of Commerce has the authority, under section 305(c) of the Magnuson-Stevens Act, to open or close an area at any time by publication in the Federal Register. Duration and seasonality are factors associated with a SC/OQ harvest area opening or closing that would affect the economic impacts described below in Section 6.0.

2.0 BACKGROUND

The SC/OQ GB Closed Area, located east of 69°00” west longitude and south of 42°20” north latitude (Figure 4.3-1), was closed on May 25, 1990 (specified as 50 CFR 648.73(a)(4)). This closure was implemented based on the advice of the FDA after samples of surfclams tested positive for toxins (saxotoxins) that cause PSP. These toxins are produced by the alga *Alexandrium fundyense*, which can form blooms commonly referred to as red tides. Red tide blooms, also known as harmful algal blooms (HABs), can produce toxins that accumulate in water column filter-feeding shellfish. Shellfish contaminated with the saxotoxin, if eaten in large enough quantity, can cause illness or death in humans from PSP. Due, in part, to the inability to test and monitor this area for the presence of PSP-causing toxins, this closure was later made permanent through a technical change under Amendment 12 to the Atlantic Surfclam and Ocean Quahog Fisheries Management Plan (FMP) in 1999.

NOAA’s National Ocean Service (NOS) has provided a grant to the FDA, the States of Maine, New Hampshire, and Massachusetts as well as a clam industry representative to collect water and shellfish samples from federal waters off of southern New England, Gulf of Maine, and GB. This multi-year project monitors *Alexandrium spp* cell counts in the water column and PSP levels in shellfish along the New England coast and on GB. Research vessels collect water samples, along with fish and shellfish taken from the ocean floor. A clam vessel collects water and shellfish samples from Nantucket Shoals, Stellwagen Bank, and GB. The FDA designed the sampling protocol and defined the locations where shellfish samples will be taken (MAFMC 2009). The National Shellfish Sanitation Program (NSSP) is the federal/state cooperative program which sets the standards for sanitary control of shellfish produced and sold for human consumption.

The FDA has spent many years developing at-sea and shore-based testing procedures to verify that any harvests taken from GB are safe (MAFMC, 2009). Exempted Fishing Permits (EFP) were issued on January 9, 2008, and on December 10, 2009 by NOAA's National Marine Fishery Service (NMFS) to Truex Enterprises of New Bedford, MA to allow for testing the efficiency of harvesting SC/OQ from a portion of the GB Closed Area (Figure 4.3-1) utilizing the latest *Protocol for Onboard Screening and Dockside Testing for PSP in Molluscan Shellfish* (Protocol). The Protocol was developed to test for the presence of saxotoxins in shellfish, and to facilitate the harvest of shellfish in waters susceptible to HABs, such as the GB Closed Area, which is not currently under rigorous water quality monitoring programs of either state or Federal management agencies (NMFS 2009).

In a letter dated January 21, 2010, the FDA requested that the NMFS reopen a portion of the GB Closed Area in the north western Atlantic Ocean, known as Cultivator Shoal, to the harvesting of surfclams and ocean quahogs for human consumption. This area represents a small portion of the much larger GB Closed Area (Figure 4.3-1). Recent testing of clams on GB by the FDA in cooperation with the NMFS and the fishing industry under the EFP demonstrated that PSP toxin levels were well below the regulatory limit established for public health safety (FDA 2010). As a result, the FDA determined that harvesting of surfclams and ocean quahog clams was once again safe for human consumption in waters south of 41° 40' north latitude, west of 67° 55' west longitude, north of 41° 25' north latitude, and east of 68° 25' west longitude. However, given the high inter-annual variability of red tide blooms, NMFS may need to close any open area within the GB Closed Area to harvesting of surfclams and ocean quahogs to prevent contaminated shellfish from entering the market. In matters of public health, NMFS traditionally defers to the FDA. Therefore, the closures or openings will be based upon PSP toxin monitoring results, the advice of the FDA and the most current information available to the NMFS.

Scientists from the NOAA-funded Gulf of Maine Toxicity Project are predicting a large regional HAB for the spring and summer of 2010. The prediction is based on a seafloor survey of the seed-like cysts of *Alexandrium fundyense*. Cysts deposited in the fall hatch the following spring and can serve as an indicator of the magnitude of the bloom in the following year. In the fall of 2009 the abundance of cysts in the sediment was 60 percent higher than observed prior to the historic bloom of 2005. The cyst bed also appears to have expanded to the south, so the 2010 bloom may affect areas such as Massachusetts Bay and GB sooner than has been the case in past years (WHOI 2010).

3.0 PURPOSE AND NEED FOR THE REOPENING

The purpose of this action is to reopen a portion of the existing GB Closed Area for the harvest of surfclams (*Spisula solidissima*) and ocean quahog (*Arctica islandica*) (SC/OQ). The proposed reopening is based upon recent results provided by the FDA which indicated that PSP toxin levels from Cultivator Shoals were well below the regulatory limit established for public health safety. The FDA determined that harvesting of surfclams and ocean quahog was once again safe for human consumption in waters south of 41° 40' north latitude, west of 67° 55' west longitude, north of 41° 25' north latitude, and east of 68° 25' west longitude. The FDA requested that the NMFS reopen this area for the harvesting of SC/OQ in a letter to the Regional Administrator of the Northeast Regional Office of NMFS (RA) dated January 21, 2010.

The need for the reopening is to allow for the harvesting of a resource which has been determined to be safe for human health consumption. Without this action, the harvest of surfclams and ocean quahogs would continue to be prohibited from the GB Closed Area.

4.0 PROPOSED ALTERNATIVES

4.1 Alternative A (the Proposed Action)

The proposed action would reopen a section of the GB Closed Area to SC/OQ harvesting which has been determined safe for human health consumption by the FDA (Figure 4.3-1). This rectangular shaped section encompasses an area of approximately 447 square miles (1,158 square kilometers [km]), and is bound by the following coordinates: south of 41° 40' north latitude, west of 67° 55' west longitude, north of 41° 25' north latitude, and east of 68° 25' west longitude. This area is part of the larger GB Closed Area which has been continually closed to SC/OQ fishing since May 25, 1990. Any or all portions of the Alternative A area may be opened or closed if requested by the FDA and approved by NMFS.

4.2 Alternative B (Open EFP exemption area)

This alternative would reopen the entire section of the GB Closed Area to SC/OQ harvesting that is defined under the EFP, and fished pursuant to the Protocol. This section encompasses an area of approximately 6,378 square miles (16,519 sq. km), and the east and west sides are adjacent to the groundfish Closed Areas II and I, respectively. The latitude and longitude of the points forming this alternative area (Figure 4.3-1) begin with the north-westernmost point (point 1) and continue clockwise as follows:

Point	Latitude	Longitude
1	42°00’	68°50’
2	42°00’	67°20’
3	41°00’	67°20’
4	41°00’	67°10’
5	40°40’	67°10’
6	40°40’	68°30’
7	41°30’	68°30’
8	41°30’	68°50’

This alternative would limit harvesting of SC/OQ to areas determined to be safe for human health consumption by the FDA. Any or all portions of the Alternative B area, including the smaller area described in Alternative A, may be opened or closed if requested by the FDA and approved by NMFS.

4.3 Alternative C (The Status Quo/ No Action)

As mentioned above, the SC/OQ GB Closed Area has been closed since May 25, 1990. Thus, the no action alternative would be to leave the entire GB Closed Area closed to the harvesting of SC/OQ. This area encompasses an area approximately equal to 37,325 square miles (96,671 square km), which is bound by the following coordinates and the EEZ: east of 69°00” west longitude and south of 42° 20” north latitude (Figure 4.3-1). This alternative is the baseline scenario for this PEA, as it represents the continuation of the current condition.

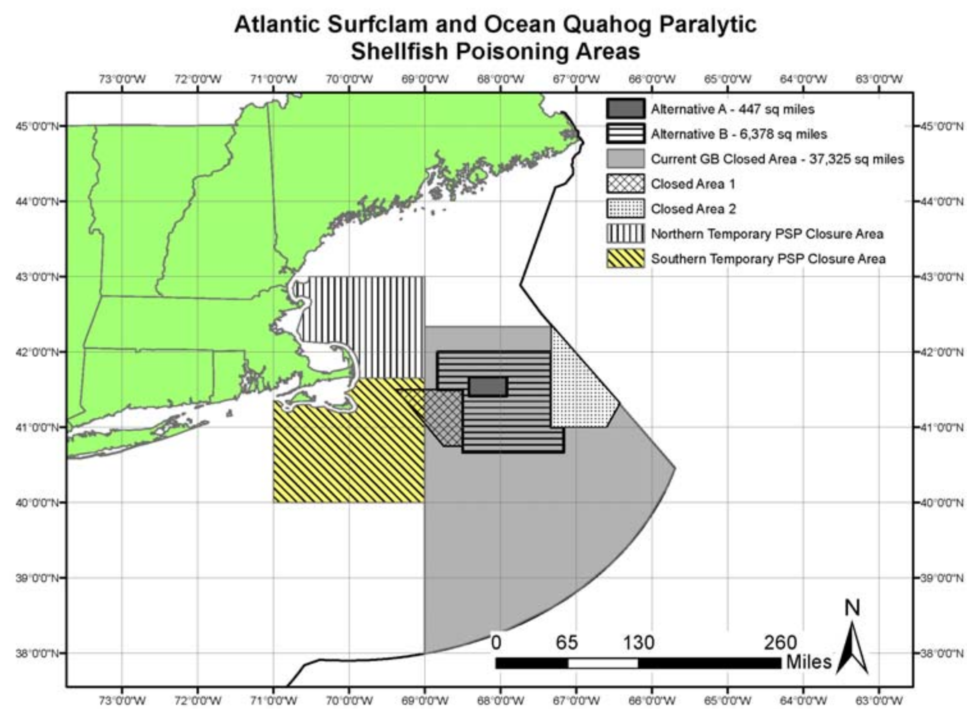


Figure 4.3-1 Map of Proposed Alternatives

4.4 Alternatives Considered but Not Further Analyzed

This PEA considers the reopening of the entire GB Closed Area for SC/OQ harvest. However, this alternative was considered to be not reasonable because a large portion of the GB Closed Area is not suitable for the harvesting of SC/OQ due to excessive depths and the presence of non-sandy substrate types which render clam dredges ineffective. Additionally, there are insufficient sampling and/or monitoring data within the GB Closed Area, outside of the area encompassing the proposed alternatives, to allow the FDA to make a determination regarding whether harvest of SC/OQ would be safe for human consumption. Therefore, opening the entire GB Closed Area to SC/OQ harvesting is not considered a viable alternative at this time.

5.0 AFFECTED ENVIRONMENT

5.1 Location/Physical Environment

The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream (Figure 5.1-1). The continental slope includes the area east of the shelf, out to a depth of 2000 meters (m). Four distinct sub-regions comprise the NOAA Fisheries Northeast Region: the Gulf of Maine (GOM), GB, the Mid-Atlantic Bight, and the continental slope. Occasionally another sub-region, Southern New England, is described; however, discussions of any distinctive features of this area have been incorporated into the sections describing GB and the Mid-Atlantic Bight.

The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. GB is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and strong currents. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, NC. The continental slope begins at the continental shelf break and continues eastward with increasing depth until it becomes the continental rise. It is fairly homogenous, with exceptions at the shelf break, some of the canyons, the Hudson Shelf Valley, and in areas of glacially rafted hard bottom.

Pertinent physical characteristics of GB that could potentially be affected by this action are described in this section. Information included in this document was extracted from Stevenson et al. (2004).

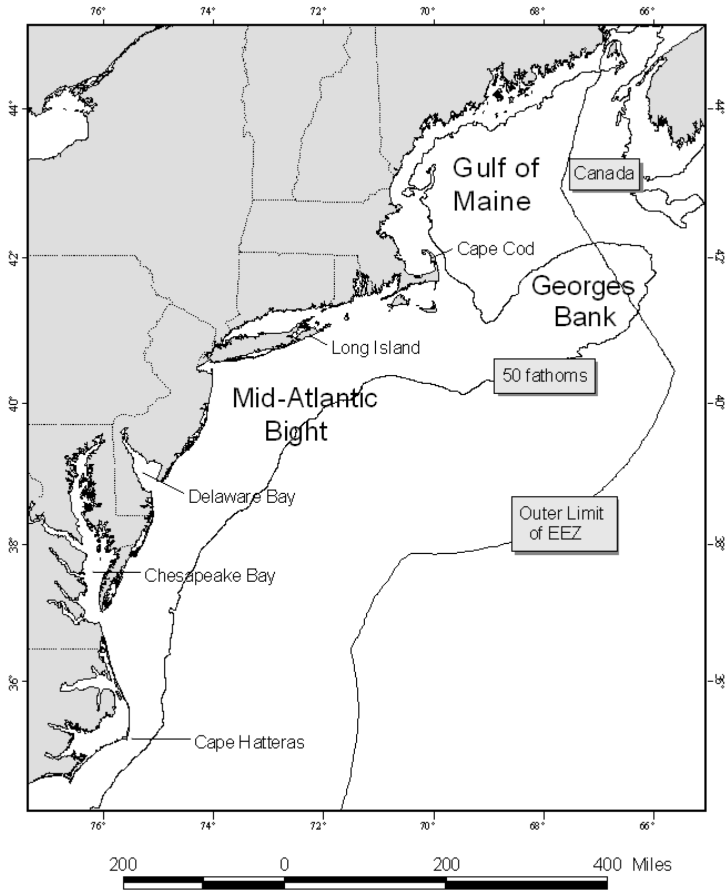


Figure 5.1-1 Northeast U.S Shelf Ecosystem

<u>Georges Bank</u>

GB is a shallow (3 - 150 meter [m] depth), elongate (161 km wide by 322 km long) extension of the continental shelf that was formed by the Wisconsinian glacial episode. It is characterized by a steep slope on its northern edge and a broad, flat, gently sloping southern flank. The Great South Channel lies to the west. Natural processes continue to erode and rework the sediments on GB. It is anticipated that erosion and reworking of sediments will reduce the amount of sand available to the sand sheets, and cause an overall coarsening of the bottom sediments (Valentine *et al.* 1993).

Glacial retreat during the late Pleistocene deposited the bottom sediments currently observed on the eastern section of GB, and the sediments have been continuously reworked and redistributed by the action of rising sea level, and by tidal, storm and other currents. The strong, erosive currents affect the character of the biological community. Bottom topography on eastern GB is characterized by linear ridges in the western shoal areas; a relatively smooth, gently dipping sea floor on the deeper, easternmost part; a highly energetic peak in the north with sand ridges up to 30 m high and extensive gravel pavement; and steeper and smoother topography incised by submarine canyons on the southeastern margin. The interaction of several environmental factors, including availability and type of sediment, current speed and direction, and bottom topography, has formed seven sedimentary provinces on eastern GB (Valentine and Lough 1991), which are described in Table 5.1-1 and depicted in Figure 5.1-2. The gravel-sand mixture is usually a transition zone between coarse gravel and finer sediments.

The central region of the Bank is shallow, and the bottom is characterized by shoals and troughs, with sand dunes superimposed upon them. The two most prominent elevations on the ridge and trough area are Cultivator and Georges Shoals. This shoal and trough area is a region of strong currents, with average flood and ebb tidal currents greater than 4 km/h, and as high as 7 km/h. The dunes migrate at variable rates, and the ridges may also move. In an area that lies between the central part and Northeast Peak, Almeida *et al.* (2000) identified high-energy areas as between 35 - 65 m deep, where sand is transported on a daily basis by tidal currents, and a low-energy area at depths > 65 m that is affected only by storm currents.

The area west of the Great South Channel, known as Nantucket Shoals, is similar in nature to the central region of the Bank. Currents in these areas are strongest where water depth is shallower than 50 m. This type of travelling dune and swale morphology is also found in the Mid-Atlantic Bight, and further described in that section of the document. The Great South Channel separates the main part of GB from Nantucket Shoals. Sediments in this region include gravel pavement and mounds, some scattered boulders, sand with storm generated ripples, and scattered shell and mussel beds. Tidal and storm currents range from moderate to strong, depending upon location and storm activity.

Table 5.1-1 Sedimentary provinces and associated benthic landscapes of GB

Sedimentary Province	Depth (m)	Description	Benthic Assemblage
Northern Edge / Northeast Peak (1)	40 - 200	Dominated by gravel with portions of sand, common boulder areas, and tightly packed pebbles. Representative epifauna (bryozoa, hydrozoa, anemones, and calcareous worm tubes) are abundant in areas of boulders. Strong tidal and storm currents.	Northeast Peak
Northern Slope and Northeast Channel (2)	200 - 240	Variable sediment type (gravel, gravel-sand, and sand) scattered bedforms. This is a transition zone between the northern edge and southern slope. Strong tidal and storm currents.	Northeast Peak
North /Central Shelf (3)	60 - 120	Highly variable sediment type (ranging from gravel to sand) with rippled sand, large bedforms, and patchy gravel lag deposits. Minimal epifauna on gravel due to sand movement. Representative epifauna in sand areas includes amphipods, sand dollars, and burrowing anemones.	Central Georges
Central and Southwestern Shelf - shoal ridges (4)	10 - 80	Dominated by sand (fine and medium grain) with large sand ridges, dunes, waves, and ripples. Small bedforms in southern part. Minimal epifauna on gravel due to sand movement. Representative epifauna in sand areas includes amphipods, sand dollars, and burrowing anemones.	Central Georges
Central and Southwestern Shelf - shoal troughs (5)	40 - 60	Gravel (including gravel lag) and gravel-sand between large sand ridges. Patchy large bedforms. Strong currents. (Few samples – submersible observation noted presence of gravel lag, rippled gravel-sand, and large bedforms.) Minimal epifauna on gravel due to sand movement. Representative epifauna in sand areas includes amphipods, sand dollars, and burrowing anemones.	Central Georges
Southeastern Shelf (6)	80 - 200	Rippled gravel-sand (medium and fine grained sand) with patchy large bedforms and gravel lag. Weaker currents; ripples are formed by intermittent storm currents. Representative epifauna includes sponges attached to shell fragments and amphipods.	Southern Georges
Southeastern Slope (7)	400 - 2000	Dominated by silt and clay with portions of sand (medium and fine) with rippled sand on shallow slope and smooth silt-sand deeper.	none

***Sediment provinces as defined by Valentine *et al*. (1993) and Valentine and Lough (1991), with additional comments by Valentine (pers. comm.) and benthic assemblages assigned by Theroux and Grosslein (1987). See text for further discussion on benthic assemblages.**

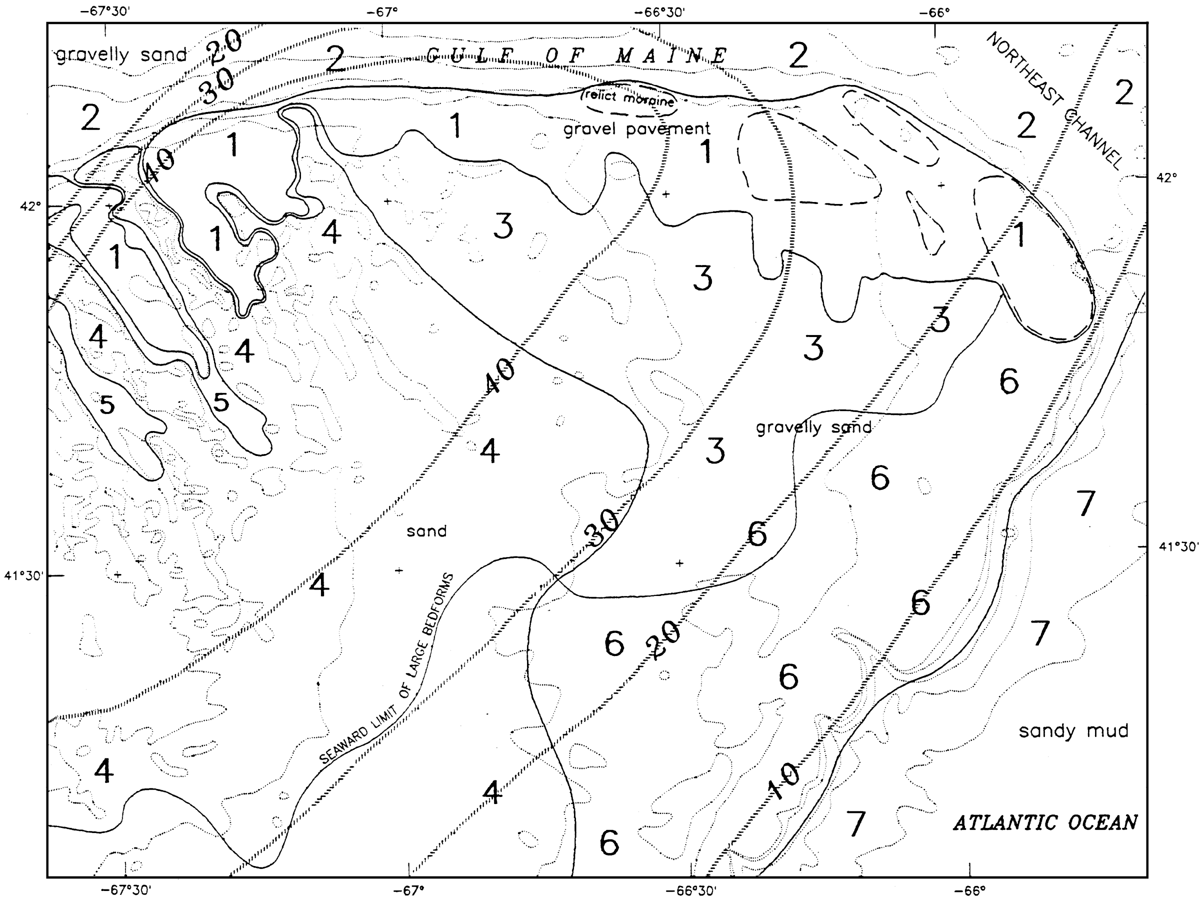


Figure 5.1-2 Sedimentary provinces of eastern GB

Based on criteria of sea floor morphology, texture, sediment movement and bedforms, and mean tidal bottom current speed (cm/s). Relict moraines (bouldery seafloor) are enclosed by dashed lines. See Table 5.1-1 for descriptions of provinces. Source: Valentine and Lough (1991).

Oceanographic frontal systems separate water masses of the Gulf of Maine and GB from oceanic waters south of the Bank. These water masses differ in temperature, salinity, nutrient concentration, and planktonic communities, which influence productivity and may influence fish abundance and distribution. Currents on GB include a weak, persistent clockwise gyre around the Bank, a strong semidiurnal tidal flow predominantly northwest and southeast, and very strong, intermittent storm induced currents, which all can occur simultaneously (Figure 5.1-3). Tidal currents over the shallow top of GB can be very strong, and keep the waters over the Bank well mixed vertically. This results in a tidal front that separates the cool waters of the well mixed shallows of the central Bank from the warmer, seasonally stratified shelf waters on the seaward and shoreward sides of the Bank. The clockwise gyre is instrumental in distribution of plankton, including fish eggs and larvae.

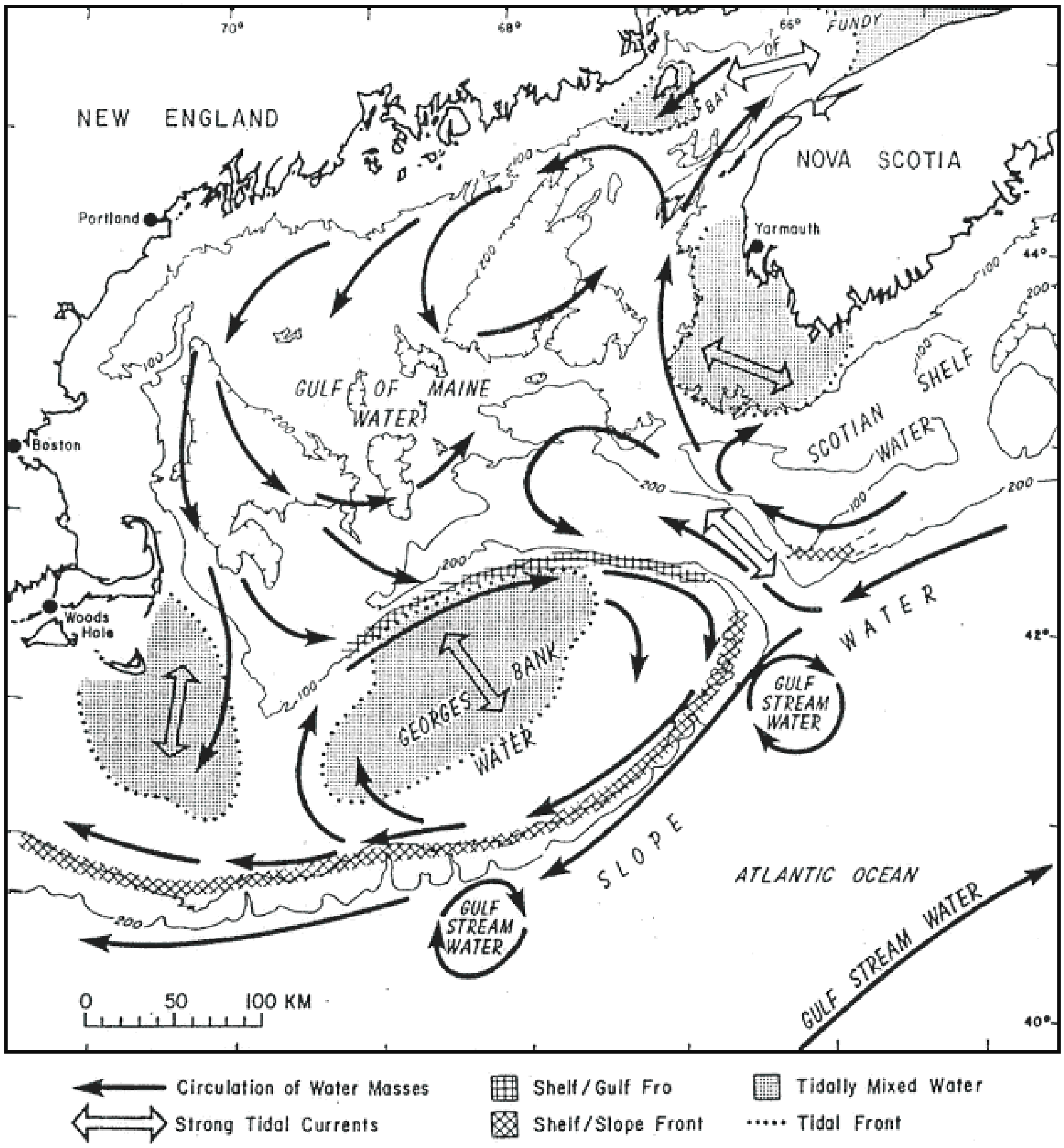


Figure 5.1-3 Water mass circulation patterns in the GB - Gulf of Maine region

<u>Invertebrates</u>

Amphipod crustaceans (49%) and annelid worms (28%) numerically dominated the contents of 211 samples collected on GB during 1956-1965 (Theroux and Wigley 1998). Biomass was dominated by sand dollars (50%) and bivalves (33%). Theroux and Grosslein (1987) utilized the same database to identify four macrobenthic invertebrate assemblages. They noted that the boundaries between assemblages were not well defined because there is considerable intergrading between adjacent assemblages. Their assemblages are associated with those identified by Valentine and Lough (1991) in Table 5.1-1.

The Western Basin assemblage is found in the upper Great South Channel region at the northwestern corner of the Bank, in comparatively deepwater (150 - 200 m) with relatively slow currents and fine bottom sediments of silt, clay and muddy sand. Fauna are comprised mainly of small burrowing detritivores and deposit feeders, and carnivorous scavengers. Valentine and Lough (1991) did not identify a comparable assemblage; however, this assemblage is geographically located adjacent to Assemblage 5 as described by Watling (1998) (Table 5.1-1).

The Northeast Peak assemblage is found along the Northern Edge and Northeast Peak, which varies in depth and current strength and includes coarse sediments, consisting mainly of gravel and coarse sand with interspersed boulders, cobbles, and pebbles. Fauna tend to be sessile (coelenterates, brachiopods, barnacles, and tubiferous annelids) or free-living (brittle stars, crustaceans, and polychaetes), with a characteristic absence of burrowing forms.

The Central GB assemblage occupies the greatest area, including the central and northern portions of the Bank in depths less than 100 m. Medium grained shifting sands are predominant in this dynamic area of strong currents. Organisms tend to be small to moderately large with burrowing or motile habits.

The Southern GB assemblage is found on the southern and southwestern flanks at depths from 80 - 200 m, where fine grained sands and moderate currents predominate. Many southern species exist here at the northern limits of their range.

<u>Demersal Fish</u>
Along with high levels of primary productivity, GB has been historically characterized by high levels of fish production. Several studies have attempted to identify demersal fish assemblages over large spatial scales. Overholtz and Tyler (1985) found five depth related groundfish assemblages for GB and the GOM that were persistent temporally and spatially. Depth and salinity were identified as major physical influences explaining assemblage structure. Gabriel (1992) identified six assemblages, which are compared with the results of Overholtz and Tyler (1985) in Table 5.1-2. Mahon *et al.* (1998) found similar results.

Table 5.1-2 Comparison of demersal fish assemblages of GB and the Gulf of Maine

Overholtz and Tyler (1985)		**Gabriel (1992)**	
Assemblage	**Species**	**Species**	**Assemblage**
Slope and Canyon	offshore hake blackbelly rosefish Gulf stream flounder fourspot flounder, goosefish, silver hake, white hake, red hake	offshore hake blackbelly rosefish Gulf stream flounder fawn cusk-eel, longfin hake, armored sea robin	Deepwater
Intermediate	silver hake red hake goosefish Atlantic cod, haddock, ocean pout, yellowtail flounder, winter skate, little skate, sea raven, longhorn sculpin	silver hake red hake goosefish northern shortfin squid, spiny dogfish, cusk	Combination of Deepwater Gulf of Maine/GB and Gulf of Maine-GB Transition
Shallow	Atlantic cod haddock pollock silver hake white hake red hake goosefish ocean pout yellowtail flounder windowpane winter flounder winter skate little skate longhorn sculpin summer flounder sea raven, sand lance	Atlantic cod haddock pollock yellowtail flounder windowpane winter flounder winter skate little skate longhorn sculpin	Gulf of Maine-GB Transition Zone (*see below also*) Shallow Water GB-Southern New England
Gulf of Maine-Deep	white hake American plaice witch flounder thorny skate silver hake, Atlantic cod, haddock, cusk, Atlantic wolffish	white hake American plaice witch flounder thorny skate redfish	Deepwater Gulf of Maine-GB
Northeast Peak	Atlantic cod haddock pollock ocean pout, winter flounder, white hake, thorny skate, longhorn sculpin	Atlantic cod haddock pollock	Gulf of Maine-GB Transition Zone (*see above also*)

SC/OQ Fishing Gear

Hydraulic dredges are used to extract surfclams and ocean quahogs from the sediment. The typical dredge is about 12 feet wide and about 22 feet long, and uses pressurized water jets to wash clams out of the seafloor. The vessels are equipped with large pumps, connected to the dredges via flexible hoses that inject seawater into the sediment through a manifold with multiple nozzles, ahead of the blade of the dredge. The water jets penetrate the sediment in the front of the dredge to a depth of about 8 to 10 inches, depending on the type of sediment and water pressure. Water pressure varies from 50 pounds per square inch (psi) to 110 psi, depending on the type of sediment. The dredge must be towed slowly so as not to exceed the rate at which the sediment is fluidized (NEFSC 2002).

When operated correctly these dredges are highly efficient, taking as much as 90% of the clams in their path. A stern rig dredge, which is basically a giant sieve, allows small clams and bycatch to fall through the bottom of the cage into the trench minimizing damage or injury. Most tows are conducted in large grain sand but hydraulic clam dredges can also be operated in areas of fine sand, small grain gravel, sand and small amounts of mud, and sand with very small amounts of clay. Boat captains will not dredge in areas with very soft or hard substrate due to the risk of losing or damaging the gear. The fishery is also limited to the sandy sediments because the processors do not want mud blown into the clam bodies by the dredge (NEFSC 2002). An analysis of data collected by observers placed aboard commercial clam dredge vessels (unpublished data, NEFSC 2010b) shows that most tows are made no deeper than 70 meters.

Surfclams grow much more rapidly than ocean quahogs. As a result, surfclam beds are dredged every few years and areas dredged for ocean quahogs are left untouched for many years. Ocean quahogs are much more likely to be dredged from a number of more or less discrete patches surrounded by undisturbed areas. As a general rule, once 50% of the harvestable clams are removed from an area, the catch rates drop to a point where it is no longer economically feasible for fishing to continue there. (NEFSC 2002)

Impacts of Hydraulic Clam Dredge Gear

Results of eleven hydraulic dredge studies are summarized in Table 5.2-3. Hydraulic clam dredges created steep-sided trenches 8-30 cm deep that started deteriorating immediately after they were formed (Hall *et al.* 1990, Medcof and Caddy 1971, Meyer *et al.* 1981, Pranovi and Giovanardi 1994, Tuck *et al.* 2000, Murawski and Serchuk 1989). Trenches in a shallow, inshore location with strong bottom currents filled in within 24 hours (Meyer *et al.* 1981). Trenches in a shallow, protected, coastal lagoon were still visible two months after they were formed (Pranovi and Giovanardi 1994). Dredge tracks in fine sediments in the U.S. Mid-Atlantic Bight filled in within several days and even more quickly in coarse sediments (Murawski and Serchuk 1989). Hydraulic dredges also fluidized sediments in the bottom and sides of trenches (Tuck *et al.* 2000), created mounds of sediment along the edges of the trench (Tuck *et al.* 2000), re-suspended and dispersed fine sediment (Meyer *et al.* 1981), and caused a re-sorting of sediments that settled back into trenches (MacKenzie, 1982). In one study (Tuck *et al.* 2000), sediment in the bottom of trenches was initially fluidized to a depth of 30 cm and in the sides of the trench to 15 cm. After 11 weeks, sand in the bottom of the trench was still fluidized to a depth of 20 cm, but trenches were no longer visible. Silt clouds only last for a few minutes or hours (Medcof and Caddy 1971, Meyer *et al.* 1981). Complete recovery of seafloor topography, sediment grain size, and sediment water content was noted after 40 days in a shallow, sandy environment that was exposed to winter storms (Hall *et al.* 1990).

Commercial clam dredges on the Scotian shelf cut deep (20 cm), wide (4 m) furrows in the sandy bottom and caused the loss of burrows, tubes, and shells through destruction or burial, and local sedimentation (Gilkinson et al. 2005a and b). Densities of large burrows were reduced by up to 90% immediately after dredging. The margins of the dredge furrows were gradually degraded, likely through the combined actions of slumping, sediment transport and bioturbation. Over time empty shells are trapped in dredge furrows. Dredge furrows were no longer visible in video one year after dredging due to their low relief; however, sidescan sonograms showed that they persisted for three years, while undergoing changes. There were no signs of burrow recovery after three years due to the high mortalities of their architect, the propellerclam (*Cyrtodaria siliqua*).

Benthic organisms are dislodged from the sediment, or damaged by the dredge, temporarily providing food for foraging fish and invertebrates (Hall *et al.* 1990, Meyer *et al.* 1981, Murawski and Serchuk 1989, and Morello et al. 2005). Hydraulic dredging caused an immediate and significant reduction in the total number of infaunal organisms in four studies (Hall *et al.* 1990, Pranovi and Giovanardi 1994, Tuck *et al.* 2000, and Gilkinson et al. 2005a and b) and, in another case, on the abundance and biomass of mollusks (Morello et al. 2005). There were also significant reductions in the number of infaunal species in one case (Tuck *et al.* 2000) and in the number of macrofaunal species and biomass in another (Pranovi and Giovanardi 1994). In this study (Pranovi and Giovanardi 1994), polychaetes were most affected. Total infaunal abundance was reduced by approximately 45% immediately after dredging in Iceland (Thorarinsdottir et al 2008) and 36% after three months, but the differences between treatment and control samples were not significant. One study failed to detect any significant reduction in the abundance of any individual species (Hall *et al.* 1990), but there were significant reductions in the total number of infaunal organisms and the mean abundances of the ten most common species were all lower one day after dredging, with a significant difference in the abundance of the whole group (all ten species). Evidence from the study conducted off the New Jersey coast indicated that the number of infaunal organisms and species, and species composition, were the same in actively dredged and un-dredged locations (MacKenzie 1982).

Biological recovery times were estimated in six studies. Five of them (Hall *et al.* 1990, Pranovi and Giovanardi 1994, Tuck *et al.* 2000, Morello et al. 2005, and Thorarinsdottir et al 2008) were conducted in very shallow (1.5-10 m) water and one in deep water (10, 70-80 m) . Total infaunal abundance and species diversity had fully recovered only five days after dredging in one location where tidal currents reach maximum speeds of three knots (Tuck *et al.* 2000). Some species had recovered after 11 weeks. Total abundance recovered 40 days after dredging in another location exposed to winter storms, when the site was re-visited for the first time (Hall *et al.* 1990). Total macrofaunal abundance (but not biomass) recovered within two months at a protected, commercially exploited site (Pranovi and Giovanardi 1994), where recovery was monitored at three-week intervals for two months, but not at a nearby, unexploited site. The actual recovery time at the exposed sub-tidal site (Hall *et al.* 1990) was probably much quicker than 40 days, the only point in time when the post-experimental observations were made. In the Scotian shelf study (Gilkinson et al. 2005a and b), there were marked increases in the abundance of polychaetes and amphipods after one year; two years after dredging, opportunistic species were even more abundant relative to pre-dredging levels. The authors concluded that the disturbed community was still in the colonizing phase two years after dredging. In the Iceland study (Thorarinsdottir et al 2008), crustaceans and bivalves recovered within three months, with full recovery of the entire infaunal assemblage occurring sometime between sampling three months and a year after dredging.

Table 5.1-3 Effects of hydraulic clam dredges on sand and mixed substrate habitat: summary of published studies

(S=statistically significant; citations in bold print are peer-reviewed publications.)

No.	Reference	Location	Depth	Sediment	Effects	Recovery	Approach
1	**Hall *et al.* (1990)**	Loch Gairloch, Scotland	7 m	Fine sand	Shallow trenches (25 cm deep) and large holes; sediment "almost fluidized"; median sediment grain size S higher in fished area; S reductions in numbers of infaunal organisms; no S effect on abundance of any individual species, but mean abundances of 10 most common species were all lower 1 d after fishing than in controls and difference for whole group was S; some mortality (not assessed) of large polychaetes and crustaceans retained on conveyor belt or returned to sea surface.	Complete recovery of physical features and benthic community after 40 days; filling of trenches and holes accelerated by winter storms.	Experimental study in unexploited area to evaluate effects of simulated commercial escalator dredging activity; recovery evaluated after 40 days.
2	**MacKenzie, 1982**	East of Cape May, New Jersey, USA	37 m	Very fine to medium sand	Resorting of sediments (coarser at bottom of dredge track); no effect on total number of individuals or species, but S more polychaetes and S fewer mollusks at AF site. No S differences in mean number of invertebrates (annelids, arthropods, mollusks, and sand dollars) from samples collected in "evidently" dredged and undredged locations at AF and RF sites.		Comparison of macrofauna in an area actively fished (AF) by commercial quahog vessels, an area recently fished for a yr then abandoned 4 mo prior to sampling (RF), and a never fished (NF) area on the continental shelf.
3	Medcof and Caddy 1971	Southern Nova Scotia, Canada	7-12 m	Sand and sand-mud	Smooth tracks with steep walls, 20 cm deep; sediment cloud.	Sediment plume lasted 1 min; dredge tracks still clearly visible after 2-3 days.	SCUBA and submersible observations of the effects of individual tows with a cage dredge.
4	**Meyer *et al.* 1981**	South of Long Island, New York, USA	11 m	Fine to medium sand, covered by silt layer	>20-cm-deep trench; sediment pushed into mounds 15-35 cm wide and 5-15 cm high on either side of trench; silt cloud, attraction of predators.	Slumping along walls of trench began immediately, trench nearly indistinct, and predator abundance normal, after 24 hr; silt settled in 4 min.	SCUBA observations during and following a single tow with a cage dredge in a closed area; effects evaluated after 2 and 24 hr.
5	**Pranovi and Giovanardi 1994**	Venice Lagoon, Adriatic Sea, Italy	1.5-2 m	Sand	8-10 cm deep trench; S decrease in total abundance, biomass, and diversity of benthic macrofauna in fishing ground; no S effects outside fishing ground.	After 2 mo, dredge tracks still visible; densities (especially of small species and epibenthic species) in fishing ground recovered, biomass did not.	Experimental dredging with a cage dredge (single tows) in previously dredged and undredged areas in coastal lagoon; recovery monitored every 3 wk for 2 mo.
6	**Tuck *et al.* 2000**	Sound of Ronay, Outer	2-5 m	Medium to fine sand	Steep-sided trenches (30 cm deep); sediments fluidized up to 30 cm; S decrease in number of infaunal species and individuals within a day of	Trenches no longer visible but sand still fluidized after 11 wk;	Experimental dredging with cage dredge (individual tows at 6 sites)

		Hebrides, Scotland			dredging; S decrease in proportion of polychaetes and S increase in proportion of amphipods 5 days after dredging; S increases in abundance of some species and S decreases in abundance of other species.	species diversity and total abundance recovered within 5 days; proportions of polychaetes and amphipods, and abundances of individual species, returned to pre-dredge levels after 11 wk.	in area closed to commercial dredging, effects evaluated 1 day, 5 days, and 11 wk after dredging.
7	Murawski and Serchuk 1989	Mid-Atlantic Bight, USA	Not given	Sand, mud, and coarse gravel	Trench cut; temporary increase in turbidity, disruption of benthic organisms in dredge path; attraction of predators.	Trenches filled quickly in coarse gravel, but took several days in fine sediments.	Submersible observations following hydraulic cage dredge tows.
8	**Morello et al. 2005**	Adriatic Sea (Italy)	6 m	Very fine sand	No impacts of experimental tows on entire sampled macrobenthic community or on polychaetes, crustaceans, detritivores, or suspensivores, but abundance and biomass of mollusks (excluding target species of fishery) were S reduced by dredging; predators and scavengers S more abundant 1 day after dredging in dredged sites.	Abundance and biomass of mollusks had not recovered at end of experiment (18 days after dredging).	Experimental BACI study in small, heavily-dredged area; impacts evaluated 4,7,11 and 18 days after dredging (repeated 50 m tows).
9	**Gilkinson et al. 2003**	Banquereau Bank (Scotian Shelf), Canada	70-80 m	Sand	Dredges cut deep (20 cm), wide (4 m) furrows in bottom; the loss of burrows, tubes, and shells through destruction or burial, and local sedimentation created a smooth surface; the margins of furrows were gradually degraded, likely through the combined actions of slumping, sediment transport and bioturbation; differences in patterns of acoustic reflectance between dredge furrows and the surrounding seabed indicate long-lasting effects on sediment structure; over time empty shells are trapped in dredge furrows; densities of large burrows were reduced by up to 90% after dredging.	Dredge furrows were no longer visible in video 1 year after dredging due to their low relief; however, they persisted for 3 yrs, while undergoing changes, as evidenced in sidescan sonograms; no signs of recovery of burrows after 3 yrs due to the high mortalities of their architect, the propellerclam, (Cyrtodaria siliqua).	Three year BACI study in previously undredged low-energy site; experimental tows using a commercial cage dredge.
10	**Gilkinson et al. 2005a and b**	Banquereau Bank (Scotian Shelf), Canada	70-80 m	Sand	Immediately after dredging, most macrofaunal species (polychaetes and amphipods most common) decreased in abundance and biomass (average across samples typically >40%,), with the greatest declines inside dredge furrows (which covered 53-68% of the area inside the dredged boxes); no detectable effects of dredging on soft coral abundances (esp *Gersemia rubiformis*), but power of ANOVA was relatively low.	Marked increases in abundance of polychaetes and amphipods after 1 year; two years after dredging, abundances of opportunistic species were generally elevated by >> 100% relative to pre-dredging levels; authors conclude that the disturbed community was still in the colonizing phase 2 years after dredging.	BACI study in previously undredged low-energy location; experimental tows using a commercial cage dredge, effects evaluated (video) immediately after, and 1&2 yrs after dredging; dredged-only impacts compared with dredged + discards, visible soft corals counted in dredged and non-dredged areas.
11	Thorarinsdottir et al 2008	Iceland	10 m	Sand	NS effects of dredging on all infaunal organisms, or on indiv taxonomic groups, but results confounded by low sample size; immediate NS 45% reduction in density of all organisms (except quahogs), still 36% 3 mos later; effects (NS) on polychaetes, cumaceans, and other organism lasted 3 mos, only imm effects on crustaceans and bivalves, no effects on hydrozoa.	Full recovery of total assemblage within a year (could have been sooner); crustaceans and bivalves recovered within 3 mos (mean densities higher in dredge tracks than outside).	Experimental dredge tows (3) in unfished area, 3 core samples collected inside/outside dredge tracks imm after and 3,13,25 mos after dredging

Recovery times – biological communities

Environment	Total abundance	Biomass	Number of species
Shallow, exposed to strong tidal currents and/or winter storms	• Within 5 days • Within 40 days • 3 months – 1 year (crustaceans and bivalves within 3 months)		Within 5 days
Shallow, protected (coastal lagoon)	Within 2 months (not after 3 or 6 weeks)	Not within 2 months	
Deep (70-80 m), low energy	Marked increase in polychaetes and amphipods within a year, even more so after 2 years		

Recovery times – physical habitat features

Environment	Trenches	Fluidized sediment	Grain size
Shallow, exposed to strong tidal currents and/or winter storms	• Within 24 hours • Still visible after 5 days, but not after 11 weeks	• Sand still fluidized after 11 weeks (to 2/3 of original depth) • Within 40 days	Within 40 days
Shallow, protected (coastal lagoon)	Still visible after 2 months		
Continental shelf	Within several days, faster in coarser sediment		
Deep (70-80 m), low energy	No longer visible after 1 year, but persisted in sonograms for 3 years	See trenches	

Summary of Results from Dredge Impact Studies

Immediate physical habitat effects

- Trenches 8-30 cm deep with sediment mounds along sides
- Sand in bottom of trench fluidized to 30 cm, in sides of trench to 15 cm
- Re-suspension and loss of fine sediment in dredge path
- Re-sorting of sediment in trench, coarser sediment at bottom and finer at surface
- Destruction and burial of biogenic burrows and tubes in dredge path
- Partial burial and sedimentation of burrow and tubes adjacent to trench

Immediate biological habitat effects

- Benthic organisms dislodged from sediment surface and sub-sediment
- Reduction in total number, biomass, and species diversity of benthic organisms

Recovery

- Total abundance of organisms in affected biological communities in shallow and deep-water environments recovered as quickly as within a few days to a few months; in all cases, recovery was complete within a year

- Dredge tracks (trenches) in highly-energetic environments filled in within a matter of one to a few days and within a year in more stable environments
- In shallow environments, sand remained fluidized for at least 11 weeks in one study, but in another study sand was no longer fluidized and there was no difference in median size between dredged and undredged areas 40 days after dredging
- In deeper water, the acoustic properties of dredge tracks were still affected three years after dredging, suggesting that sediments were still re-sorted and/or fluidized to some extent

<u>Impacts of Other Fishing Gear</u>
In addition to the hydraulic clam dredges, other bottom-tending gear fished on GB includes scallop dredges, trawls, sink gill nets, longlines, pots and traps. Like clam dredges, bottom trawls and scallop dredges are mobile, bottom-tending gear that affect benthic habitats much more severely than stationary bottom-tending gear like sink gill nets, longlines, and traps (NEFSC 2002). The adverse impacts of scallop dredging and bottom trawling were evaluated in Amendment 13 to the NE Multispecies FMP and Amendment 10 to the Scallop FMP. The impacts of these two gears were determined to be more than minimal and not temporary in nature and management measures (closed areas) were established to minimize the impacts of all mobile, bottom-tending gear, including hydraulic dredges (see Figure 4.3.-1). Adverse impacts of scallop dredges and bottom trawls on sandy substrate include the disturbance of physical and benthic features (e.g., sand ripples and waves, shell deposits, amphipod tube mats, and biogenic burrows and depressions), the loss of fine surficial sediment, and reductions in the abundance of epifaunal organisms (e.g., sponges, tube-dwelling anemones and polychaetes, and bryozoans) (NEFSC 2002). Scallop dredges and bottom trawls are dragged over the bottom, primarily affecting the sediment surface and epifaunal organisms, while hydraulic clam dredges affect surface and sub-surface sediments and organisms that live on and in the sediment.

As shown in Figure 5.1-2, fishing trips made by vessels using bottom trawls on GB during fishing year (FY) 2008 (May 1 2008 – April 30 2009) were reported within the Alternative B area along the northern edge of the bank, primarily, north and east of the Alternative A area in sand, gravel, and cobble substrates, and west of the western boundary of Closed Area 2. There were only 52 trips made by scallop dredge vessels in FY2008 (March 1, 2008 – February 28, 2009) in the six statistical areas on GB shown in Figure 5.1-2 (unpublished, NMFS 2010a). Scallop dredging activity in recent years has shifted south into the Mid-Atlantic region, but is expected to increase on GB in the near future in response to increasing scallop biomass (NEFMC 2009). Scallop dredge vessels are more likely to operate in the same areas where clam dredging occurs because both gears are designed for use in sandy bottom habitats, whereas bottom trawls are used in a greater variety of bottom types.

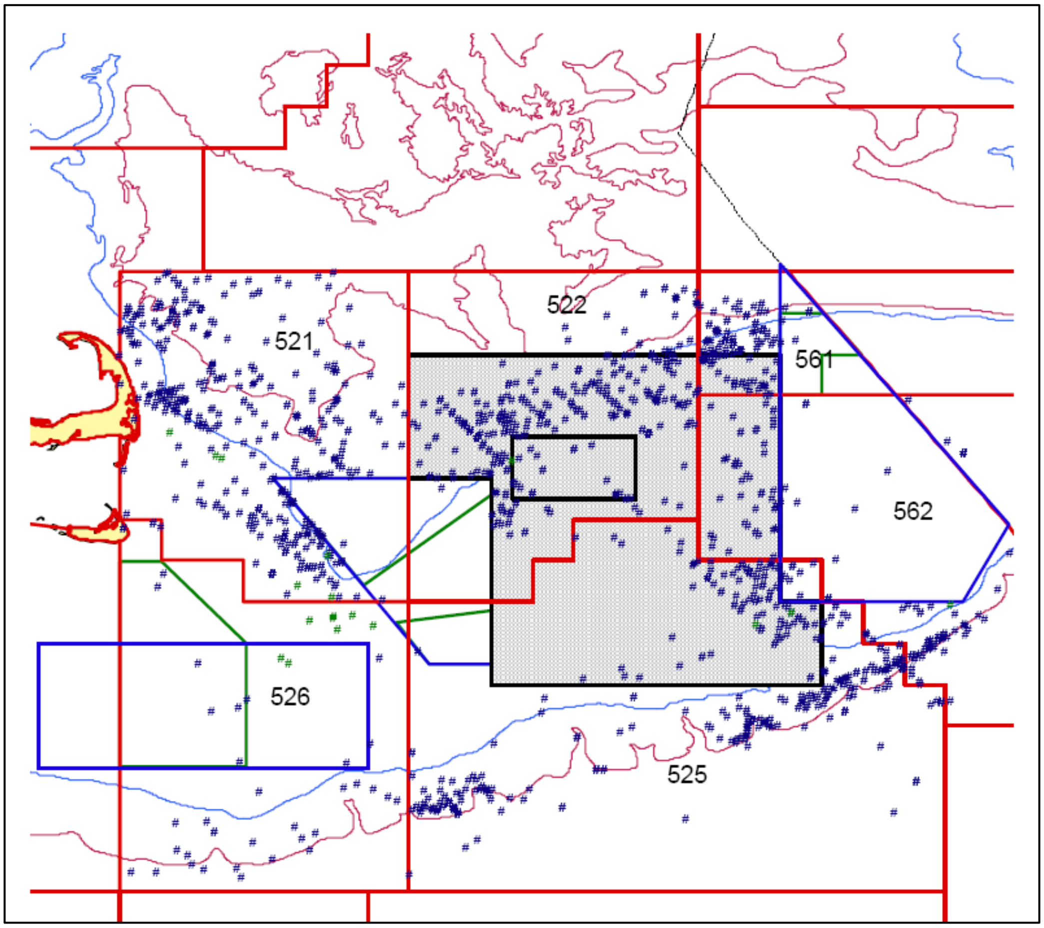


Figure 5.1-2 Locations of trips reported by bottom trawl (blue) and scallop dredge vessels (green) during fishing year 2008 in six statistical areas on Georges Bank. Cross-hatched areas are Alternatives A and B. Statistical areas are outlined in red, fishing mortality closed areas in blue, and habitat closed areas in green. Depth contours are 50 and 100 fathoms (approximately 100 and 200 meters or 300 and 600 feet).

Note: This is only an approximate representation of fishing activity on GB since 38% of the bottom trawl trips in the logbook database for this time period were only reported by statistical area and are not shown in this figure. Also, entire trips are assigned to a point location that best represents where fishing takes place during an entire trip which often lasts several days, whereas in reality fishing during a trip occurs over a much larger area

Substrate Analysis Overview

The substrate type data layer shown in Fig 5.1.3 was created and provided by Brad Harris at the School for Marine Science and Technology (SMAST), University of Massachusetts, Dartmouth, MA. Two data sources were used to create the data layer, video survey data collected and processed by SMAST, and sediment point sample data compiled by the U.S. Geological Survey. Substrates were classified into five types based on established grain size criteria defined in the Wentworth classification scale (silt/clay <.062 mm, sand .062-2 mm, granule-pebble 2-64 mm, cobble 64-256 mm, boulders >256 mm diameter). Survey and substrate classification methods for the video survey can be found in Stokesbury et al. (2004) and the USGS sediment data collection and compilation procedures at http://coastalmap.marine.usgs.gov/National/usSeaBed. Individual data points were interpolated spatially using a Voronoi tessellation technique in which each sample site has a cell consisting of all points closer to that site than to any other site. In Figure 5.1-3 the much higher sampling frequency in the video survey shows up as small, closely spaced cells, whereas the cells generated from the randomly placed and widely dispersed USGS sample points in the deeper water north and south of the bank are large and irregularly shaped.

Substrate within Alternative A reopening area:
Alternative A consists of an approximately 447 square miles (1158 square km) rectangular area on the northern portion of the existing GB Closed Area. Water depths within the Alternative A area generally range between 20m and 60m. Table 5.1-4 summarizes the abundance of the various substrates within this area. Surfclams and quahogs are harvested primarily from the sand substrate type and to a lesser extent the granule-pebble substrate type. Therefore approximately 95% or 425 square miles (1101 square km) of the Alternative A area is potentially suitable for harvesting SC/OQ and may be impacted by hydraulic clam dredges.

Table 5.1-4 Substrate types within Alternative A

Substrate Type	Area (square miles)	Area (square km)	Percent of Total Area
Cobble	21	55	5%
Granule-Pebble	41	105	9%
Silt/Clay	1	2	<1%
Sand	385	996	86.0%
Total	447	1,158	

Substrate within Alternative B reopening area:
Alternative B consists of an approximately 6,378 square mile (16,519 square km), irregularly shaped area on the northern portion of GB. Depths with this area range from approximately 20m to over 200 m. Table 5.1-5 summarizes the abundance of the various substrates within the entire Alternative B area. However, hydraulic clam dredges are operated at a maximum depth of approximately 80m. Therefore, it may be more appropriate to analyze substrate types inside a depth of 80m (Table 5.1-6). Surfclams and quahogs are harvested primarily from the sand substrate type and to a lesser extent the granule-pebble substrate type. Therefore approximately 94% or 4,869 square miles (12,611 square km) of the fishable area (i.e. depth greater than or equal to 80m) within Alternative B area is potentially suitable for harvesting SC/OQ and may be impacted by hydraulic clam dredges.

Table 5.1-5 Substrate types within Alternative B

Substrate Type	Area (square miles)	Area (square km)	Percent of Total Area
Boulder	6	17	< 1%
Cobble	277	716	4%
Granule-Pebble	493	1,276	8%
Silt/Clay	396	1,027	6%
Sand	5,206	13,483	82%
Total	6,378	16,519	

Table 5.1-6 Substrate types within Alternative B inside a depth of 80m

Substrate Type	Area (square miles)	Area (square km)	Percent of Total Area
Boulder	6	17	< 1%
Cobble	264	683	5%
Granule-Pebble	476	1,232	9%
Silt/Clay	40	103	1%
Sand	4,394	11,381	85%
Total	5,180	13,416	

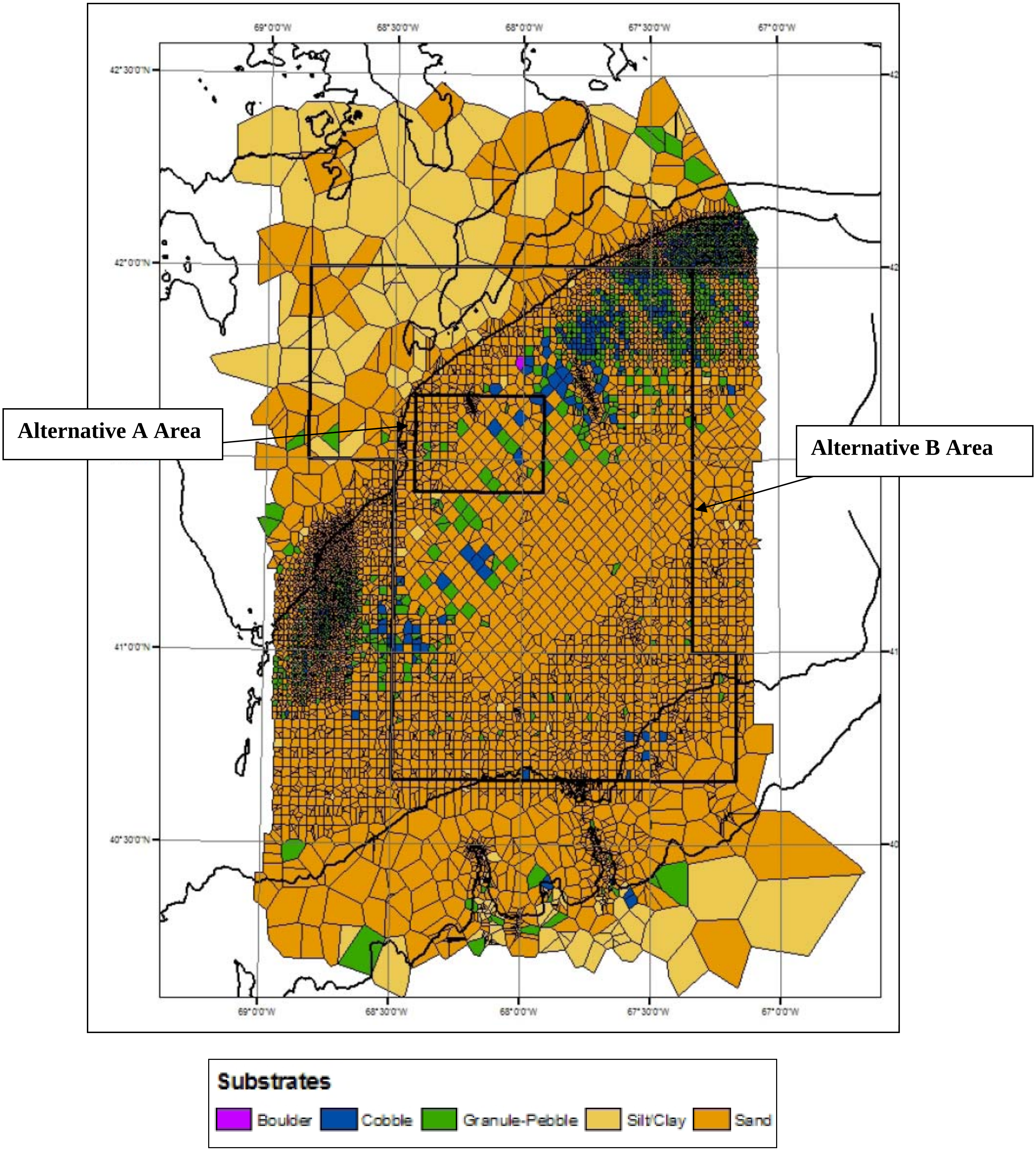
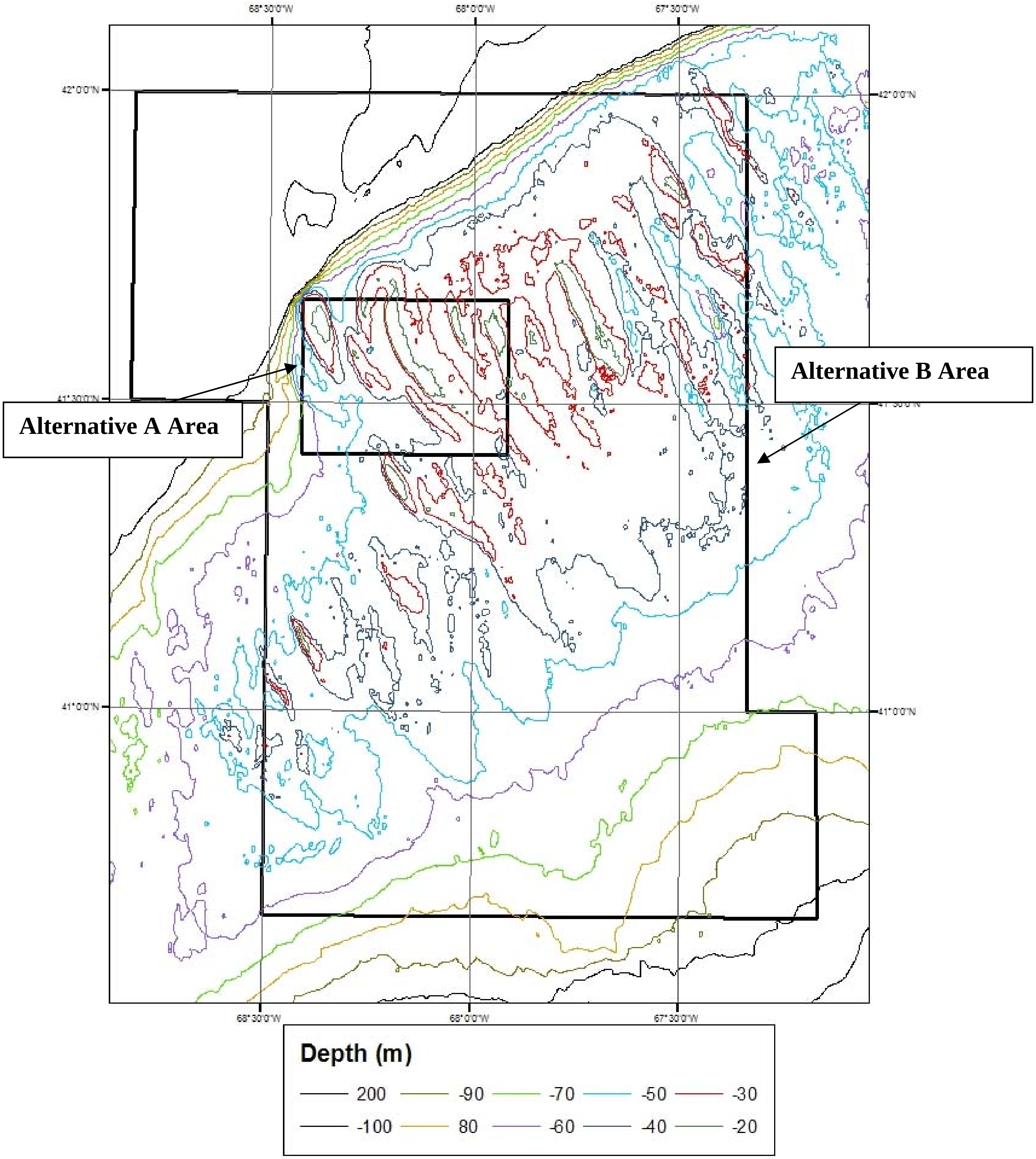


Figure 5.1-3 Substrates within Alternative Areas

Figure 5.1-4 Depths within Proposed Alternative Areas



Essential Fish Habitat (EFH)

Amendment 12 (MAFMC 1998) identified and described EFH for surfclams and ocean quahogs. The EFH descriptions are summarized in the following table.

Table 5.1-7 Essential Fish Habitat description for ocean quahog and Atlantic surfclam

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
Ocean quahog	adult	Eastern edge of GB and Gulf of Maine throughout the Atlantic EEZ	8 - 245	Throughout substrate to a depth of 3 ft within federal waters, occurs progressively further offshore between Cape Cod and Cape Hatteras
Ocean quahog	juvenile	Eastern edge of GB and Gulf of Maine throughout the Atlantic EEZ	8 - 245	Throughout substrate to a depth of 3 ft within federal waters, occurs progressively further offshore between Cape Cod and Cape Hatteras
Atlantic surfclam	juvenile	Eastern edge of GB and the Gulf of Maine throughout Atlantic EEZ	0 - 60, low density beyond 38	Throughout substrate to a depth of 3 ft within federal waters, burrow in medium to coarse sand and gravel substrates, also found in silty to fine sand, but not in mud
Atlantic surfclam	adult	Eastern edge of GB and the Gulf of Maine throughout Atlantic EEZ	0 - 60, low density beyond 38	Throughout substrate to a depth of 3 ft within federal waters

Stevenson *et al* (2004) determined the following species and life stages to have EFH that may be vulnerable to impacts from hydraulic clam dredges: black sea bass (juveniles and adults), scup (juveniles), ocean pout (all life stages), red hake (juveniles), silver hake (juveniles), winter flounder (juveniles and adults), and Atlantic sea scallops (juveniles). EFH descriptions of the geographic range, depth, and bottom types for all the benthic life stages of the species identified as vulnerable to hydraulic clam dredges are summarized in the following table.

Table 5.1-8 EFH descriptions for all benthic life stages of federally-managed species and life stages which are vulnerable to hydraulic clam dredges

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
Black sea bass	juvenile	Demersal waters over continental shelf from GOME to Cape Hatteras, NC, also includes estuaries from Buzzards Bay to Long Island Sound; Gardiners Bay, Barnegat Bay to Chesapeake Bay; Tangier/ Pocomoke Sound, and James River	1 - 38	Rough bottom, shellfish and eelgrass beds, manmade structures in sandy-shelly areas, offshore clam beds, and shell patches may be used during wintering
Black sea bass	adult	Demersal waters over continental shelf from GOME to Cape Hatteras, NC, also includes estuaries: Buzzards Bay, Narragansett Bay, Gardiners Bay, Great South Bay, Barnegat Bay to Chesapeake Bay; Tangier/ Pocomoke Sound, and James River	20 - 50	Structured habitats (natural and manmade), sand and shell substrates preferred
Scup	juvenile	Continental shelf from GOME to Cape Hatteras, NC includes the following estuaries: Mass. Bay, Cape Cod Bay to Long Island Sound; Gardiners Bay to Delaware Inland Bays; and Chesapeake Bay	(0 - 38)	Demersal waters north of Cape Hatteras and inshore on various sands, mud, mussel, and eelgrass bed type substrates
Ocean pout	eggs	GOME, GB, southern NE, and middle Atlantic south to Delaware Bay, and the following estuaries: Passamaquoddy Bay to Saco Bay, Massachusetts and Cape Cod Bay	<50	Bottom habitats, generally in hard bottom sheltered nests, holes, or crevices
Ocean pout	juvenile	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, and Cape Cod Bay	< 50	Bottom habitats in close proximity to hard bottom nesting areas
Ocean pout	adult	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, Boston Harbor, and Cape Cod Bay	< 80	Bottom habitats, often smooth bottom near rocks or algae
Red hake	juvenile	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass. Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan Bay, and Chesapeake Bay	< 100	Bottom habitats with substrate of shell fragments, including areas with an abundance of live scallops
Silver hake	juvenile	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass. Bay to Cape Cod Bay	20 – 270	Bottom habitats of all substrate types
Winter flounder	juvenile	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	0.1 – 10 (1 - 50, age 1+)	Bottom habitats with a substrate of mud or fine grained sand
Winter flounder	adult	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	1 - 100	Bottom habitats including estuaries with substrates of mud, sand, grave
Atlantic sea scallop	juvenile	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	18 - 110	Bottom habitats with a substrate of cobble, shells, and silt

5.2 Target Species: Surfclams and Ocean Quahogs

Atlantic surfclams (*Spisula solidissima*) are bivalve mollusks which are distributed in the western North Atlantic from the Gulf of St. Lawrence to Cape Hatteras. Although Atlantic surfclams can inhabit waters from the surf zone to a depth of 420 feet (128 m), most are found at depths of less than 240 feet (73 m). The greatest concentrations of surfclams are usually found in well-sorted, medium sand, but they may also occur in fine sand and silty fine sand. Surfclams are most common in the turbulent areas beyond the breaker zone (Cargnelli *et al*. 1999a). Analysis of NEFSC clam surveys from 1980 to 2008 shows that surfclams are most commonly found in depths of 10 to 40 meters (unpublished, NEFSC 2010b). Growth rates are relatively rapid, with clams reaching the preferred harvest size of approximately 5 inches in about 6 years (MAFMC 2009). Maximum size is about 9 inches in length, though individuals larger than 8 inches are rare. They have a maximum age of approximately 31 years, and while some individuals reach sexual maturity within 3 months, most spawn by the end of their second year. Surfclams have planktonic larvae which may disperse sufficiently to cause gene flow throughout the entire geographical range (Cargnelli et al. 1999a).

Surfclams have traditionally been used in the in the "strip market" to produce fried clams. However, in recent years they have increasingly been used in chopped or ground form for other products, such as high quality soups and chowders (MAFMC 2009).

Ocean quahogs (*Arctica islandica*) are found in the colder waters on both sides of the North Atlantic. On the western Atlantic, they range from Newfoundland to Cape Hatteras. 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. Although adult ocean quahogs have been found as deep as 256 m (Cargnelli *et al*., 1999b) an analysis of NEFSC clam surveys from 1980 to 2008 shows that surfclams are most commonly found in depths of 40 to 80 meters (unpublished, NEFMC 2010b). Ocean quahogs are one of the longest-living, slowest growing marine bivalves in the world. Under normal circumstances, they live to more than 100 years old but have been aged in excess of 200 years. Ocean quahogs require roughly 20 years to grow to sizes currently harvested by the industry (approximately 3 inches), and reach sexual maturity between ages 5 and 10 (MAFMC 2009).

The dominant use of ocean quahogs has traditionally been in soups, chowders, and white sauces. Their small meat has a shaper taste and darker color than surfclams, which has not permitted their use in strip products or the higher-quality chowders (MAFMC 2009).

Both the SC/OQ fisheries are managed by the Mid-Atlantic Fishery Management Council (MAFMC) under the Surfclam/Ocean Quahog Fishery Management Plan that was approved in 1977 (MAFMC 1977). Both fisheries have been managed under an Individual Transfer Quota (ITQ) since 1990 where annual landings are allocated to the participating vessels based on a combination of performance history and vessel size. Neither species is characterized as overfished and overfishing is not occurring (NEFSC 2010a and NEFSC 2009b). Both species occur in and have the potential to be commercially harvested within the existing GB Closed Area. However, only one species can be landed per trip even if a vessel holds a permit for both species.

Stock assessment regions for surfclams and ocean quahogs are shown in (Figure 5.2-1). From north to south, regions of interest are: Georges Bank (GBK), Southern New England (SNE), Long Island (LI), New Jersey (NJ), Delmarva (DMV) and southern Virginia (SVA). Biomass of the total Atlantic surfclam stock (120+ mm shell length

[SL]) has declined from high levels during the late 1990s to current levels which are similar to the levels during 1981-1992. High stock biomass (120+ mm SL) during the late 1990s was due to good recruitment and relatively faster growth rates in southern regions in the past. Total biomass increased to peak levels during the late 1990's and then declined at about 3% per year afterwards. Stock biomass during 2008 was 878 (CV = 0.16) thousand mt (NEFSC 2010a).

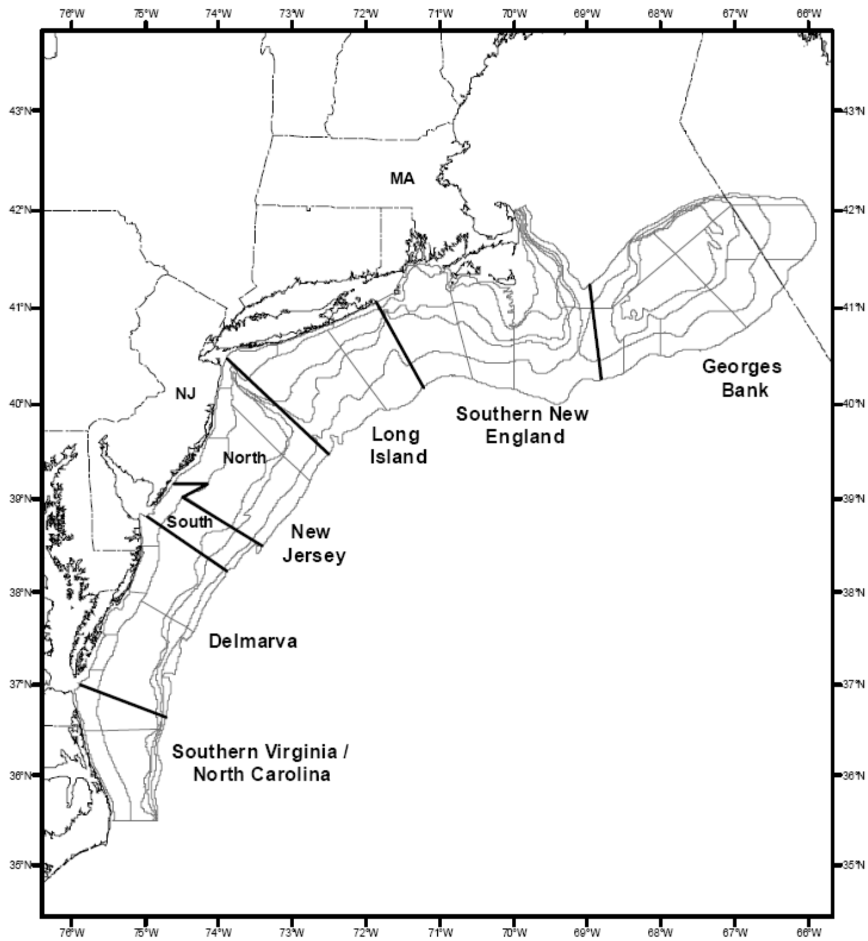


Figure 5.2-1 Stock Assessment regions for Atlantic surfclam and ocean quahog in the US EEZ with survey strata and stock assessment regions. For ocean quahog the southern and northern portions of the New Jersey regions area combined.

The decline in surfclam biomass since the late 1990s can be explained by negative surplus production caused by lower recruitment and slower growth rates in the NJ and DMV regions. Recruitment has been below average since 1999. The last strong year classes on GB, NJ, and DMV occurred in 1999, 1992 and 1993 (NEFSC 2010a).

The distribution of surfclam biomass has shifted to the north during 1982-2008 (Figure 5.2-2). NJ held the largest fraction of surfclam biomass during 1994-2002. During 2008, the largest fraction of surfclam biomass was in GB (48%) due to declining biomass in DMV and NJ, and increasing biomass on GBK (NEFSC 2010a).

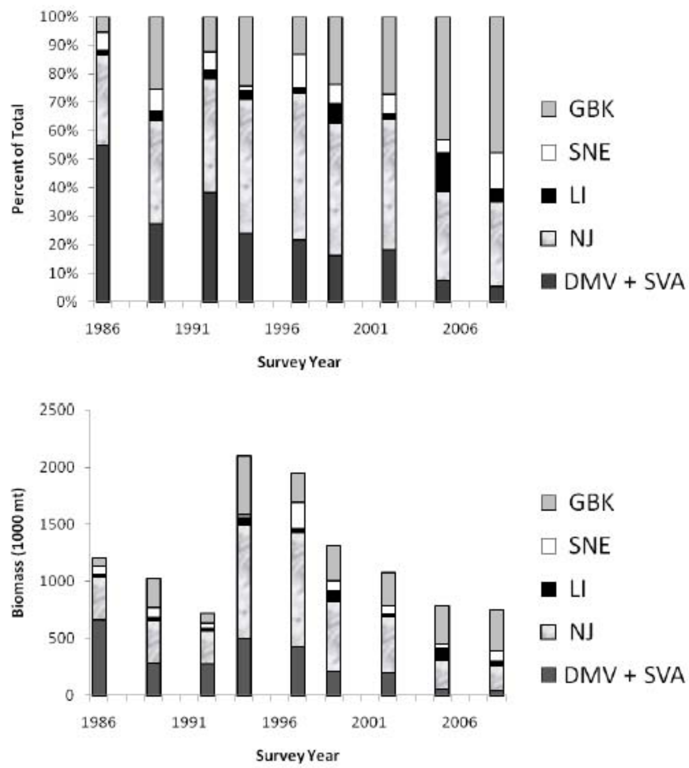


Figure 5.2-2 Efficiency corrected swept area biomass estimates for surfclams (120+ mm SL), by region, during years with NEFSC clam surveys

The ocean quahog population is an unproductive stock with infrequent and limited recruitment. Biomass of the total fishable ocean quahog stock during 2008 was 2.905 million mt, which is above the then recommended target of 1.790 million mt (NEFSC 2009b).

An increasingly large fraction of the ocean quahog stock (84% during 2008 compared to 67% during 1978) now occurs in the northern regions (Long Island, Southern New England, and GB). The GB region is of particular importance because it contained 32% of total biomass in 1978 and 45% of total biomass in 2008 (NEFSC 2009b).

The 2008 NEFSC stock assessment survey for surfclams and ocean quahogs included a number of stations on GB (Figures 5.2-3 and 5.2-4). Surfclams were more abundant on the northern edge of the bank and quahogs on the southern portion of the bank, in deeper water. The catch rates of quahogs in this area were very high. Generally speaking, these same patterns of distribution were observed in earlier years of the survey (NEFSC 2009b; NEFSC 2010a).

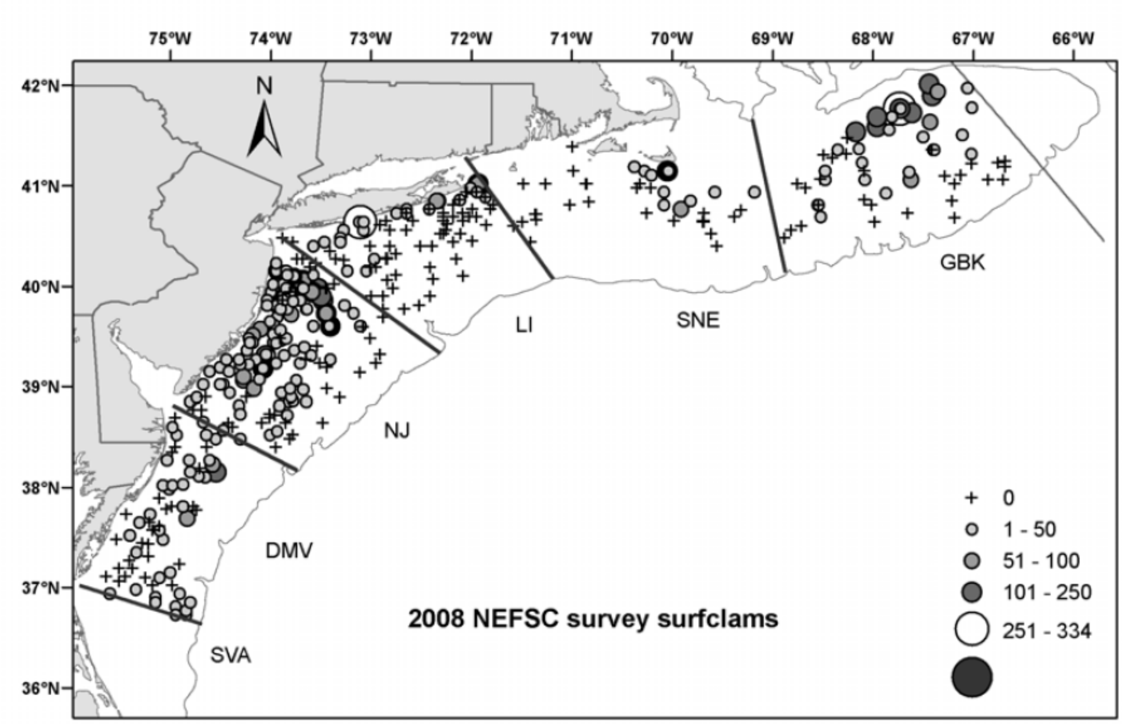


Figure 5.2-3 NEFSC surfclam survey map (2008). Symbols represent numbers per tow.

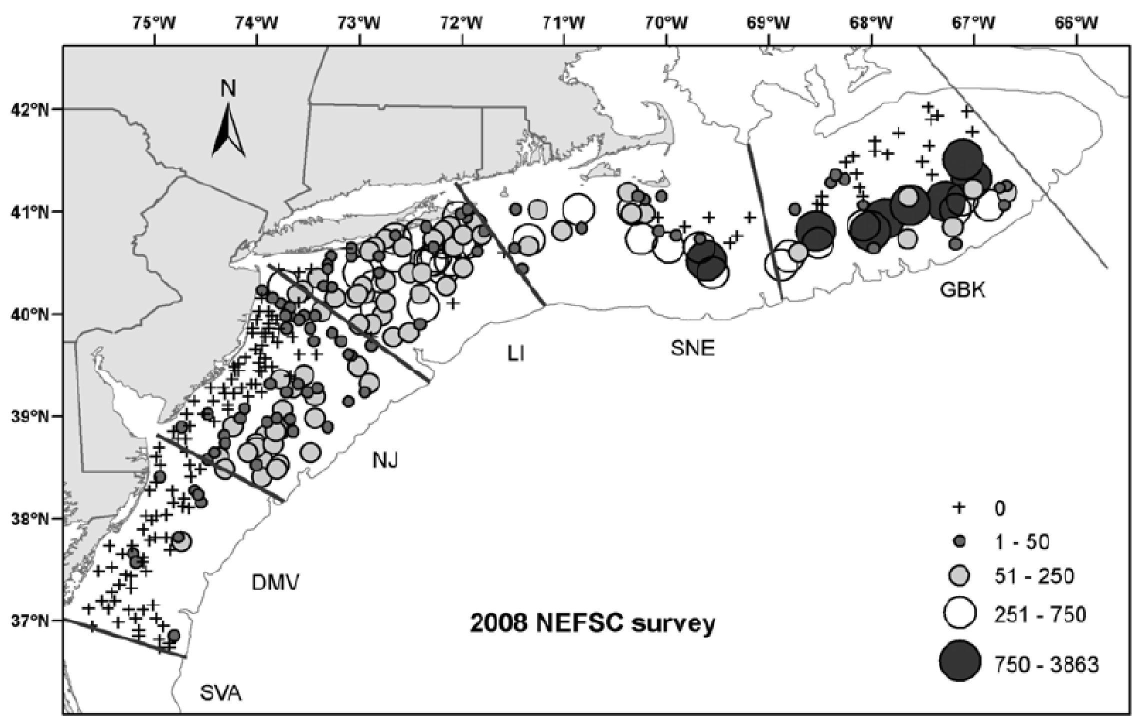


Figure 5.2-4 NEFSC ocean quahog survey map (2008). Symbols represent numbers per tow.

5.3 Non-Target Species

The surfclam/ocean quahog is considered a "clean" fishery with regards to incidental catch since the target species comprises well over 80% of the catches. This is demonstrated in the 1997 NEFSC clam survey species listing (Table 5.2-1) (Weinburg pers. comm.). No fish were caught during the survey and only sea scallops, representing other commercially desirable invertebrates, were caught at around one-half of one percent of the total catch. The remaining non-target species caught included a variety of benthic invertebrates including a variety of crabs, other bivalves, snails, and starfish, among them rock crab, Jonah crab, several species of whelks and horseshoe crab (MAFMC 2003). It is noted that commercial operations are certainly even cleaner than the scientific surveys which have liners in the dredges, as all animate and inanimate objects except for surfclams and ocean quahogs are discarded quickly before the resources is placed in cages. The processors reduce their payments if species other than surfclams or ocean quahogs are in the cages (MAFMC 2003).

Table 5.3-1 List of number of animals, by species, captured during the 1997 NMFS Clam Survey. All tows are included. This list is ordered by total number caught

Total #	Animal	Species
6	Sea Scallop (Clapper)	*Placopecten magelanicus*
6	Southern Quahog (Clapper)	*Mercenaria campechianus*
12	Ten-Ridged Whelk	*Neptunea decemcostata*
67	Spider Crab (Unclassified)	*Majidae* spp.
75	Knobbed Whelk	*Busycon carica*
81	Horseshoe Crab	*Limulus polyphemus*
101	Stimpson's Whelk	*Colus stimpsoni*
104	Dog Whelk	*Nassaruis* spp.
121	Horse Mussel	*Modiolus modiolus*
154	Northern Cardita	*Venercardia borealis*
155	False Quahog	*Pitar morrhuana*
167	Pastel Swimming Crab	*Ovalipes guadalupensis*
198	Channeled Whelk	*Busycon Canaliculatum*
245	Shark's Eye or Lobed Moonshell	*Polinices duplicatus*
303	Waved Whelk	*Buccunum undatum*
351	Southern Quahog (Live)	*Mercenaria campechianus*
423	Jonah Crab	*Cancer borealis*
441	Lady Crab	*Ovalipes ocellatus*
647	Hermit Crab (Unclassified)	*Diogenidae/Paguridae* spp.
679	Chestnut Astarte	*Astarte castanea*
787	Sea Scallop (Live)	*Placopecten magelanicus*
1,052	Northern Moon Shell	*Lunatia heros*
1,630	Common Razor Clam	*Ensis directus*
1,873	Surfclam (Clapper)	*Spisula solidissima*
2,206	Starfish (Unclassified)	*Asteriidae* spp.
2,233	Boreal Asterias	*Asterias vulgaris*
2,593	Ocean Quahog (Clapper)	*Arctica islandica*
3,073	Margined Seastar	*Astropecten* spp.
3,486	Rock Crab	*Cancer irroratus*
36,221	Surfclam (Live)	*Spisula solidissima*
66,682	Ocean Quahog (Live)	*Arctica islandica*
126,172	Total	

Source: Weinberg pers. comm.

5.4 Protected Species

There are numerous species of marine mammal and sea turtle species that inhabit the PSP closure area and are protected under the Endangered Species Act (ESA) of 1973. The species under NMFS' jurisdiction protected by either the Endangered Species Act or the Marine Mammal Protection Act and found in this region include cetaceans (14 species), sea turtles (5 species) and fish (2 species). The species are listed in Appendix II and are described in detail in Section 6.1.3.1 of the Amendment 13 of the Surfclam and Ocean Quahog FMP (MAFMC 2003).

Marine mammals including the humpback whale, northern right whale, fin whale and four species of protected sea turtles may be found in the action area for this fishery. The four turtle species found in the action area are the loggerhead sea turtle, Kemp's ridley sea turtle, green sea turtle, and leatherback sea turtle. The gear used for the SC/OQ fisheries is a hydraulic clam dredge. Due to clam dredge fishing protocol, physical configuration and the typical slow movement of the gear, the fishery has little interaction potential with endangered and threatened species. The fisheries are included under Category III in the final List of Fisheries (LOF) for 2010 (NOAA 2010) for the taking of marine mammals by commercial fishing operations under the MMPA. Gear classified as Category III in the LOF indicate that as a result of this gear use, annual mortality and serious injury of a stock in a given fishery is less than or equal to 1 percent of the Potential Biological Removal (PBR) level. No mortalities or serious injuries of marine mammals have been documented due to use of the hydraulic dredge in the U.S. Mid-Atlantic offshore SC/OQ fisheries.

SC/OQ fisheries and ESA-listed species overlap to a large degree, and there always exists some very limited potential for an incidental take. However, according to the LOF there have been no documented takes of any marine mammal or sea turtle in either the surfclam or ocean quahog fisheries. The effects of the SC/OQ fisheries on protected marine mammals and sea turtles have been previously considered in informal ESA Section 7 consultations. While listed species may occur near SC/OQ beds, it is likely that there will be no conflict between the fishers of this FMP and these endangered or threatened species because SC/OQ dredges are very slow moving and listed species are capable of moving out of the way and avoiding the gear.

5.5 Human Communities

This PEA evaluates the effect this action may have on people's way of life, traditions, and community. Participants in the fishery, ports, and public health are the three facets of human communities that are discussed in this section. The geographic scope for the human communities will consist of those port communities from which vessels land the bulk of their allocation, the fishing communities where the majority of the product is processed and consumers for SC/OQ products.

Economics and Fishery Participants

A total of 3.1 million bushels of surf clams were landed in 2002 valued at $40 million (Table 5.5-1). Surfclam landings increased slightly in 2003 but declined in both 2004 and 2005. Even though landings declined by about 400 thousand bushels in 2005, an increase in average price to almost $13 per bushel resulted in industry revenues equivalent to that received in 2004. Total landings increased in 2006 and 2007 to pre-2005 levels. Surfclam landings in 2008 returned to 2004-2005 levels.

Table 5.5-1 Summary of Surf Clam Landings

Year	Total Bushels	Total Sales ($millions)	Average Price per Bushel
2002	3,100,000	40.0	$12.90
2003	3,200,000	39.4	$12.32
2004	3,100,000	35.1	$11.32
2005	2,700,000	33.1	$12.27
2006	3,100,000	35.9	$11.58
2007	3,200,000	40.8	$12.74
2008	2,900,000	34.7	$11.91

The pattern of landings and prices for ocean quahogs was similar to that of surfclams from 2002 to 2005. Four million bushels of ocean quahogs were harvested in 2002 followed by a small increase to 4 million bushels in 2003 and an annual decline to 3-3.5 million bushels in 2005-2008 (Table 5.5-3). With their low price per bushel, ocean quahog have historically been a bulk, low-priced food item and the industrial ocean quahog fishery has only been viable when large quantities could be harvested quickly and efficiently.

Table 5.5-2 Summary of Ocean Quahog Landings (Excluding Maine)

Year	Total Bushels	Total Sales ($ millions)	Average Price per Bushel
2002	4,000,000	25.5	$6.37
2003	4,200,000	26.0	$6.20
2004	3,900,000	23.6	$6.06
2005	3,000,000	18.6	$6.19
2006	3,200,000	19.4	$6.07
2007	3,500,000	20.6	$5.88
2008	3,400,000	22.3	$6.61

Although regarded as a single stock, the EEZ and Maine components of the ocean quahog fishery have different biological characteristics and are managed separately. The Maine ocean quahog fishery uses small vessels (approximately 35-45 feet) to actively target smaller ocean quahogs for the fresh, half-shell market. The Maine ocean quahog fishery is generally excluded in the discussion of this PEA as biomass and landings are minor compared to the rest of the EEZ fishery and would have no appreciable effect on estimates for the whole stock. (MAFMC 2009) Additionally, based on the small scale nature of the Maine ocean quahog fishery it is assumed these vessels would not harvest ocean quahog on GB.

Industry has experienced difficulty utilizing increases in both the federal SC/OQ quotas that were implemented in 2004. In 2008 the unharvested portion of the surfclam quota equaled 14% of the 3.4 million bushel total. In 2008 the unharvested portion of the ocean quahog quota equaled 37% of the 5.3 million bushel total. Table 5.5-4 lists the federal quotas and/or landings data from 1979 through 2009. (MAFMC 2009)

Table 5.5-3 Federal SC/OQ Quota and Landings: 1979- 2009

Federal Surfclam & Ocean Quahog Quotas and Landings: 1979 - 2009								
Surfclams (Thou Bushels)					Ocean Quahogs (Thou. Bushels)			
* Georges Bank first closed for PSP in 1990					* Maine ocean quahog fishery excluded 1991 - 2009			
Year	**Landings**	**Quota**	**% Harvested**		**Year**	**Landings**	**Quota**	**% Harvested**
1979	1,674	1,800	93%		1979	3,035	3,000	101%
1980	1,924	1,825	105%		1980	2,962	3,500	85%
1981	1,976	1,825	108%		1981	2,888	4,000	72%
1982	2,003	2,400	83%		1982	3,241	4,000	81%
1983	2,412	2,450	98%		1983	3,216	4,000	80%
1984	2,967	2,750	108%		1984	3,963	4,000	99%
1985	2,909	3,150	92%		1985	4,570	4,900	93%
1986	3,181	3,225	99%		1986	4,167	6,000	69%
1987	2,820	3,120	90%		1987	4,743	6,000	79%
1988	3,032	3,385	90%		1988	4,469	6,000	74%
1989	2,838	3,266	87%		1989	4,930	5,200	95%
1990*	3,114	2,850	109%		1990	4,622	5,300	87%
1991	2,673	2,850	94%		1991*	4,840	5,300	91%
1992	2,812	2,850	99%		1992*	4,939	5,300	93%
1993	2,835	2,850	99%		1993*	4,812	5,400	89%
1994	2,847	2,850	100%		1994*	4,611	5,400	85%
1995	2,545	2,565	99%		1995*	4,628	4,900	94%
1996	2,569	2,565	100%		1996*	4,391	4,450	99%
1997	2,414	2,565	94%		1997*	4,279	4,317	99%
1998	2,365	2,565	92%		1998*	3,897	4,000	97%
1999	2,538	2,565	99%		1999*	3,770	4,500	84%
2000	2,561	2,565	100%		2000*	3,161	4,500	70%
2001	2,855	2,850	100%		2001*	3,691	4,500	82%
2002	3,113	3,135	99%		2002*	3,871	4,500	86%
2003	3,244	3,250	100%		2003*	4,069	4,500	90%
2004	3,138	3,400	92%		2004*	3,823	5,000	77%
2005	2,744	3,400	81%		2005*	2,940	5,333	55%
2006	3,057	3,400	90%		2006*	3,066	5,333	57%
2007	3,226	3,400	95%		2007*	3,366	5,333	63%
2008	2,914	3,400	86%		2008*	3,374	5,333	63%
2009	n/a	3,400			2009*	n/a	5,333	
Source: NMFS Clam Vessel Logbook Reports, Woods Hole, MA								

Productivity of effort in the surfclam fishery has declined in recent years. The average number of bushels harvested in an hour of fishing is an important indicator of both the abundance of clams in the beds being fished, as well as the costs of fishing operations. Increases in fishing time from working on sparser beds translate directly into higher fuel costs (MAFMC 2009).

A fleet-wide calculation of surfclam Landings Per Unit of Effort (LPUE) has declined by an average of almost 10% each year between 2000 and 2008, from 129 to 57 bushels per hour. Figure 5.5-1 illustrates the decline as almost a straight line (MAFMC 2009).

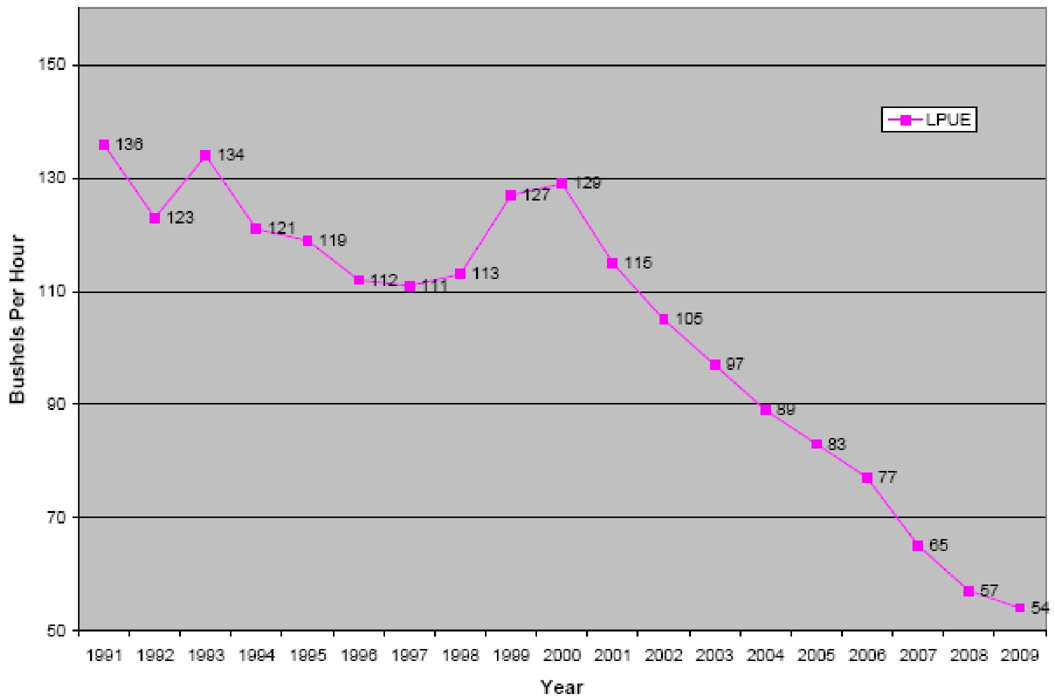


Figure 5.5-1 Surfclam landing per unit of effort: 1991-2009. (All Vessel Classes- 2009 trips reported through May 20, 2009 only

As described in Section 5.2, the distribution of surfclam biomass has shifted to the north during 1982-2008. Figure 5.5-2 depicts the most current surfclam LPUE data per 10 minute square.

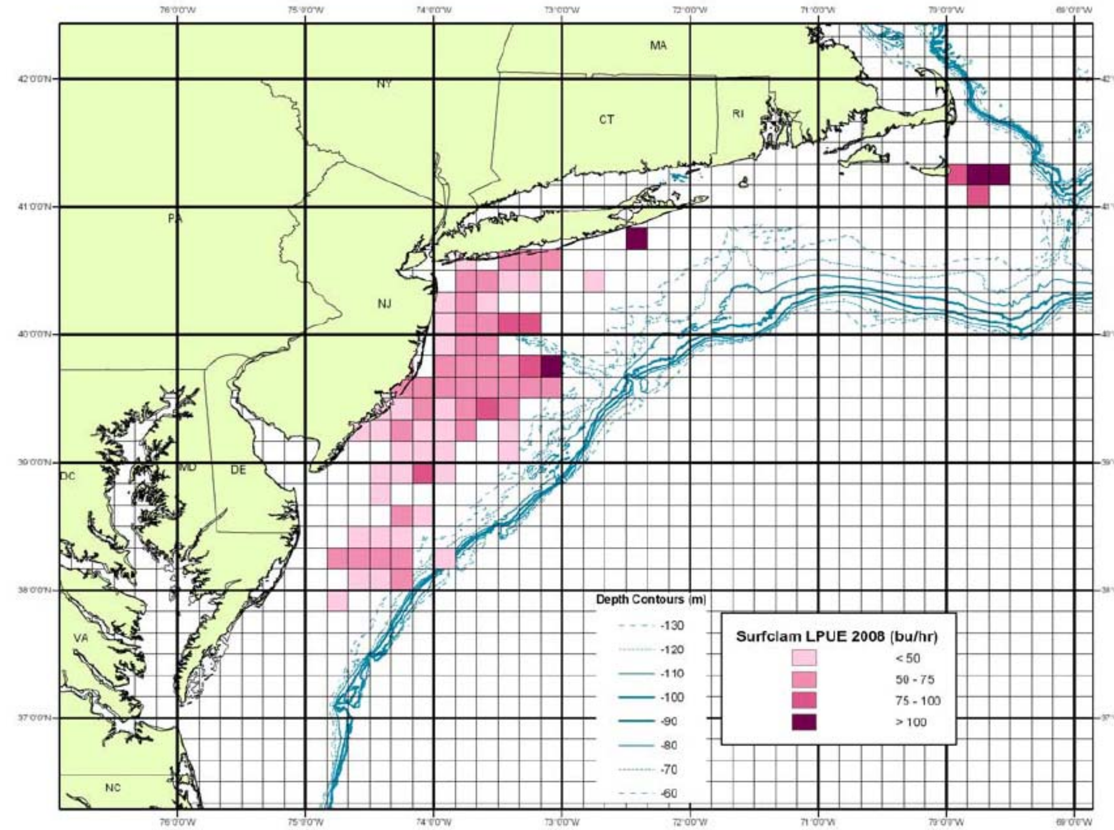


Figure 5.5-2 Surfclam LPUE by 10 minute square (2008)

The ocean quahog fishery has historically been able to find large, dense beds of high-yield ocean quahog to replace those that have been the mainstay of the fleet for many years. Examination of ocean quahog LPUE over the past 20 years (Figure 5.5-3) illustrates distinct patterns of improved productivity (higher LPUE) as the fleet moves to a new area of virgin biomass followed by a decline in productivity (Lower LPUE) as that area is fished down (MAFMC 2009).

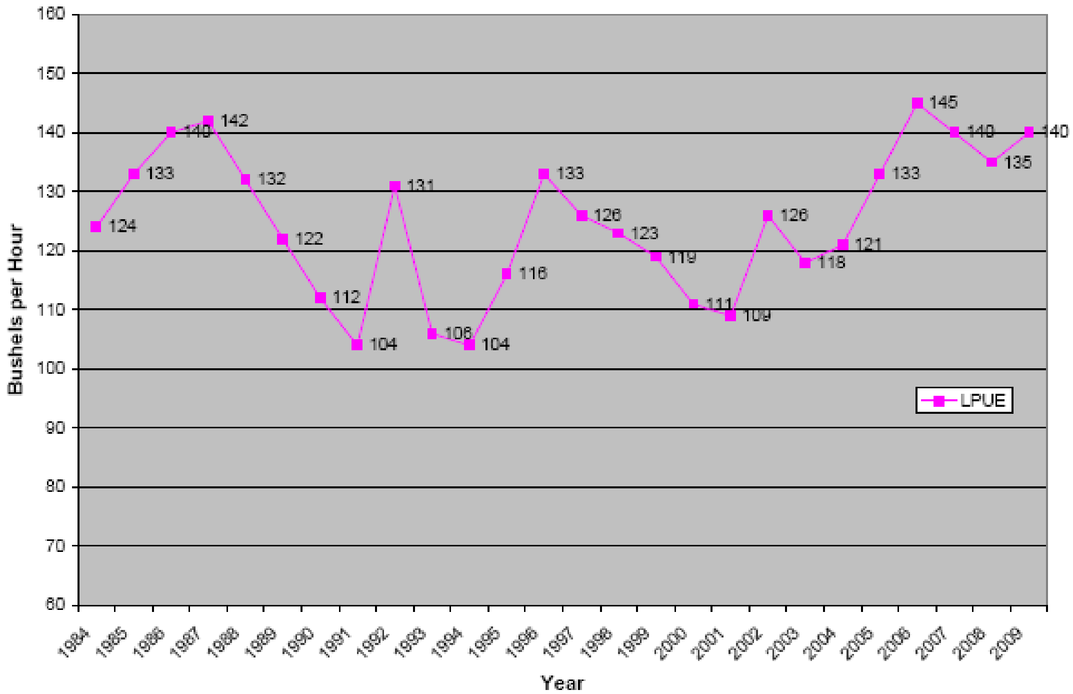


Figure 5.5-3 Ocean quahog landings per unit of effort: 1984-2009. (All vessel classes, excluding Maine fishery. 2009 trips reported through May 20, 2009 only

As noted in Section 5.2, an increasingly large fraction of the ocean quahog stock (84% during 2008 compared to 67% during 1978) now occurs in the northern regions (Long Island, Southern New England, and GB). Figure 5.5-4 depicts the most current ocean quahog LPUE data per 10 minute square.

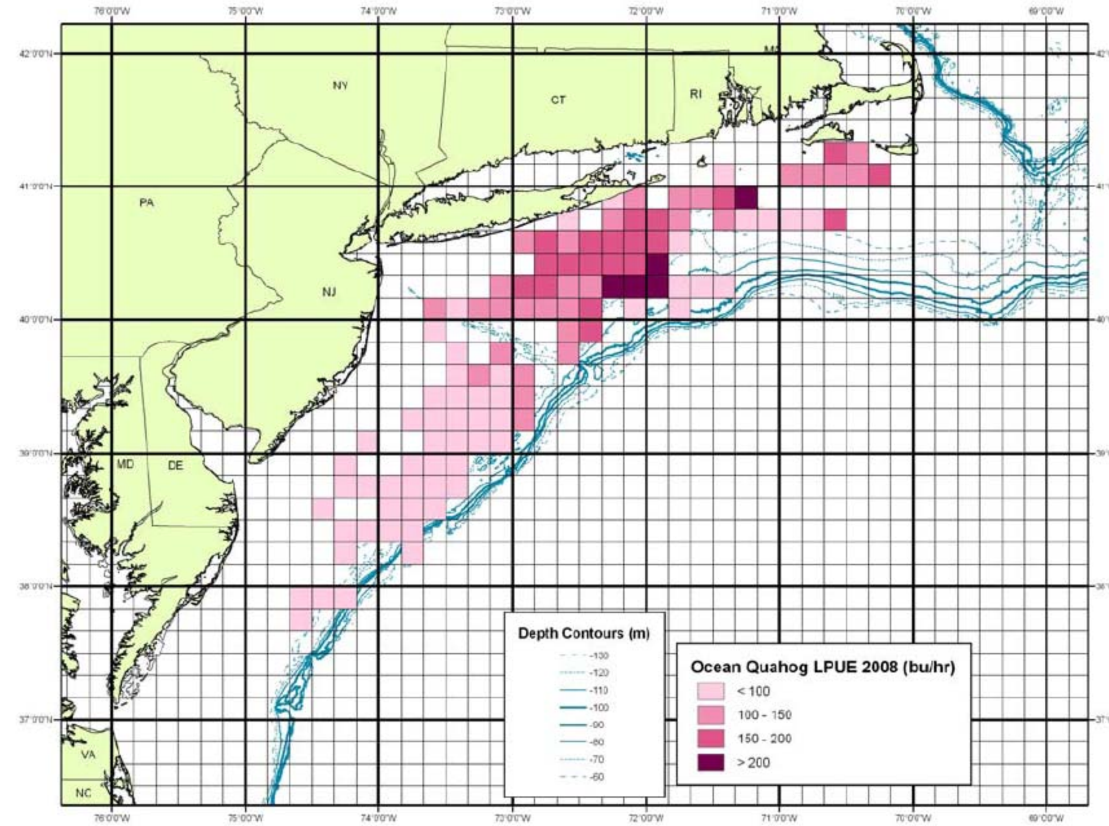


Figure 5.5-4 Ocean quahog LPUE by 10 minute square (2008)

The small-scale fishery for ocean quahogs in Maine provides a stark contrast to the industrial fishery that occurs off the coast of the Mid-Atlantic States up to Massachusetts. Small vessels in the 35 to45 foot range actively target smaller ocean quahogs for the fresh, half shell market in Maine. Most of the catch is trucked directly out of Maine and brings an ex-vessel price that ranges from $24 - $40 per Maine bushel (MAFMC 2009).

The total number of vessels participating in the SC/OQ fisheries outside the State of Maine has experienced a dramatic decline as the fisheries moved beyond a market crisis in 2005. The 50 or so vessels that reported landings during 2004 & 2005 was slashed and coast-wide harvests consolidated on to approximately 40 vessels in the subsequent years (Table 5.5-4). In the ocean quahog fishery consolidation is very evident as just four large vessels accounted for over 50% of the federal ocean quahog harvest in each of the past few years (MAFMC 2009). In 2009 these four large vessels listed their home port state as New Jersey. The majority of vessels in the federal SC/OQ fishery, outside of the State of Maine, listed a fishing community in New Jersey as their home port. In 2009, 46% of the federal surfclam permits listed a home port in the State of New Jersey and 64% of the federal surfclam landings (total bushels) came from vessels with a home port in New Jersey. In 2009, 57% of the federal ocean quahog permits (outside of Maine) listed a home port in the State of New Jersey and 79% of the federal surfclam landings (total bushels outside of Maine) came from vessels with a home port in New Jersey (NMFS 2010b).

Table 5.5-4 Federal Fleet Profile, 1997 through 2008

Non-Maine Vessels	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Harvests BOTH surfclams & ocean quahogs	14	14	8	11	12	14	16	11	14	12	9	9	8
Harvests only surfclams	20	19	23	22	19	21	23	23	21	24	20	24	24
Harvests only ocean quahogs	22	17	16	12	17	16	15	16	15	12	9	8	10
Total Non-Maine Vessels	56	50	47	45	48	51	54	50	50	48	38	41	42
Maine Ocean Quahog Vessels	25	34	39	38	34	31	35	35	34	32	25	24	22
Source: NMFS Clam Vessel Logbooks													

<u>Ports</u>

Communities from Maine to Virginia are involved in the harvesting and processing of surfclams and ocean quahogs. Ports in New Jersey and Massachusetts handle the most volume and value, particularly Atlantic City, Point Pleasant, New Bedford and Fairhaven. There are also significant landings in Ocean City, Maryland, Warren, Rhode Island and the Jonesport/Beals Island area of Maine (NMFS 2010b). Figure 5.5-5 and Figure 5.5-6 depict landings data compiled by NMFS from vessel logbooks for the 2009 fishing year.

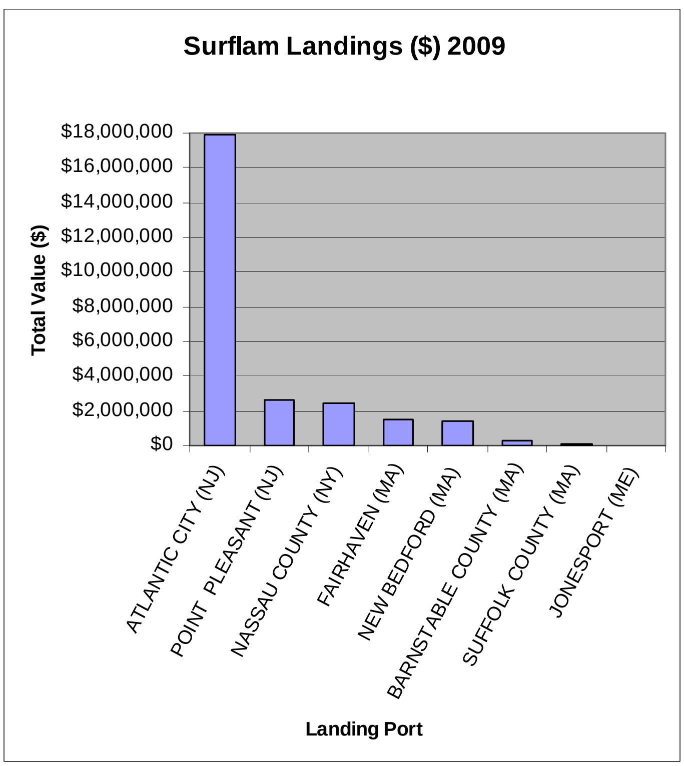


Figure 5.5-5 Value of surfclam landings by landing port for FY2009

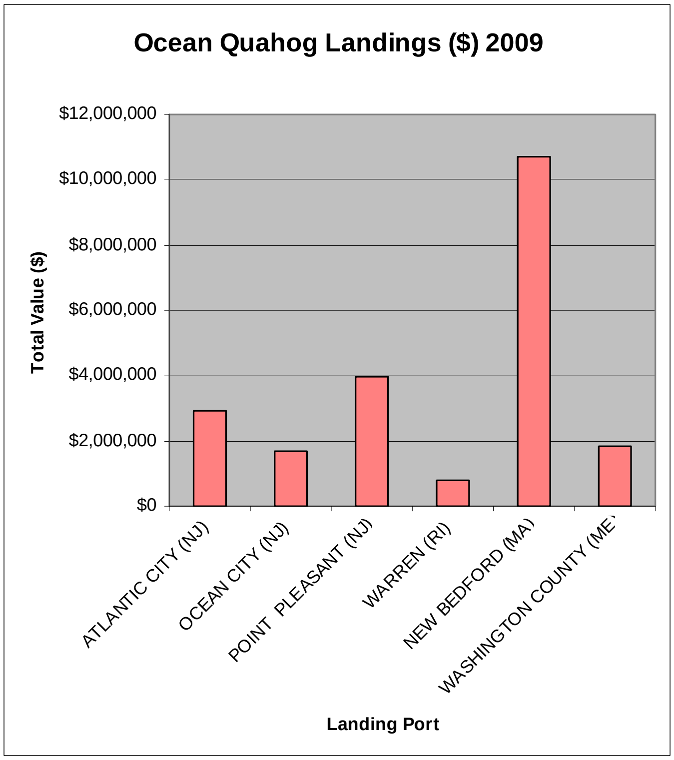


Figure 5.5-6 Value of ocean quahog landings by landing port for FY2009

Due to the highly industrial nature of the fishery, with the exception of the Maine fishery, processing plants are a major component and must be considered in addition to port towns. In early 2009 there were a total of ten companies reporting purchases of surfclams or ocean quahogs from the industrial fisheries outside of Maine. The twelve processing facilities operated by these companies are listed below with the species they processed, arrayed from north to south (MAFMC 2009).

Table 5.5-5 SC/OQ processing facilities

State	Processing facility	Species processed
Massachusetts	Blount Seafood (Fall River)	Surfclams & ocean quahogs
	Fair Tide Shellfish (New Bedford)	Surfclams only; hand-shucked
	Intershell Seafood (Gloucester)	Surfclams only
	Sea Watch (New Bedford)	Surfclams & ocean quahogs
	Harbor Blue Seafood (Fairhaven)	Offloading of surfclams only – no processing
Rhode Island	Blount Seafood (Warren)	Surfclams & ocean quahogs
	Galilean Seafood (Bristol) -Owned by Atlantic Cape Fisheries	Surfclams only; hand-shucked
New Jersey	Atlantic Capes Fisheries (Point Pleasant Beach)- Offices in Cape May	Surfclams only; hand-shucked
	La Monica Fine Foods (Millville)	Surfclams only; hand-shucked
	Surfside Products (Port Norris)	Primarily ocean quahogs, some surfclams
Delaware	Sea Watch (Milford)	Surfclams & ocean quahogs
Maryland	Sea Watch (Easton)	Secondary processing
Virginia	J H Miles & Company (Norfolk)	Surfclams & ocean quahogs

Atlantic City, New Jersey's commercial fishing fleet is based in the Marina section of the city, in the shadow of the casinos. The fishery almost exclusively targets SC/OQ. There are no processing facilities in Atlantic City, so the clams must be trucked elsewhere. In addition to the large commercial clam industry, numerous small-scale fishing operations in Atlantic City fish for clams on the bay side using rakes and tongs or fishing by hand (NEFSC 2009a). In 2009 the value of the SC/OQ landings for Atlantic City was just under $21 million (NMFS 2010b).

Point Pleasant, New Jersey is located in Ocean County and is with a reasonable driving distance of New York City and Philadelphia. Much of the economy of Point Pleasant and Point Pleasant Beach is based on tourism, and a substantial segment of the tourist population travel to this area to fish. The landings values (1997-2006) for Point Pleasant show the highest value species as surfclams and ocean quahogs, followed by scallops, summer flounder, scup, and black sea bass (NEFSC 2009a). In 2009 the value of the SC/OQ landings for Point Pleasant was about $6.6 million (NMFS 2010b). The ocean quahogs and scallops, as well as most of the surfclams are trucked away elsewhere for shucking, as Point Pleasant no longer has a processing plant with the exception of a small facility where some surfclams are shucked by hand (NEFSC 2009a).

New Bedford, the fourth largest city in the commonwealth of Massachusetts, is situated on Buzzards Bay, located in the southeastern section of the state in Bristol County. The range of species landed in New Bedford is quite diverse. According to the federal commercial landings data, New Bedford's most successful fishery in the past ten years has been scallops, followed by groundfish (NEFSC 2009a). In 2009 the value of the SC/OQ landings for New Bedford was just over $12 million (NMFS 2010b). Fairhaven's fishing industry is so closely linked to that of its neighbor New Bedford that it is often considered one and the same. Most of Fairhaven's vessels unload and sell their fish in New Bedford, while vessels from both communities haul out in Fairhaven (NEFSC 2009a). In 2009 the value of the SC/OQ landings for Fairhaven was about $1.5 million (NMFS 2010b).

Detailed descriptions of the all fishing communities involved in the SC/OQ fisheries are provided in Amendment 13 to the Atlantic SC/OQ Fishery Management Plan as well as the Community Profiles for the Northeast US Fisheries articles which are available on the NOAA website (http://www.nefsc.noaa.gov/read/socialsci/community_profiles).

Since 1979, 85-100% of landings have been taken from the Mid-Atlantic Bight (SVA, DMV and NJ). Areas of highest landings have shifted north from DMV to NJ over time (Figure 5.5-7). After 1983, the importance of DMV declined and NJ has supplied the bulk of landings since 1985. About 8% of landings were taken from SNE and LI since 2005 (NEFSC, 2010a).

The regional distribution of fishing effort is similar to that of landings although fishing effort in DMV has increased in recent years. Declining LPUE trends reflect stock conditions for regions where clam fishing occurred (excluding GB) but overstate declines in biomass for the stock as a whole (including GB) (NEFSC, 2010a).

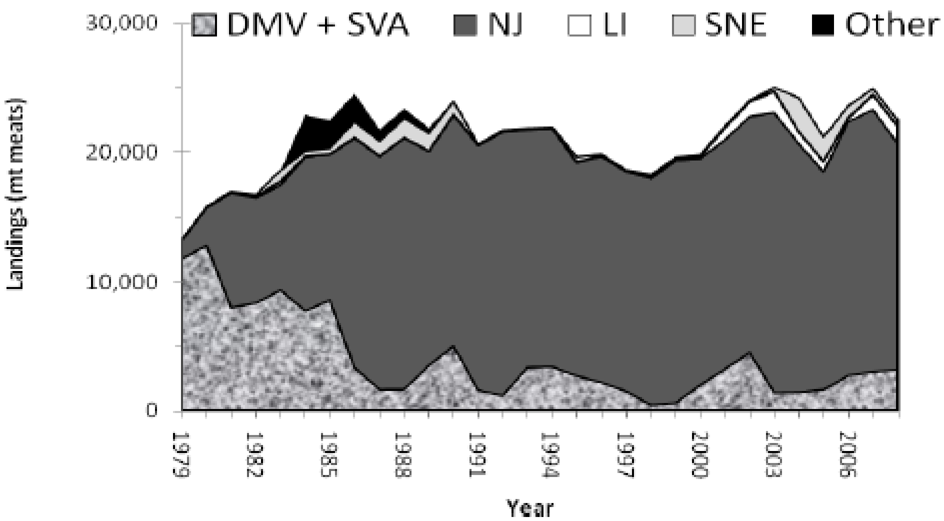


Figure 5.5-7 Surfclam landings data during 1979-2008 by stock assessment region

The ocean quahog fishery has shifted north over the last two decades as catch rates declined in the original fishing grounds off Delmarva and New Jersey. In the 1980s, the bulk of the fishing effort was off Delmarva and southern New Jersey, with some fishing off southern New England. In the early 1990s effort fell by half in the Delmarva region while effort increased south of Long Island until about 40% of total effort was concentrated there. By the late 1990s, most of the fishing effort had moved to the Southern New England region. In the early 2000s, the majority of fishing effort was in the Long Island region. By the late 2000s only 22% of total effort was in the Delmarva and New Jersey regions (NEFSC 2009b).

Public Health

In addition to economic and social impacts, this PEA considers public health for consumers of SC/OQ as a facet of the human communities VEC. Saxotoxins (toxins) are produced by the alga *Alexandrium fundyense*, which can form blooms commonly referred to as red tides. Red tide blooms, also known as harmful algal blooms (HABs), can produce toxins that accumulate in water column filter-feeding shellfish. Shellfish contaminated with the saxotoxin, if eaten in large enough quantity, can cause illness or death in humans from PSP. Given the high inter-annual variability of red tide blooms, NMFS may need to close any open area within the GB Closed Area to harvesting of surfclams and ocean quahogs to prevent contaminated shellfish from entering the market. NMFS traditionally defers to the FDA in matters of public health. Therefore any SC/OQ closures or openings by NMFS are based upon PSP toxin monitoring results provided by the FDA and the most current available scientific information.

6.0 ENVIRONMENTAL CONSEQUENCES- ANALYSIS OF (DIRECT AND INDIRECT) IMPACTS

6.1 Impacts to Physical Environment, Habitat and Essential Fish Habitat (EFH)

Alternative A

The proposed reopening of this area (Cultivator Shoal) for the harvesting of surfclams and ocean quahogs would expose benthic habitats to the effects of hydraulic clam dredging for the first time since the entire GB PSP area was closed to clam dredging in 1990. It is difficult to predict the extent to which this alternative would displace fishing effort from currently harvested areas into the proposed open area, but it is clear that any use of hydraulic dredges in the area would have a direct adverse (negative) impact on the EFH of all the managed species listed in Table 5.1-8. It is also fairly clear that the other two mobile, bottom-tending fishing gears that adversely impact benthic habitats – scallop dredges and bottom trawls – are not currently used to any great extent in this area (Figure 5.1-2). Thus, hydraulic dredging would constitute a new threat to the quality of benthic habitats in the area. However, several factors mitigate the impact hydraulic clam dredging would have on the physical environment.

The Alternative A area is shallow (mostly 20-50 meters) and the predominant substrate is sand (86%). Based on the limited trip location data shown in Figure 5.1-2 and the fact that the Alternative A area is shallow and sandy, there has been very little bottom trawling or scallop dredging there in recent years, so clam dredging would constitute a new source of fishing disturbance. As described in Section 5.1, this area of GB is exposed to extremely strong tidal bottom currents (and storms) which are constantly moving sand around. Benthic organisms that inhabit this highly dynamic environment are generally adapted to extreme natural disturbance conditions. Total abundance of benthic organisms in highly dynamic environments recovers as quickly as within a few days/months to a year. Studies of hydraulic clam dredging on sand are summarized in Section 5.1. These studies indicated that this gear has severe impacts on geological and biological habitat features, even in shallow, high energy, environments, but they also show that recovery times in this kind of environment are relatively rapid, on the order of days (or even hours) to months. The adverse impacts of hydraulic dredging in shallow, highly-disturbed, sandy or gravelly substrates would therefore be minimal and temporary. Hydraulic clam dredges are not operated in mud, cobble or boulder areas, and therefore impacts to these substrates would be negligible under Alternative A or Alternative B.

Alternative B

The area included under this alternative is over fourteen times larger than what is proposed under the preferred alternative. As was the case for Alternative A, the proposed reopening of this area for the harvesting of surfclams and ocean quahogs would expose benthic habitats to the effects of hydraulic clam dredging for the first time since the entire GB PSP area was closed to clam dredging in 1990. However, the primary difference between these two areas is not based solely on their size. Subject to FDA testing results and NMFS approval, any sub-set of this larger area could be opened to clam dredging at any point in time, and any area that was opened could subsequently be closed if PSP levels reached threshold concentrations. Thus, clam dredging activity could, over the long term, shift from one area to another within the 6,378 square miles defined by this alternative. Without knowing where within this large area clam dredging could occur, or when, this evaluation assumes that the entire area could be opened at some point in time to dredging, or that during some period of time (years), dredging could occur in a number of discrete areas within the larger area.

Since hydraulic clam dredges can not currently be operated deeper than 80 meters (see Section 5.1), the area within which clams could be harvested is actually smaller than 6,378 square miles, i.e., about 5,180 square miles. The predominant substrate type within this area is still sand (85%) (Table 5.1-6), but there is a greater variety of depths than in the smaller Alternative A area. In particular, the southeast portion of the larger area drops off gradually to depths greater than 50 meters, reaching 100 meters in the extreme southeast corner (Figure 5.1-3). Bottom habitats deeper than 65 meters on eastern Georges Bank are generally low energy environments where bottom sediments (sand) is only subject to occasional bottom disturbance caused by storm currents or waves (see Section 5.1). Because hydraulic clam dredging is generally limited to shallower, high energy, environments, it is reasonable to conclude that any new clam dredging within the Alternative B area would take place in high energy, sandy, bottom habitats. Shallow, sandy areas on the central part of the bank, south of Cultivator Shoal, are currently exposed to very little fishing by any mobile, bottom-tending gear (Figure 5.2-1), but in other parts of the Alternative B area there is a greater probability that there would be cumulative impacts to the physical environment/habitat/EFH in localized areas as hydraulic clam dredges would be used in addition to the current bottom trawls and/or scallop dredges. However, as pointed out elsewhere in this analysis, recovery times for benthic habitat features that are affected by any of these gears are expected to be fairly rapid given the dynamic nature of the physical environment.

Although a much larger area on GB would potentially be opened to clam dredging under this alternative, the same amount of fishing effort (bottom contact time) that could be concentrated in the smaller alternative A area would either be directed at an area of comparable size, or dispersed over a larger area with reduced per unit area habitat impacts. Under either scenario, Alternative B would have negative habitat impacts relative to the No Action alternative, but the adverse impacts to EFH would be minimal and temporary for the same reasons given for Alternative A.

<u>Alternative C</u>
This alternative would not result in a change in fishing effort, areas fished, or harvest. Therefore, Alternative C would not result in a change of the quality or disturbance of habitat in the surfclam and ocean quahog fisheries.

<u>Impacts throughout the range of the fishery</u>
Based upon the most recent data available, bottom disturbance for the entire SC/OQ fishery in 2000 was estimated to be approximately 145 square miles (USDC 2002). The total amount of bottom area swept by the gear every year is expected to remain consistent as the quota for surfclams and ocean quahogs will not increase under the proposed alternatives, or decline as the result of higher catch rates (bushels per tow) in previously-

unexploited areas. While Alternative A and Alternative B would result in negative short term impacts to dredged areas on GB, the impact on EFH across the entire area open to the surfclam and ocean quahog fishery would be a low negative. This conclusion is based on the relatively small area of bottom that would be subject to disturbance for the entire fishery and the highly dynamic nature of the benthic environments on the SC/OQ fishing grounds. Under Alternative A or Alternative B, the geographic distribution of effort would likely shift to include some benthic habitats that have not been affected by hydraulic clam dredges for 20 years. Even if hydraulic clam dredging were to occur in an area of GB that is currently subjected to scallop dredging or bottom trawling, injecting pressurized water into the bottom has a greater impact on subsurface sediment structure than the other bottom-tending gear. However, under Alternative A or Alternative B quotas and associated fishing effort would not increase. Thus, across the entire range of the SC/OQ fishery, low negative impacts to EFH for species affected by the hydraulic clam dredge (Table 5.1-7 & Table 5.1-8) would be anticipated under Alternative A or Alternative B.

6.2 Impacts to Target Species

The proposed reopening of any portion of the existing GB Closed Area for the harvesting of surfclams and ocean quahogs (either Alternative A or Alternative B) would subject the target species to exploitation for the first time since the area was closed to commercial clam dredging in 1990. Alternative B would potentially open a much larger area than Alternative A. While it is difficult to predict the extent to which either Alternative A or Alternative B would displace fishing effort from currently harvested areas to newly opened areas, it is anticipated that at least some fishing effort would be displaced. The entire existing GB Closed Area contains approximately 48% of the total biomass for surfclams and approximately 45% of the total biomass for ocean quahog. At least in the short term it would be expected that the landings per unit effort (LPUE) would be higher in the GB Closed Area due to the high biomass and that vessels would move into any new open area on GB to take advantage of the available resource. However, higher costs associated with getting to and operating in GB may limit fishing effort in these newly opened areas.

Alternative A and Alternative B are not expected to impact the stock or population size of the surfclam or ocean quahog fisheries. Both fisheries have been managed under an Individual Transfer Quota (ITQ) since 1990 where annual landings are allocated disproportionately to the participating vessels based on a combination of performance history and vessel size. Neither species is characterized as overfished and overfishing is not occurring. As discussed in Section 5.5, total stock biomass is relatively high and total fishing mortality rates are low. The quota is currently set well below a threshold that would represent overfishing. Additionally, landings data for the past several years suggests that the total number of bushels harvested for the entire fishery has been market price driven as the industry has not been taking the entire allotted quota.

As noted above, GB contains a large portion of the biomass for SC/OQ. Since the larvae remain in the water column for weeks or months, spawning on GB may also provide a source of new recruits throughout the range of both species as water movement off GB is typically westerly and southerly (see Section 5.1). Alternative B represents 17% of the entire GB PSP Closure Area but, based upon the substrate and depth data presented in Section 5.1, it contains a large portion of the suitable clam habitat. Alternative B could potentially open up a much larger area to harvest SC/OQ than Alternative A. However, any opened area would likely be small in size as it would be dependent on PSP toxin levels as well as be subject to PSP toxin testing by the FDA and the approval of NMFS. Alternative B would potentially allow industry access to any number of areas within the Alternative B boundaries at different points in time and could potentially allow for an *ad hoc* rotational management scheme. Over the long run this could potentially result in the harvesting of a much larger percentage of the SC/OQ biomass on GB than Alternative A. However, since SC/OQ are not overfished and the quota would not increase under either alternative, Alternative A and Alternative B are not expected to have a significant impact on the spawning biomass on GB. In fact, Alternative A and Alternative B may have a potentially positive long term impact on the target species because fishing will be more spread out over the entire range, thereby helping to avoid localized depletion and taking pressure off of the southern stocks.

Alternative C would not impact the stock or population size for the surfclam or ocean quahog fisheries since the area has been closed to commercial fishing since 1990. Only scientific surveys and PSP toxin testing over the past 20 years have produced surfclams and ocean quahogs collected by hydraulic dredge. There would be no change in the amount of fishing effort, areas fished, or harvest under Alternative C.

6.3 Impacts to Non-Target Species/Bycatch

SC/OQ is considered a "clean" fishery with regards to incidental catch since the target species comprises well over 80% of the catches. Based upon scientific surveys bycatch typically consists of scallops, benthic invertebrates including a variety of crabs, other bivalves, snails, and starfish, among them rock crab, Jonah crab, several species of whelks and horseshoe crab. The implementation of Alternative A or Alternative B may temporarily reduce bycatch for the entire fishery due to the fewer and shorter dredges anticipated in an area of high biomass such as GB. However, the implementation of Alternative A or Alternative B would have a negligible impact on bycatch since the LPUE of open areas on GB would likely diminish over time as LPUE declines to levels similar to other harvesting areas.

Alternative C would have negligible impact on bycatch since there would be no change in the amount of fishing effort, areas fished, or harvest.

6.4 Impacts to Protected Resources

While listed species may occur near SC/OQ beds, it is likely that there will be no conflict between the fishers of this FMP and these endangered or threatened species because SC/OQ dredges are very slow moving and listed species are capable of moving out of the way and avoiding the gear. The gear used in the SC/OQ fisheries is classified as Category III. No mortalities or serious injuries of marine mammals have been documented due to use of the hydraulic dredge in the U.S. Mid-Atlantic offshore SC/OQ fisheries. Therefore, the implementation of Alternative A, Alternative B, or Alternative C would have negligible impact upon ESA-listed species.

6.5 Impacts to Human Communities

The implementation of Alternative A or Alternative B is expected to have a positive impact to fishing communities. Higher LPUE is likely expected in the short term as a result of the higher biomass associated with GB region. However, the attractiveness of the Alternative A and Alternative B opening areas would likely diminish over time as LPUE declines to levels similar to other harvesting areas. That is, assuming these areas remain open to harvesting and catch rates approach the average, the importance of the opened GB area will be diminished. Higher fuel and/or labor costs may be a factor if vessels must travel further distances to reach GB than they would have to catch the same fixed amount in another area. As the higher-value commodity, surfclam may be targeted over ocean quahog to compensate for the higher fuel and labor costs associated with fishing on GB. The longer trips associated with fishing on GB may also carry additional risk to fisherman safety.

There is potential for long term economic benefit from the implementation of either Alternative A or Alternative B as they would result in a larger area open to fishing and provide fisherman with more potentially profitable fishing options. Alternative B would potentially be more positive because it would incorporate a larger open fishing area. It is noted that the potential economic benefits of the reopening are dependent upon PSP monitoring data provided by the FDA and benefits may increase or decrease as areas are opened or closed.

Consolidation of the federal fleet in recent years is evident as the total number of vessels participating in the SC/OQ fisheries outside the State of Maine has experienced a dramatic decline as the fisheries moved beyond a market crisis in 2005. Further consolidation of the fleet would not be expected as a result of Alternative A, Alternative B, or Alternative C as the quota would not be reduced and the federal fleet has been consolidated in its current state for several years.

At the time of this report it is unclear if federal vessels would be able to land their harvest in all of the New England and Mid-Atlantic states. Due to the potential public health concerns associated with PSP toxins there is the potential for states not to allow landings of SC/OQ from open areas of GB. New Jersey was the only state that allowed catch under the EFP to be landed. If states do not allow for SC/OQ from open areas of GB to be landed then economic and social impacts of Alternatives A and B may differ between states.

NMFS defers to the FDA in matters concerning public health. The FDA has developed a PSP testing Protocol and determines the risk to public health from the PSP toxin. The FDA has determined that SC/OQ within the Alternative A area are safe for human consumption and has requested this area be opened. Based on future PSP testing results, the FDA could declare SC/OQ in any or all portions of the Alternative B area safe for human consumption. These safe areas would have to be approved NMFS before being opened for SC/OQ harvesting. NMFS acknowledges that there exists a potential threat of PSP toxins reaching the human population from any open area, including those areas described in Alternatives A and B. While the chances of PSP toxins reaching the human population may be small, the impacts associated with this scenario would be negative. A PSP incident would not only impact human health but it also would likely carry negative economic implications for fisherman, processors, and the food industry due to negative public health concerns associated with the product. However, FDA PSP toxin monitoring procedures, as well as various state and industry PSP testing would still be in effect under Alternative A and Alternative B. Additionally, an increase in the number of SC/OQ in the marketplace would not be anticipated as the quota would not increase under Alternative A or Alternative B. Therefore, the public health risks associated with PSP under Alternative A and Alternative B would be negligible compared to the No Action alterative (Alternative C).

Alternative A and Alternative B would open new areas for fishing; however, as the harvest quotas would not be increased, these alternatives would simply be displacing fishing effort. Since the distribution of the federal fleet, location of the processors, and the harvest reaching the processors would not likely change, Alternative A and Alternative B would be expected to have a negligible impact on ports. Alternative C would have negligible impact on ports since there would be no change in the amount of fishing effort, areas fished, or harvest.

Alternative C would have negligible impact on the revenue and social well being of fishermen and/or associated businesses as there would be no change in fishing effort, areas fished, or harvest. Alternative C would have a negligible impact on public welfare as it would maintain the current risk level of PSP toxins getting to the human population from GB SC/OQ because the area is closed.

Table 6.5-1 Summary of direct and indirect effects of alternatives by VEC

	Physical Impacts	Biological Impacts			Human Communities Impacts		
	Physical Habitat/EFH	Surfclam & Ocean Quahog	Non-Target Species	Protected Resources	Participants	Public Health	Ports
Alternative A Allow access to surfclam/ocean quahog harvesters in area requested by FDA	localized negative low negative for entire range	negligible	negligible	negligible	low positive	negligible	negligible
Alternative B – Allow access to surfclam/ocean quahog harvesters in entire EFP area (or smaller portions within) which is potentially subject to FDA monitoring	localized negative low negative for entire range	negligible	negligible	negligible	low positive	negligible	negligible
Alternative C – No Action Alternative – Offshore GB Area remains closed to Surfclam/Quahog harvesting	negligible	negligible	negligible	negligible	negligible	negligible	negligible

6.6 Cumulative Effects Analysis

The need for a cumulative effects analysis (CEA) is referenced in the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR Part 1508.25). CEQ regulations define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action." The purpose of a CEA is to consider the effects of the Proposed Action and the combined effects of many other actions on the human environment over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective, but, rather, the intent is to focus on those effects that are truly meaningful. The CEA baseline in this case consists of the past, present, and reasonably foreseeable future fishing and non-fishing actions.

This CEA assesses the combined impact of the direct and indirect effects of this action, and the past, present, and reasonably foreseeable future fishing actions, as well as factors external to the SC/OQ fisheries that affect the physical, biological, and socioeconomic resource components of the shellfish environment. The analysis is focused on the VECs (see below) and compares the impacts of harvesting surfclams and/or ocean quahogs in the GB Closed Area to the status quo (No-Action Alternative) which is to continue to prohibit the taking of surfclams and ocean quahogs in the GB Closed Area.

Valued Ecosystem Components (VECs): The CEA focuses on VECs specifically including:

- Physical environment/habitat (including EFH);
- Target species (surfclams and ocean quahogs);
- Non-target species and bycatch;
- Protected resources; and
- Human communities (ports of operation, participants, and public health).

Temporal and Geographic Scope of the Analysis: The temporal range that will be considered for habitat, target species, non-target species and bycatch, and human communities, extends from 1988, the year that Amendment 8 to the Surfclam/Ocean Quahog FMP was implemented, through November 1, 2015, the beginning of the FY 2016, which encompasses the scope of the PEA. The cumulative effects analysis for this action focuses on Amendment 8 and subsequent actions because Amendment 8 implemented the ITQ system and included major changes to management of the SC/OQ fisheries, including substantial effort reductions.

The temporal range considered for endangered and other protected species begins in the 1990's when NMFS began generating stock assessments for marine mammals and developed recovery plans for sea turtles that inhibit waters of the U.S. EEZ. In terms of future actions, the analysis examines the period of approval for this action through November 1, 2015, which is the time period through which this PEA applies.

The geographic scope considered for cumulative effects to habitat, target species, and non-target species and bycatch consists of the range of species, primary ports, and geographic areas (habitat) discussed in Section 5.0 (Affected Environment). The geographic scope for protected resources generally encompasses the northwest Atlantic Ocean. The range of each endangered and protected species is presented in Section 6.1.3.1 of Amendment 13 of the Surfclam and Ocean Quahog FMP (MAFMC 2003). The geographic scope for the human communities will consist of those port communities from which vessels land the bulk of their allocation and the fishing communities where the majority of the product is processed. The scope of public health concerns will consist of all consumers of SC/OQ products.

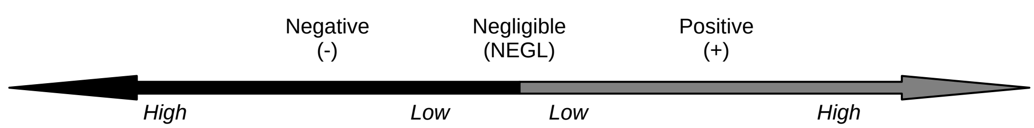
Impact Category Definitions and Qualifiers

The following definitions and qualifiers are used in the narratives and tables of this CEA:

Impact Definition			
	Direction		
VEC	**Positive (+)**	**Negative (-)**	**Negligible (Negl)**
Habitat	Actions that improve the quality or reduce disturbance of habitat	Actions that degrade the quality or increase disturbance of habitat	Actions that have no positive or negative impact on habitat quality
Target Species, Non- Target Species & Bycatch, Protected Resources	Actions that increase stock/population health	Actions that decrease stock/population health	Actions that have little or no positive or negative impact on stocks/populations
Human Communities	Actions that increase revenue and social well being of fishermen and/or associated businesses, or public welfare	Actions that decrease revenue and social well being of fishermen and/or associated businesses, or public welfare	Actions that have no positive or negative impact on revenue and social well-being of fishermen and/or associated businesses, or public welfare

Impact Qualifiers:	
Low (L; as in low positive or low negative):	To a lesser degree
High (H; as in high positive or high negative):	To a substantial degree
Likely	Some degree of uncertainty associated with the impact
ND	Impacts could not be determined at time of this writing

NEGL = Negligible



Summary of Direct and Indirect Impacts of the Alternatives

The impacts from Alternatives A (Proposed Action) and Alternative B are predicted to be the same for all VECs. As summarized in Table 6.5-1, impacts from these alternatives are expected to be negligible to the biological environment, including target species, non-target species and bycatch, and protected resources. Impacts to physical habitat and EFH are expected to be negative in localized areas that have not been subject to clam dredging for almost 20 years, but these impacts are expected to be temporary, as the sandy benthic habitats in the high energy environment where the dredging would occur recover quickly from the adverse effects of dredging. The subject areas of the alternatives range between approximately 447 and 6,378 square miles, and it has been estimated that the area swept by active vessels in 2000 was approximately 145 square miles. Since quotas and associated fishing effort are not increasing as a result of this action, impacts to the overall habitat suitable for SC/OQ and other species impacted by the hydraulic clam dredge would be expected to be less than impacts to the localized habitat, and therefore are considered to be low negative.

There are three facets to the Human Communities VEC; participants in the fishery, ports, and public health. Opening a portion of the GB Closed Area to harvesting surfclams and ocean quahogs would increase landings per unit effort (LPUE), which would increase revenue for participants, an impact which is considered to be low positive. The impact to ports would be negligible as the distribution of the federal fleet, location of the processors, and the harvest reaching the processors would not likely change. While the FDA requested consideration of this action because their testing of surfclams and ocean quahogs demonstrated that levels of PSP-toxin were safe for human consumption, conditions in the marine environment change seasonally and vary inter-annually, such that HABs may occur and contaminate shellfish before proper surveying can be conducted. Therefore, it is noted that there is still a low potential for product from any open area which is contaminated with hazardous levels of PSP-toxin to reach the marketplace. Ensuring the testing of the shellfish prior to consumption is not included in the scope of this action, nor is this function within NMFS' purview. The proposed action would not increase the number of SC/OQ harvested and would only shift fishing effort to a new area. Like the existing open areas, SC/OQ harvested from the area encompassing the proposed action will still be subject to testing by the FDA and various states for PSP toxins. Therefore, the proposed action would have a negligible effect on public health and welfare.

Other Fishing Effects: Past, Present and Reasonably Foreseeable Future Management Actions

This section is a summary of the past, present, and reasonably foreseeable future fishing actions and effects that are related to the affected environment and the proposed action. The impact assessment terms (i.e., positive, negative, negligible) are for the impacts associated with the action on the VECs discussed in the impact definition table above. Specifically, the VECs include: the physical environment and EFH; target species; non-target species and bycatch; protected resources such as marine mammals and sea turtles; and the human communities of participants, ports, and public health.

Past and Present Management Actions:

Amendment 8 (MAFMC 1988) to the SC/OQ FMP established an individual transferable quota (ITQ) system to replace regulated fishing time system in place in the mid-Atlantic surfclam fishery. As a result, fishing time in this fishery declined from 96 hours per week in 1978 to six 6-hour trips per quarter in 1988. The ITQ system essentially converted allowable fishing time into allowable individual levels of harvest. An ITQ system was also established for the ocean quahog fishery. Each vessel in these fisheries is given an allocation of the total quota, and the corresponding number of tags for each cage. Allocations can be bought and sold if approved by the Regional Administrator of NMFS. Among other changes, this amendment also empowered the Regional Administrator to authorize an experimental fishery to gather information necessary for management. This amendment is also important because it established the four primary long-term objectives for the FMP. The objectives are as follows: 1) conserve and rebuild the Atlantic SC/OQ resources by stabilizing annual harvest rates throughout the management unit in a way that minimizes short term economic dislocations; 2) simplify the maximum extent the regulatory requirement of clam and quahog management to minimize the government and private costs of administering and complying with regulatory, reporting, enforcement, and research requirements of clam and quahog management; 3) provide opportunity for industry to operate efficiently, consistent with the conservation of clam and quahog resources, which will bring harvesting capacity in balance with processing and biological and allow industry participants to achieve 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.

Fishing management actions that have been implemented subsequent to Amendment 8 include Amendments 9, 10, 11, 12, and 13. Amendment 9 (MAFMC 1996) was developed to revise the overfishing definitions in response to a scientific review by NMFS. Amendment 10 (MAFMC 1998) provided management measures for the small scale, traditional fishery for ocean quahogs off the northeast coast of Maine which had been operating as an experimental fishery since 1990. Amendment 11 (NMFS 1998) was drafted to achieve consistency among Mid-Atlantic and New England FMPs on vessel replacement and update provisions, permit history transfer and splitting and renewal regulations for fishing vessels issued Northeast Limited Access Federal Fishery permits. Amendment 12 (MAFMC 1998) was drafted to bring the FMP into compliance with the new National Standards and the 1996 Sustainable Fisheries Act (SFA). To comply with the National Standards, Amendment 12 included SC/OQ overfishing definitions (National Standard 1), the effects on fishing communities (National Standard 8), bycatch reduction (National Standard 9), and safety at sea (National Standard 10). Amendment 12 also identified EFH for surfclams and ocean quahogs. The Regional Administrator approved all measures in Amendment 12 except for the proposed overfishing definition for surfclams and the fishing gear impacts to EFH. Amendment 13 (MAFMC 2003) addressed the following five issues: 1) a new overfishing definition for surfclams, 2) analysis of fishing gear impacts on EFH, 3) the ability to adjust or suspend the minimum surfclam size through a framework adjustment, 4) multi-year fishing quotas, and 5) inclusion of a vessel monitoring system, when such a system is economically viable.

In June 2005, the FDA requested the NMFS to close an area of Federal waters off the coasts of New Hampshire and Massachusetts (Northern and Southern Temporary PSP Closure Areas -Figure 4.3-1), to fishing for bivalve shellfish intended for human consumption (FDA 2005), due to recurring red tide blooms from the dinoflagellate, *Alexandrium* sp. These red tide blooms have occurred every spring since 2005. These temporary closure areas are located west of the GB Closure Area. If portions of the GB Closure Area are opened to bivalve shellfish harvesting, prolonged annual closure of these inshore areas may increase the importance of fishing in the offshore area.

Future Management Actions:
Actions in the reasonably foreseeable future include the process of specifying commercial quotas for surfclams, ocean quahogs, Maine ocean quahogs, and continued suspension of the surfclam minimum size limit. In addition, the MAFMC is developing

an Omnibus Amendment which will amend each of the Council's FMPs to address the new requirements of the Magnuson-Stevens Reauthorization Act of 2006 (MSRA) for annual catch limits (ACLs) and accountability measures (AMs). This amendment will be Amendment 14 to the SC/OQ FMP. Amendment 15 is currently in development and will consider the following five issues: 1) EFH update, 2) cost-recovery, 3) ocean quahog overfishing threshold, 4) excessive shares, and, 5) data collection. It is anticipated that the outcome of Amendment 15 will limit the consolidation of shares. This amendment will include a revised analysis of the impacts of all fishing activities on the EFH of surfclams and ocean quahogs, and the impacts of hydraulic clam dredging on the EFH of other federally-managed species. This analysis will take into account the proposed expansion of the fishery into the GB closed area in the overall context of the entire fishery.

<u>Summary of Impacts for Other Fishing Actions:</u>
In general, past and present actions implemented by Amendments to the FMP have had positive impacts to target and non-target species because the objective stated in Amendment 8 to prevent overfishing has been achieved to date. The action with the most positive impact for all VECs was the migration to a system of ITQs, which allowed for the intensity of fishing effort to be distributed throughout the year, while still allowing for control of overall harvest. ITQs have also allowed fishermen to harvest efficiently. This system has also promoted safety at sea by eliminating derby-style fishing.

Administrative actions such as those implemented in Amendments 9, 10, 11, and 12 have had essentially negligible impacts to the physical and biological environments, but had some low positive impacts to human communities. For example, transferring of allocations and permits, has allowed fishermen to retire deteriorating vessels or facilitate purchases and sales of vessels, and vessel upgrades. The actions in these amendments have had negligible impacts on protected resources since this fishery already is already designated a Category III fishery in the List of Fisheries. Amendment 13 has also had positive impacts for the target and non-target species from continuation of management measures which have prevented overfishing of these resources for the last two decades. The addition of EFH designations in Amendment 13 has had positive impacts to habitat because it added protection to the physical environment.

Other fishing activities such as scallop dredging and trawling, may have low negative impacts to the physical and biological environment of the GB Offshore Closed Area due to additional fishing pressure and associated impacts to habitat and target/non-target species. Although these two gears primarily affect habitat features at the sediment surface, whereas hydraulic dredges affect surface and sub-surface habitat quality, there could be a cumulative effect on benthic habitats in any area where two or more of them are used concurrently. An evaluation of the spatial distribution of bottom trawling and scallop dredging activity in the areas included in the two action alternatives in the EA indicates that fishing trips made by vessels using bottom trawls on GB during fishing year (FY) 2008 (May 1 2008 – April 30 2009) were reported within the Alternative B area along the northern edge of the bank, primarily, north and east of the Alternative A area in sand, gravel, and cobble substrates, and west of the western boundary of Closed

Area 2. There were only 52 trips made by scallop dredge vessels in FY2008 (March 1, 2008 – February 28, 2009) in the six statistical areas on GB shown in Figure 5.1-2. Scallop dredging activity in recent years has shifted south into the Mid-Atlantic region, but is expected to increase on GB in the near future in response to increasing scallop biomass (NEFMC 2009). Scallop dredge vessels are more likely to operate in the same areas where clam dredging occurs because both gears are designed for use in sandy bottom habitats, whereas bottom trawls are used in a greater variety of bottom types.

As shown in Figure 5.1-2, fishing trips made by vessels using bottom trawls on GB during fishing year (FY) 2008 (May 1, 2008 – April 30, 2009) were reported within the Alternative B area along the northern edge of the bank, primarily, north and east of the Alternative A area in sand, gravel, and cobble substrates, and west of the western boundary of Closed Area 2. There were only 52 trips made by scallop dredge vessels in FY2008 (March 1 2008 – February 28 2009) in the six statistical areas on GB shown in Figure 5.1-2. Scallop dredging activity in recent years has shifted south into the Mid-Atlantic region, but is expected to increase on GB in the near future in response to increasing scallop biomass (NEFMC 2009). Scallop dredge vessels are more likely to operate in the same areas where clam dredging occurs because both gears are designed for use in sandy bottom habitats, whereas bottom trawls are used in a greater variety of bottom types.

Future fishing actions will likely have continued positive impacts on the biological and physical environment because the Council will strive to maintain the same management objectives discussed in Amendment 8, but these future actions may have some low negative impacts on human communities if consolidation of shares is limited. Amendment 13 to the Northeast Multispecies FMP and Amendment 10 of the Atlantic Sea Scallop FMP established habitat closed areas which are off-limits to all mobile, bottom-tending gear which includes hydraulic clam dredges. These closures were designed to minimize the adverse effects of fishing on EFH for a range of species which includes those impacted by hydraulic clam dredges (Table 5.1-8). These closed habitat areas are currently up for revision under the Omnibus EFH Amendment and therefore may be changed or eliminated in the future.

<u>Non-Fishing Effects: Past, Present, and Reasonably Foreseeable Future Actions</u>
Non-fishing activities that occur in the marine nearshore and offshore environments and their watersheds can cause the loss or degradation of habitat and/or affect the species that reside in those areas. The following discussions of impacts are based on past assessments of activities and assume these activities will likely continue into the future as projects are proposed. More detailed information about these and other activities and their impacts are available in the publications by Hansen (2003) and Johnson et al. (2008).

Construction/Development Activities and Projects: Construction and development activities include, but are not limited to, point source pollution, agricultural and urban runoff, land (roads, shoreline development, wetland loss) and water-based (beach nourishment, piers, jetties) coastal development, marine transportation (port maintenance, shipping, marinas), marine mining, dredging and disposal of dredged material and energy-related facilities, all of which are discussed in detail in Johnson et al. (2008). These activities can introduce pollutants (through point and non-point sources), cause changes in water quality (temperature, salinity, dissolved oxygen, suspended solids), modify the physical characteristics of a habitat or remove/replace the habitat altogether. Many of these impacts have occurred in the past and present and their effects would likely continue in the reasonably foreseeable future. It is likely that these projects would have negative impacts caused from disturbance, construction, and operational activities in the area immediately around the affected project area. However, given the wide distribution of the affected species, minor overall negative effects to offshore habitat, protected resources, target species, and non- target species and bycatch are anticipated since the affected areas are localized to the project sites, which involve a small percentage of the fish populations and their habitat. Thus, these activities for most biological VECs would likely have an overall low negative effect due to limited exposure to the population or habitat as a whole. Any impacts to inshore water quality from these permitted projects, including impacts to planktonic, juvenile, and adult life stages, are uncertain but likely minor due to the transient and limited exposure. It should be noted that wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and, as such, may indirectly constrain the sustainability of the target species, non- target species and bycatch, and protected resources.

Similar to the discussion above on non-fishing impacts to fish habitat, generally the closer the proximity of species to the coast, the greater the potential for impact (although predation, a non-fishing impact, would be one threat that would occur everywhere). However, the proposed action would be offshore where impacts from construction/development activities would likely be low because the localized nature of the activities would minimize exposure to organisms in the immediate area.

These projects are permitted by other federal and state agencies that conduct examinations of potential biological, socioeconomic, and habitat impacts. In addition to guidelines mandated by the Magnuson-Stevens Act, and the Fish and Wildlife Coordination Act, NMFS, the Councils, and the other federal and state regulatory agencies review these projects through a process required by the Clean Water Act; Rivers and Harbors Act; and the Marine Protection, Research, and Sanctuaries Act for certain activities that are regulated by federal, state, and local authorities. These reviews limit and often mitigate the impact of these projects. The jurisdiction of these authorities is in the “waters of the U.S.” and ranges from inland riverine to marine habitats offshore in the EEZ.

Restoration Projects: Other regional projects that are restorative or beneficial in nature include estuarine wetland restoration; offshore artificial reef creation, which provides structure and habitat for many aquatic species; and eelgrass (*Zostera marina*) restoration, which provides habitat for marine life. Due to past and present adverse impacts from human activities on these types of habitat, restorative projects likely have slightly positive effects at the local level.

Protected Resources Rules: The NMFS final Rule on Ship Strike Reduction Measures (73 FR 60173, October 10, 2008) is a non-fishing action in the United States-controlled North Atlantic that is likely to affect endangered species and protected resources. The goal of this rule is to significantly reduce the threat of ship strikes on North Atlantic right whales and other whale species in the region. Ship strikes are considered the main threat to North Atlantic right whales; therefore, NMFS anticipates this regulation will result in population improvements to this critically endangered species.

Energy Projects: Cape Wind Associates (CWA) proposes to construct a wind farm on Horseshoe Shoal, located between Cape Cod and Nantucket Island in Nantucket Sound, Massachusetts. The CWA project would have 130 wind turbines located as close as 4.1 miles off the shore of Cape Cod in an area of approximately 24 square miles with the turbines being placed at a minimum of 1/3 of a mile apart. The turbines would be interconnected by cables, which would relay the energy to the shore-based power grid. If constructed, the turbines would preempt other bottom uses in an area similar to oil and natural gas leases. The potential impacts associated with the CWA offshore wind energy project include the construction, operation, and removal of turbine platforms and transmission cables; thermal and vibration impacts; and changes to species assemblages within the area from the introduction of vertical structures.

Other offshore projects that can affect VECs include the construction of offshore liquefied natural gas (LNG) facilities such as the project "Neptune." The first phase of this project construction was completed in September 2008, which includes the installation of a 13-mile subsea pipeline. The second phase will connect the new pipeline to an existing pipeline network called HubLine east of Marblehead, Massachusetts, and will install the two off-loading buoys 10 miles off the coast of Gloucester, Massachusetts. Upon completion, the LNG facility will consist of an unloading buoy system where specially designed vessels will moor and offload their natural gas into a pipeline, which will deliver the product to customers in Massachusetts and throughout New England. The Neptune project is expected to have small, localized impacts where the pipelines and buoy anchors contact the bottom.

Summary of Impacts from Non-Fishing Actions:
The impacts of most of these actions are localized and although considered negative at the site, they have an overall low negative or negligible effect on each VEC due to limited exposure of action to the population or habitat as a whole. Restoration activities and the ship strike rule are exceptions to this rule. Restoration activities result in positive impacts to the physical habitat, and both restoration activities and the ship strike rule result in positive impacts to aspects of the biological environment. In general, however, all of these non-fishing actions would have negligible impacts to the VECs related to the GB Offshore Area, because of the distance from these on- or near-shore activities and the localized impacts they present.

Summary of Cumulative Effects

Since the direct and indirect impacts of Alternatives A and B are predicted to be the same, the cumulative effects resulting from the implementation of either of these alternatives and the CEA Baseline are discussed by VEC in the following sections.

Physical Environment/Habitat/EFH:
Since quotas are not increasing as a result of this action, it is anticipated that the total area swept by hydraulic clam dredges would be no more than the current area that is estimated to be swept in the current extent of the fishery. However, clam dredges would have a negative impact on benthic habitats in localized areas within the GB PSP Closure Area that have not been subject to clam dredging for almost 20 year. The direct and indirect adverse impacts on the physical environment associated with Alternatives A or B would, however, be temporary since affected habitat features in the highly energetic environment on GB would be expected to recover fairly rapidly from the disturbance caused by dredging. Either action alternative would expand the geographic range of the fishery – even if the total area swept remains the same – and open up previously unexploited areas on GB to clam dredging. Therefore, there would be an overall low negative impact of the fishery on the EFH of a number of federally-managed species, but it would be minimal and/or temporary for the reasons given above.

Other past and present fishing actions have had impacts ranging from negligible to positive, but overall impacts have been low positive due to the establishment of EFH and the switch to an ITQ management system which has allowed for distribution of fishing effort throughout the year, and consequently a decline in fishing intensity. Future management actions are likely to have negligible impacts. Non-fishing actions have had negligible impacts on the physical environment of the GB Closure Area. In summary, cumulative impacts from the proposed action, fishing actions, and non-fishing actions to the physical environment of the GB Closure Area range from negligible to negative.

Target Species:
Since there would be no change in quotas (i.e., there would be no increase in harvesting permitted), the implementation of Alternatives A or B would have negligible impacts to the SC/OQ species. Other past and present fishing actions have had impacts ranging from negligible to positive, but overall management measures have had a cumulative positive impact on these species as overfishing has not occurred. Future fishing actions would likely continue this trend of managing the resource in a sustainable manner, in accordance with the management objectives presented in Amendment 8. Non-fishing actions have had negligible impacts on the target species. In summary, cumulative impacts from the proposed action, fishing actions, and non-fishing actions to the target species of the GB Closure Area are low positive.

Non-Target Species and Bycatch:
As discussed in Section 5.3, the SC/OQ fisheries are very "clean" in terms of the efficiency with which the dredges select and capture target species over non-target and

bycatch species. Since there would be no increase in harvesting permitted, the implementation of Alternatives A or B would have negligible impacts to the non-target and bycatch species. Other past, present, and future fishing actions have had negligible impacts on non-target and bycatch species. Non-fishing actions have had negligible impacts on the non-target and bycatch species. In summary, cumulative impacts from the proposed action, fishing actions, and non-fishing actions to the non-target and bycatch species of the GB Closure Area are negligible.

Protected Resources:
As discussed in Section 5.4, the SC/OQ fisheries are considered to be Category III fisheries on the List of Fisheries, meaning that takes of protected resources are minimal. Since there would be no increase in harvesting permitted, overall fishing effort would remain the same, and the implementation of Alternatives A or B would result in negligible impacts to protected resources. Other past, present, and future fishing actions have had negligible impacts on protected resources. Non-fishing actions have had negligible impacts on protected resources. In summary, cumulative impacts from the proposed action, fishing actions, and non-fishing actions to protected resources of the GB Closure Area are negligible.

Human Communities:
As discussed in Section 5.5, opening a portion of the GB Offshore Closed Area would result in a temporary increase in the LPUE, thereby resulting in greater revenues for fishery participants in the short term. Because the quota is not changing as a result of this action, revenues for ports are not necessarily going to increase, therefore impacts from Alternatives A or B are expected to be negligible for ports, but positive for participants. Harvesting SC/OQ from any open area presents a low potential risk that shellfish contaminated with saxotoxins may reach the marketplace. However, based upon the various FDA and state testing protocols with which the proposed action will be subjected, as well as the fact that the proposed action will not increase the number of SC/OQ harvested, the impact of the proposed action on public health is considered to be negligible. Other past, present, and future fishing actions have had impacts ranging from negligible to positive for participants and ports, and negligible impacts to public health. Non-fishing actions have had negligible impacts on human communities. In summary, cumulative impacts from the proposed action, fishing actions, and non-fishing actions to fishery participants would be positive, to ports impacts and public health would be negligible.

Conclusion: In conclusion, the summary of impacts from Alternatives A or B and the CEA Baseline would be negligible on habitat, non-target species and bycatch, protected resources, and ports; low positive to target species and fishery participants; and low negative to public health. These impacts would not be significant due to the reasons stated in this assessment.

7.0 APPLICABLE LAWS

7.1 National Environmental Policy Act (NEPA)

Finding of No Significant Impact (FONSI)
This section is subject to further evaluation/consideration, including public comment, and will be addressed in the final version of this document.

7.2 Magnuson-Stevens Fishery Conservation Management Act

Pursuant to section 304(b)(1)(A) of the Magnuson-Stevens Act, the proposed action is consistent with the Surfclam and Ocean Quahog FMP, other provisions of the Magnuson-Stevens Act, and other applicable law, subject to further consideration after public comment.

Essential Fish Habitat Assessment

Description of Action
The proposed action would open an area of 447 square miles (1,158 square km) within the Georges Bank PSP Closure Area to the harvesting of surfclams and ocean quahogs, subject to requests from the Food and Drug Administration (FDA) that the area be opened because the shellfish are free of saxotoxins that cause paralytic shellfish poisoning. Any or all portions of this area (located on Cultivator Shoals) would be subject to seasonal or annual PSP openings or closings based on action taken by the FDA.

Potential Adverse Effects of the Action on EFH
The area that is proposed to be opened has been designated EFH for a number of federally-managed species. Because the area has been closed to the harvesting of these two species of clams since 1990, the use of hydraulic clam dredges by commercial fishing vessels would expose benthic habitats to the adverse effects of this gear for the first time in 20 years. Hydraulic clam dredges adversely affect benthic habitats more severely than other types of fishing gear because they inject pressurized water 8-10 inches into sandy sediments to dislodge the clams, allowing them to be caught and brought to the surface. However, this area is located in a relatively shallow (30-60 meters) part of Georges Bank that is highly disturbed by strong tidal currents and wave action from storms. Furthermore, published studies of the effects of hydraulic clam dredges in high-energy, sandy, habitats indicate that, in this type of environment, the affected physical and biological features of the seafloor can be expected to recover from the impacts of this gear within a matter of a few days or months. Therefore, the proposed action would have no more than a minimal or temporary adverse impact on EFH in the affected area. The effect throughout the entire range of the fishery, which includes the Mid-Atlantic region, is also expected to be minimal, since the proposed action would not increase the quantity of clams that can be harvested annually and, therefore, the total amount of bottom contact time by dredges would not increase.

Proposed Measures to Avoid, Minimize, or Mitigate Adverse Impacts of This Action
No such measures are required because the adverse impacts of this action are no more

than minimal and not temporary in nature.

Conclusions
The proposed action would adversely impact EFH within the 447 square miles that would be opened to surfclam and ocean quahog harvesting, but because the area is subject to a high degree of natural disturbance and because any affected benthic habitat features are expected to recover within a few days or months, the impacts would be minimal and/or temporary and not require any mitigation.

7.3 Endangered Species Act

Section 7 of the ESA requires agencies conducting, authorizing, or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species. The impact of the proposed action on protected species is considered in Sections 5.4 and 6.4 of the PEA. This action is not expected to have a direct or indirect impact on protected resources, including endangered or threatened species or their habitat.

7.4 Marine Mammal Protection Act

The impact of the proposed action on protected species is considered in Sections 5.4 and 6.4 of the PEA. This action is not expected to have any direct or indirect impacts on marine mammals, is consistent with the provisions of the MMPA, and would not alter existing measures to protect the marine mammal-listed species that are likely to inhabit the management units of the subject fisheries.

7.5 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972, as amended, provides measures for ensuring stability of productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. It is recognized that responsible management of both coastal zones and fish stocks must involve mutually supportive goals.

NMFS must determine whether the FMP or regulatory action will affect a state's coastal zone. If it will, the FMP must be evaluated relative to the state's approved CZM program to determine whether it is consistent to the maximum extent practicable. The states have 60 days in which to agree or disagree with NMFS evaluation. If a state fails to respond within 60 days, the state's agreement may be presumed. If a state disagrees, the issue may be resolved through negotiation or, if that fails, by the Secretary.

NMFS has determined that this action is consistent to the maximum extent practicable with the enforceable provisions of the approved coastal management programs as understood by NMFS. This determination was submitted for review by the responsible state agencies on April , 2010 under section 307 of the Coastal Zone Management Act. Letters were sent to each of the following states within the management unit reviewing the consistency of the NMFS-proposed action relative to each state's Coastal Zone Management Program: Maine; New Hampshire; Massachusetts; Rhode Island; Connecticut; New York; New Jersey; Pennsylvania; Delaware; Maryland; Virginia; and

North Carolina. To request a copy of the letter or a list of the CZM contacts for each state, contact Anna Macan at NOAA National Marine Fisheries Service, Northeast Region, Sustainable Fisheries Division, 55 Great Republic Drive, Gloucester, MA 01930, Telephone: (978) 281-9165, Fax: (978) 281-9135.

7.6 Administrative Procedure Act

Section 553 of the Administrative Procedure Act establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of these requirements is to ensure public access to the Federal rulemaking process, and to give the public adequate opportunity for comment. At this time, NMFS is not requesting any abridgement of the rulemaking process for this action. The public will have an opportunity to comment on this action once NMFS publishes a request for comments notice in the Federal Register (FR).

7.7 Section 515 (Information Quality Act)

Pursuant to NOAA guidelines implementing section 515 of Public Law 106-554 (the Information Quality Act), all information products released to the public must first undergo a Pre-Dissemination Review to ensure and maximize the quality, objectivity, utility, and integrity of the information (including statistical information) disseminated by or for Federal agencies. The following sections address these requirements.

Utility of Information Product

The information presented in this document is helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the proposed action, the measures proposed and the impacts of those measures. A discussion of the reasons for selecting the proposed action is included so that intended users may have a full understanding of the proposed action and its implications.

The proposed rule informs the public that NMFS proposes a change in the regulations that would open a portion of the GB Closed Area to the harvest of surfclams and ocean quahogs for human consumption. This proposed action is being developed in response to a request from the FDA. NMFS defers to the FDA in matters of public health, and the FDA has determined, through recent testing, that the PSP toxin levels are below regulatory limits established for public health and that the harvest of SC/OQ in the proposed area as listed in Section 4.1 of the PEA, is safe for human consumption.

Until a proposed rule is published, this document is the principle means by which the information pertaining to this action will be made available to the public. The information provided in the proposed rule is based on the most recent information available from relevant data sources. The information contained in this document and includes detailed and relatively recent information on the surfclam and ocean quahog resource and, therefore, represents an improvement over previously available information. The information product will be subject to public comment through proposed rulemaking, as required under the Administrative Procedure Act and, therefore, may be improved based on comments received.

The proposed rule prepared for this action is available in several formats, including printed publication, and online through the Northeast Regional Office web page (www.nero.noaa.gov). The Federal Register notice announces that the proposed rule will be made available in printed publication, on the website for the Northeast Regional Office (www.nero.noaa.gov), and through the Regulations.gov website.

Integrity of Information Product
Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information.

The information product meets the standards for integrity under the following types of documents:

Other/Discussion (e.g., Confidentiality of Statistics of the Magnuson-Stevens Fishery Conservation and Management Act; NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics; 50 CFR 229.11, Confidentiality of information collected under the Marine Mammal Protection Act.)

Objectivity of Information Product
The category of information product that applies for this product is "Natural Resource Plans."

The proposed rule, adheres to the published standards of the Magnuson-Stevens Act; the Operational Guidelines, Fishery Management Plan Process; the Essential Fish Habitat Guidelines; the National Standards Guidelines; and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act.

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Several sources of data were used in the development of the regulatory amendment. The data sources included, but are not limited to, vessel trip reports and commercial dealer databases, and Northeast Fisheries Science Center (NEFSC) and Council prepared documents. In addition to these sources, additional information is presented that has been accepted and published in peer-reviewed journals or scientific organizations.

The management measures proposed for this action were selected based upon the best scientific information available. The analysis conducted used information from the most recent fishing years through 2009. Specialists who worked with the data are familiar with the available data and information relevant to the SC/OQ fishery.

The policy choices are clearly articulated in the proposed rule and all supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

The review process used in preparation of this document involves the NEFSC, the Northeast Regional Office (NERO), and NMFS Headquarters. The Center's technical review is conducted by senior level scientist with specialties in population dynamics, stock assessment methods, demersal resources, population biology, and the social sciences. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. Final approval of any proposed regulatory action, including any implementing regulations, is conducted by staff at NMFS Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget.

7.8 Paperwork Reduction Act

The Paperwork Reduction Act (PRA) concerns the collection of information. The intent of the PRA is to minimize the Federal paperwork burden for individuals, small businesses, state and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government. This action does not modify any existing collections, or to add any new collections; therefore, no review under the PRA is necessary.

7.9 Impacts of the Plan Relative to Federalism/Executive Order (E.O.) 13132

This specifications document does not contain policies with federalism implications sufficient to warrant preparation of a federalism assessment under E.O. 13132.

7.10 E.O. 13158 (Marine Protected Areas)

The Executive Order on Marine Protected Areas (MPA) requires each Federal agency whose actions affect the natural or cultural resources that are protected by an MPA to identify such actions, and, to the extent permitted by law and to the maximum extent practicable, in taking such actions, avoid harm to the natural and cultural resources that are protected by and MPA. The E.O. directs Federal agencies to refer to the MPAs identified in a list of MPAs that meet the definition of MPA for the purpose of the Order. The E.O. requires that the Department of Commerce and the Interior jointly publish and maintain such a list of MPAs. As of the date of submission of this document, the list of MPA sites has not been developed by the departments. No further guidance related to this E.O. is available at this time.

7.11 Environmental Justice/E.O. 12898

This E.O. provides that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." E.O. 12898 directs each Federal agency to analyze the environmental effects, including human health, economic, and social effects of Federal actions on minority populations, low-income populations, and Indian tribes, when such analysis is required by NEPA. Agencies are further directed to "identify potential effects and mitigation measures in consultation with affected communities, and improve the accessibility of meetings, crucial documents, and notices."

Due to data constraints, the means for conducting this analysis in detail are not available at this time. It is unknown if any of the participants in the surfclam and ocean quahog fishery come from lower income and/or ethnic minority populations. Nonetheless, because the management of the SC/OQ fishery is managed under an Individual Transfer Quota (ITQ) and this action would not increase the quota, the proposed action is not expected to affect the participants in a negative social or economic manner. This action would increase the fishing grounds available to the fleet, resulting in a positive impact on fishing communities. This action would cause fishing efforts to shift north, but is not expected to have a significant impact to the fleet or processors (Section 6.5). NMFS does not determine any health risk associated with a PSP conditions and defers to the FDA in all matters of the public health. The FDA has determined that the proposed area, as listed in Section 4.1 of the PEA, is safe for human consumption.

7.12 E.O. 12866

Background
In compliance with Executive Order (E.O.) 12866, NOAA's National Marine Fisheries Service (NMFS) requires the preparation of a Regulatory Impact Review (RIR) for all regulatory actions or for significant policy changes that are of public interest. E.O. 12866 was signed on September 30, 1993, and established guidelines for Federal agencies promulgating new regulations and reviewing existing regulations.

An RIR is a required component of the process of preparing and reviewing fishery management plans (FMPs) or amendments and provides a comprehensive review of the economic impacts associated with the proposed regulatory action. An RIR addresses many of the concerns posed by the regulatory philosophy and principles of E.O. 12866. An RIR also serves as the basis for assessing whether or not any proposed regulation is a "significant regulatory action" under criteria specified in E.O. 12866. According to the "Guidelines for Economic Analyses of Fishery Management Actions," published by NMFS in August 2000, an RIR must include the following elements: (1) A description of the management objectives of the regulatory action; (2) a description of the fishery affected by the regulatory action; (3) a statement of the problem the regulatory action is intended to address; (4) a description of each selected alternative, including the "no action" alternative; and (5) an economic analysis of the expected effects of each selected alternative relative to the baseline.

The MAFMC has managed the SC/OQ fishery since the implementation of the first FMP on November 25, 1977. The FMP established quotas; effort limitations; permit and logbook provision; and placed a moratorium on the surfclam fishery. The SC/OQ has been amended several times since the original FMP. Amendment 8, approved by NMFS on March 23, 1990, was one of the most significant amendments because it replaced the allowable fishing time system with ITQs. The objective to implementing ITQs were to improve conservation and management of the SC/OQ resources, provide the opportunity for the industry to operate efficiently and consistent with the conservation efforts, and build a management system that would meet the objectives and long-term goals of the plan. The fishery continues to operate under the ITQ system and Section 5.5 of the PEA presents a detailed description of the past and current participation in the SC/OQ fishery.

Statement of the Problem and Management Objectives of the Regulatory Action
The SC/OQ range extends to the GB, however, the GB area, known as the GB Closed Area, as defined in Section 4.3 of the PEA has been closed to the harvest of SC/OQ since 1990. The closure was implemented as an emergency action at the request of the FDA, in response to samples of surfclams that tested positive for the toxin (saxotoxins) known to cause PSP. The toxins are produced by the alga, *Alexandrium fundyense*, which can form blooms known as red tides. The red tides, also known as harmful algal blooms (HABs), can produce toxins that accumulate in filter-feeding shellfish. The contaminated shellfish, if eaten in large enough quantity could cause illness or death from PSP. Due to the inability of the FDA to monitor the GB Closed Area for PSP toxins, the closure was made permanent during the implementation of Amendment 12 to the SC/OQ FMP in 1999.

The management objective of the regulatory action is to consider opening a portion of the GB Closed Area. The area proposed to be opened is listed in Section 4.1 and Section 4.3-1 of the PEA. NMFS is implementing this action in response to a letter received from the FDA on January 21, 2010, in which the FDA has determined that through recent testing, that the levels of PSP are below the regulatory limit established for public health safety and the harvest of SC/OQ in a portion of the closed area, as defined in Section 4.1 and shown in Figure 4.3-1, is now safe for human consumption.

Description of the Affected Fishery
A complete description of the ports and communities affected by this action is found under Section 5.5 of the PEA.

Description of the Alternatives
<u>Alternative A – The Proposed Action</u>

Alternative A would open a portion of the GB Closed Area to the harvest of SC/OQ that the FDA determined to be safe for human consumption. The area encompasses 447 square miles (see Section 4.1, and Figure 4.3-1).

<u>Alternative B – Open EFP Exemption Area</u>

Alternative B would open the section of the GB Closed Area that is defined under an Exempted Fishing Permit (EFP) that was issued by NMFS. This area is defined in Section 4.2 and shown in Figure 4.3-1 of the PEA and encompasses approximately 6,378 square miles. The EFP authorizes one vessel to participate in a Shellfish Harvesting Pilot

Project to test the efficacy of the sampling protocol that was developed by state and Federal regulatory agencies to test for presence of saxotoxins in shellfish, and which has been in a trial period through previous EFPs since 2006.

Alternative C – Status Quo/No Action

Alternative C is a no action alternative and the entire GB Closed Area would remain closed to the harvest of SC/OQ.

Expected Economic Effects of the Alternatives

Both Alternatives A and B would not have an adverse impact on the economy as both alternatives would provide a larger area open to the harvest of SC/OQ. In addition, SC/OQs are managed under an ITQ, and this action does not change the quota. Furthermore, the amount of SC/OQ harvested is largely driven by market demand. The entire allocated quota available for surfclams has not been harvested since 2001 and the available quota available for ocean quahogs came close to being fully harvested in 1997 (99 percent) (Table 5.5-3). In FY 2009, the quota harvested for SC/OQ was the lowest to date, 70 percent and 52 percent, respectively. This is another indicator that the harvest of SC/OQ is market limited. Overall, Alternatives A and B would provide a positive economic impacts due to increased area and target species biomass available to harvest SC/OQ. Additionally, opening part of this area may decrease fishing pressure on the southern SC/OQ stocks that are experiencing localized depletions (Section 6.1).).

If an area of the GB Closed Area is opened to the harvest of SC/OQ, due to health concerns associated with PSP, there is the potential that some states may not permit landings of SC/OQ from the GB area (Section 6.5). The majority of surf clams harvested in Federal waters are landed in New Jersey and trucked to Delaware for processing. New Jersey, however, has already authorized landings of clams harvested from the GB area through an Exempted Fishing Permit that was issued by NMFS. The EFP authorizes one vessel to participate in a Shellfish Harvesting Pilot Project to test the efficacy of the sampling protocol that was developed by state and Federal regulatory agencies to test for presence of saxotoxins in shellfish, and which has been in a trial period through previous EFPs since 2006. Since New Jersey and Delaware have already authorized landings and processing of clams harvested from the GB Area, this action is not expected to have a significant impact on major landing ports and processing plants.

Alternative C is a no action alternative and the entire GB Closed Area would remain closed to the harvest of SC/OQ. Under this alternative, there would be no change in the area available to the harvest of SC/OQ, and no change in fishing effort; thus, Alternative C would have not have an economic impact as a result of this action.

Determination of Significance Under E.O. 12866

E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be significant. A "significant regulatory action" is one that is likely to: (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, safety, or state, local, or tribal Governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

A regulatory program is "economically significant" if it is likely to result in the effects described above. The RIR is designed to provide information to determine whether the proposed regulation is likely to be "economically significant."

NMFS has determined that, based on the information presented above, this action is expected to have an annual effect on the economy of $100 million. Because none of the factors defining "significant regulatory action" are triggered by this action, the action has been determined to be not significant for the purposes of E.O. 12866.

7.13 Regulatory Flexibility Act (RFA)

The purpose of the RFA is to reduce the impacts of burdensome regulations and recordkeeping requirements on small businesses. To achieve this goal, the RFA requires Federal agencies to describe and analyze the effects of proposed regulations, and possible alternatives, on small business entities. For the purpose of this action, NMFS has determined that this action would not have a significant economic impact on a substantial number of small entities and therefore an initial regulatory flexibility analysis is not required and none has been prepared. NMFS has submitted a request for certification under section 605(b) of the Regulatory Flexibility Act. Factual basis for the certification is described below.

Objective and legal basis for the action

The purpose and need for this action is described in Section 3.0 of the PEA. The regulations implementing the GB Closure Area (50 CFR 648.73(a)(4)) to the harvest of SC/OQ were implemented in response to the presence of PSP toxin levels and its associated health risks. NMFS is implementing this action in response to a letter received from the FDA on January 21, 2010, in which the FDA has determined that through recent testing, that the levels of PSP are below the regulatory limit established for public health safety and the harvest of SC/OQ in a portion of the closed area, as defined in Section 4.1 and shown in Figure 4.3-1, is now safe for human consumption.

Description and estimate of the number of small entities to which the rule applies

The Small Business Administration (SBA) defines a small business in the commercial fishing and recreational fishing activity, as a firm with receipts (gross revenues) of up to $4.0 million. The SC/OQ fishery is managed under an Individual Transferable Quota (ITQ), where annual landings are allocated to the industry based on catch history and vessel size. The proposed measure would affect any vessel which actively fishes and holds a current federal surfclam/ocean quahog permit. In 2009 there were 47 non-Maine vessels that landed surfclams and/or ocean quahogs. All of these vessels fall within the definition of a small business.

Economic impacts to affected small businesses

The proposed action is not expected to have an adverse impact on small business. The action only proposes to open an area of water that has previously been closed. Since the area is farther offshore, it is likely that the larger vessels (>90 feet) would target the SC/OQ from the GB area. The SC/OQ fishery, however, is managed under an ITQ system, and since the quotas are not being changed, as a result of this action, there would be no net change in fishing effort, and participating vessels regardless of is size would still be able to fish in any of existing areas open to the harvest of SC/OQ. Those vessels that would fish in the area proposed to be opened would experience increased operational costs. These costs, however, may be offset due to increased productivity in effort because of greater abundance of SC/OQ in the GB Closed Area. In addition, given their high value, it is likely that SC would be targeted over ocean quahogs. Vessels that target ocean quahogs are generally larger because ocean quahogs are farther offshore and thus these vessels are likely to fish in the GB Area and are likely to target surfclams to offset the increase in operational costs (e.g., fuel and labor). Due to the seasonal variability of PSP toxin levels, it is likely that the any or all of the areas associated with this action may open or close based on PSP conditions. Given this uncertainty for the area to remain open, it is not anticipated that there would be an increase in participation in the fishery.

The Economic impacts associated with this action are discussed in more detain in section 6.5 of the PEA.

Analysis of Significant Economic Impact

Profitability

The analysis presented in Section 6.5 of the PEA indicates that the profitability of vessels would overall have a positive impact to the fleet. The proposed action would provide a larger area available to harvest SC/OQ. The biomass on the GB Closed Area represents 48 percent of the total biomass for SC and 45 percent of the total biomass for OQ, and opening a small portion of the GB Closed Area would provide some of this abundance to the SC/OQ fleet.

Disproportionality

There are no large businesses involved in the SC/OQ fishery. All vessels are considered to be small entities under the SBA approved size definition of "small entity". Since the area is farther offshore, it is likely that the larger vessels would target the SC/OQ from the GB area. The SC/OQ fishery, however, is managed under an ITQ system, and since the quotas are not being changed, as a result of this action, there would be no net change in fishing effort, and participating vessels regardless of is size would still be able to fish in any of existing areas open to the harvest of SC/OQ. As well, the SC/OQ is largely market limited, as the total quota available for SC/OQ in most years are not fully harvested (Table 5.5-3).

Substantial number criterion
All vessels that actively fish in the SC/OQ fishery will be affected by this rule. The large vessels of the total vessels engaged in the fishery will primarily be affected.

8.0 LIST OF PREPARERS AND PERSONS/AGENCIES CONSULTED

This document was prepared by the National Marine Fisheries Service staff in the Sustainable Fisheries Division (Timothy Cardiasmenos & Anna Macan), the Habitat Conservation Division (David Stevenson) and the National Environmental Policy Group (Brian Hooper & Allison Guinan). In addition, this document was reviewed by NMFS staff in the following divisions:

Habitat Conservation Division, Northeast Region Office, Gloucester, MA
Protected Resource Division, Northeast Region Office, Gloucester, MA
Sustainable Fisheries Division, Northeast Region Office, Gloucester, MA
NEPA Group, Northeast Region Office, Gloucester, MA

The following agencies were consulted in the preparation of this PEA:
Social Science Unit of the NMFS Northeast Fisheries Science Center
U.S. Food and Drug Administration (FDA)

Questions concerning this document may be addressed to:
Anna Macan, Fishery Management Specialist
NOAA Fisheries Service
Northeast Regional Office
Sustainable Fisheries Division
55 Great Republic Drive
Gloucester, MA 01930-2276

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ATTACHEMENT I

FDA letter to NMFS Regional Administrator, dated January 21, 2010

ATTACHEMENT II

Endangered, Threatened and Protected Species

The list of protected species affected by the Surfclam/Ocean Quahog FMP is discussed in the FSEIS for Amendment 13. The following species are found in the alternative PSP closure areas and are listed under the Endangered Species Act of 1973 (ESA) as endangered or threatened under NMFS' jurisdiction. The list includes a number of species that are identified as protected under the Marine Mammal Protection Act of 1972 (MMPA).

Cetaceans	
Northern right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*)	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Harbor porpoise (*Phocoena phocoena*)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
Pilot whale (*Globicephala* spp.)	Protected
White-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Spotted and striped dolphins (*Stenella* spp.)	Protected
Bottlenose dolphin (*Tursiops truncatus*)	Protected
Seals	
Harbor seal (*Phoca vitulina*)	Protected
Gray seal (*Halichoerus grypus*)	Protected
Harp seal (*Phoca groenlandica*)	Protected
Sea Turtles	
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered