

Mid-Atlantic Fishery Management Council **Ocean Quahog Information Document - April 2016**

Note: The National Marine Fisheries Service (NMFS) Northeast Fishery Science Center (Dan Hennen Pers. Comm., NEFSC 2016) has provided data updates regarding recent fishery and biological data available. The following summarizes some of the information from that data update, but not all; the data update can be referenced for additional details and is available at: http://www.mafmc.org/s/DataUpdatefromNEFSC_OceanQuahog.pdf.

Management System

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

Basic Biology

Information on ocean quahog biology can be found in the document titled, “Essential Fish Habitat Source Document: Ocean Quahog, *Arctica islandica*, Life History and Habitat Requirements” (Cargnelli et al. 1999). An electronic version is available at the following website: <http://www.nefsc.noaa.gov/nefsc/habitat/efh/>. Additional information on this species is available at the following website: <http://www.fishwatch.gov/>. A summary of the basic biology is provided below.

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

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. Ocean quahogs have been aged well in excess of 200 years. Growth tends to slow after age 20, which corresponds to the size currently harvested by the industry (approximately 3 inches). Size and age at sexual maturity are variable and poorly known. Studies in Icelandic waters indicate that 10, 50, and 90 percent of female ocean quahogs were sexually mature at 40, 64 and 88 mm (1.5, 2.5 and 3.5 inches) shell

length or approximately 2, 19 and 61 years of age. Spawning occurs over a protracted interval from summer through autumn. Free-floating larvae may drift far from their spawning location because they develop slowly and are planktonic for more than 30 days before settling. Major recruitment events appear to be separated by periods of decades.

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

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

Status of the Stock

A forward projecting stock assessment model, based on the Deriso-Schnute delay-difference equation, was applied in a program called (KLAMZ) and was used in the most recent ocean quahog assessment update (Chute et al. 2013). This update utilized the same peer-reviewed and approved methods developed at Stock Assessment Workshop 48 (SAW 48). Detailed reports on “Stock Status,” including annual assessment and reference point update reports, SAW reports, and Stock Assessment Review Committee (SARC) panelist reports are available online at the NEFSC website: <http://www.nefsc.noaa.gov/>.

Based on the June 2013 update, which utilized data through 2011, the stock is not overfished and overfishing is not occurring, relative to the biological reference points (Chute et al. 2013). Whole stock fishable biomass during 2011 was 2.96 million mt meats (Figure 1), which is above the revised B_{target} of 1.73 million mt and the revised $B_{\text{threshold}}$ of 1.39 million mt. The fishing mortality rate during 2011 for the stock in the exploited region was $F = 0.010 \text{ y}^{-1}$ (Figure 2), below the revised $F_{\text{threshold}}$ of 0.022 y^{-1} . Fishing mortality for the exploited area of the stock was also below the previous $F_{\text{threshold}}$ of 0.08 y^{-1} , and whole stock biomass was above the previous $B_{\text{threshold}}$ of 0.89 million mt.

Based on assessment data, the ocean quahog population is an unproductive stock with infrequent recruitment, and thus vulnerable to overfishing (Chute et al. 2013). After three decades of fishing at a low F , the stock as a whole is being fished down. In 2011, fishable stock biomass in the southernmost regions of Southern VA, Delmarva, and NJ was less than half of 1978 pre-fishery levels (recommended target biomass for the stock as a whole is 50% of the pre-fishery biomass). Biomass in the more northern regions of LI increased after 1978 due to a recruitment event and growth, but then began to decrease in the early 1990s when recruitment declined and the fishery gradually began to move north into these regions. Recruitment events appear to be localized and separated by decades, although survey length frequencies show that a low level of recruitment occurs on a continuous basis. The potential contribution of this recruitment to stock biomass and productivity is unknown.

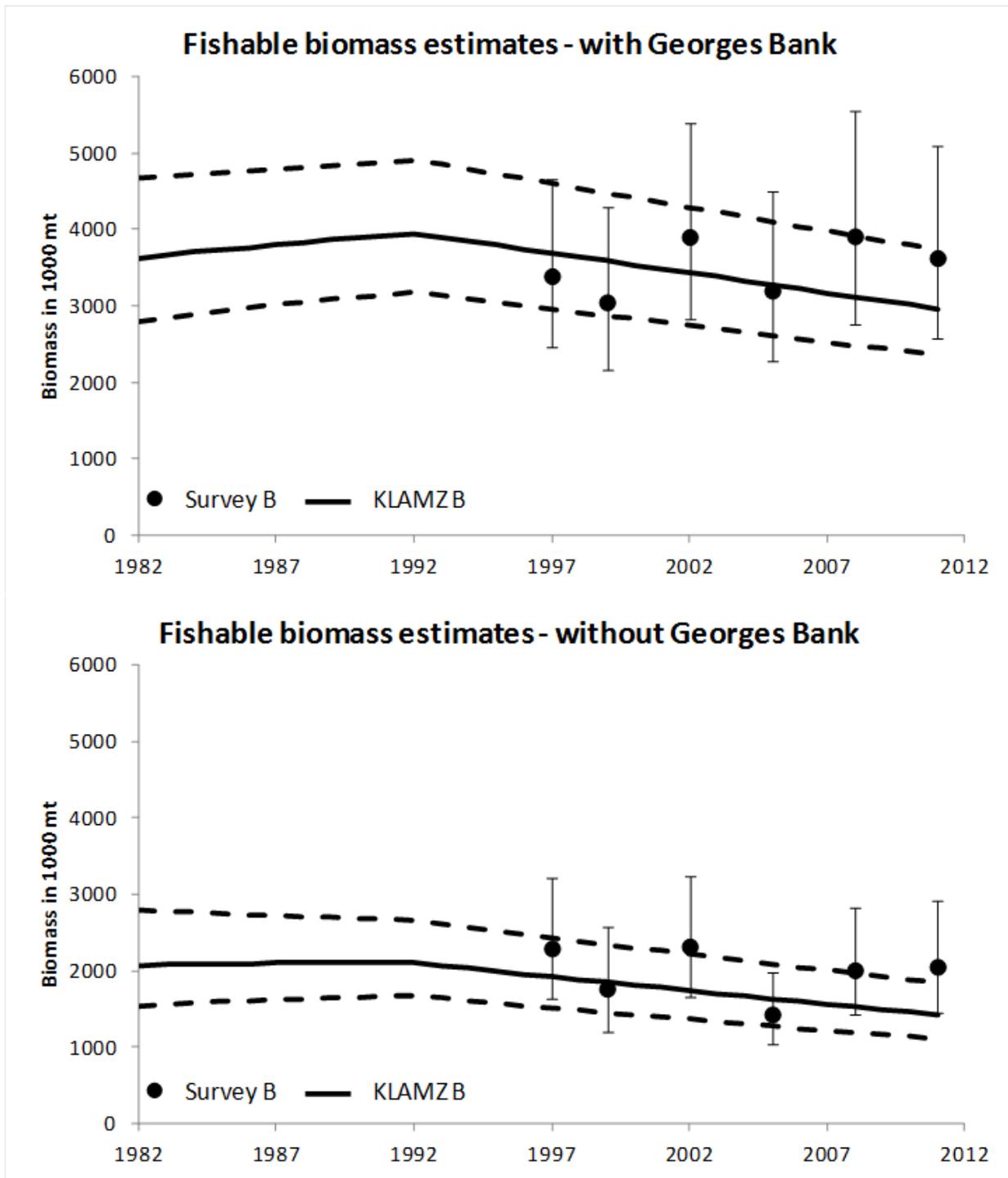


Figure 1. KLAMZ model estimates of fishable biomass for the entire stock (top) and the exploited regions (bottom), 1982-2011. Source: Stock Assessment Update (Chute et al. 2013).

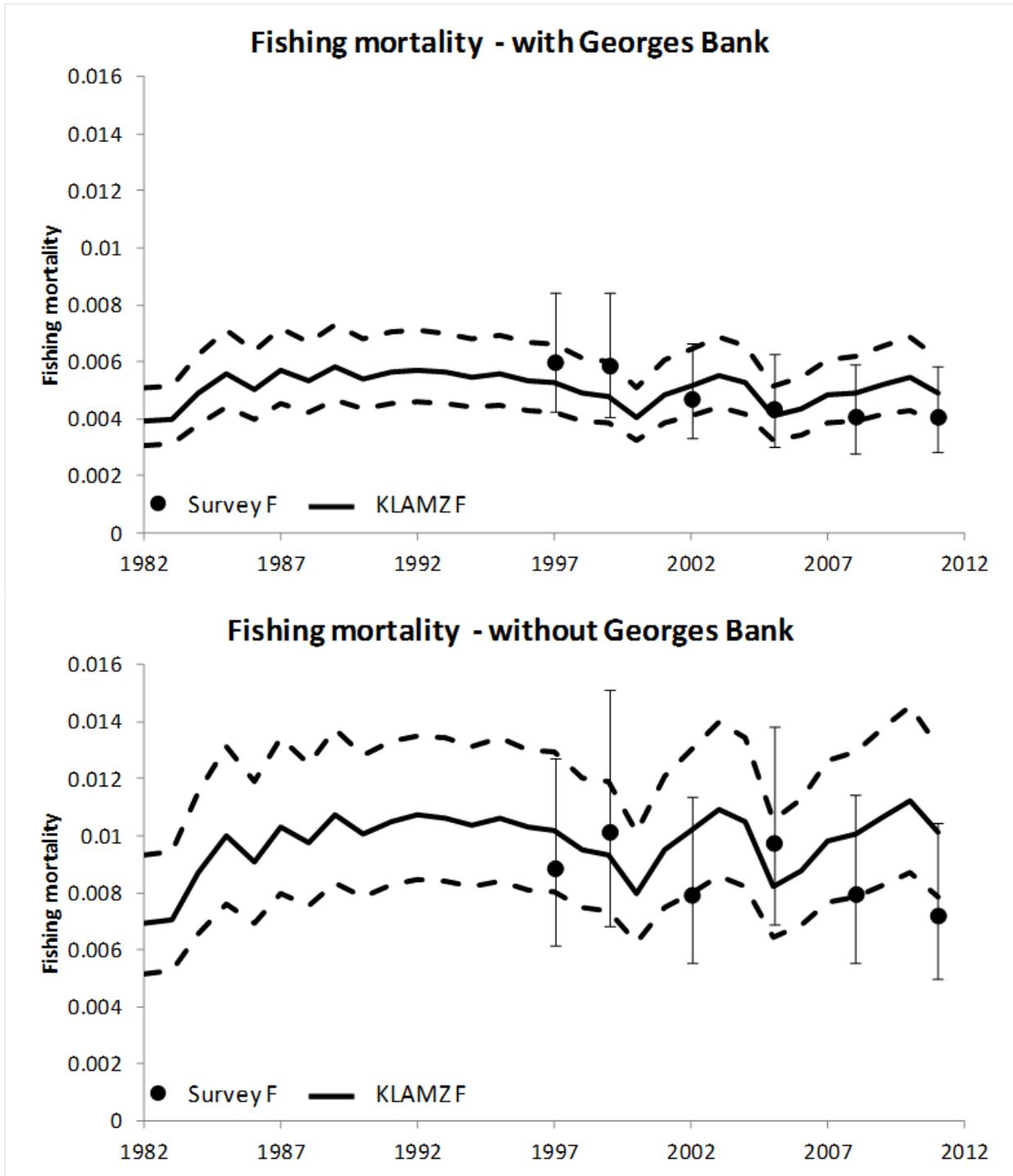


Figure 2. KLAMZ estimates of fishing mortality for the entire stock (top) and the exploited regions (bottom), 1982-2011. Source: Stock Assessment Update (Chute et al. 2013).

Description of the Fishery and Market

The commercial fishery for ocean quahog in Federal waters is prosecuted with large vessels and hydraulic dredges, and is very different from the small Maine fishery prosecuted with small vessels (35-45 ft) targeting quahogs for the local fresh, half shell market. Ocean quahog landings and commercial quotas are given below in Table 1 and Figure 3.

Table 1. Federal Ocean Quahog Quotas and Landings: 1998 - 2016.

Year	EEZ Landings (mt meats)	EEZ Landings ^a ('000 bu)	EEZ Quota ('000 bu)	% Harvested
1998	17,897	3,946	4,000	99%
1999	17,381	3,832	4,500	85%
2000	14,723	3,246	4,500	72%
2001	17,069	3,763	4,500	84%
2002	17,947	3,957	4,500	88%
2003	18,815	4,148	4,500	92%
2004	17,655	3,892	5,000	78%
2005	13,635	3,006	5,333	56%
2006	14,273	3,147	5,333	59%
2007	15,564	3,431	5,333	64%
2008	15,727	3,467	5,333	65%
2009	15,710	3,463	5,333	65%
2010	16,289	3,591	5,333	67%
2011 ^b	14,332	3,160	5,333	59%
2012 ^b	15,864	3,497	5,333	66%
2013 ^b	14,721	3,245	5,333	61%
2014 ^c	14,498	3,196	5,333	60%
2015 ^c	13,491 ^d	2,974 ^d	5,333	56% ^d
2016 ^c	NA	NA	5,333	NA

^a 1 ocean quahog bushel is approximately 10 lb. ^b The Scientific and Statistical Committee (SSC) recommended an overfishing limit (OFL) for 2011-2013 = 34,800 mt, and an acceptable biological catch (ABC) = 26,100 mt. ^c For 2014-2016, the SSC did not recommend an OFL. They recommended a constant ABC of 26,100 mt, for 2014-2016. ^d Preliminary 2015 data. Source: NMFS clam vessel logbook reports. Dan Hennen Pers. Comm., NEFSC 2016.

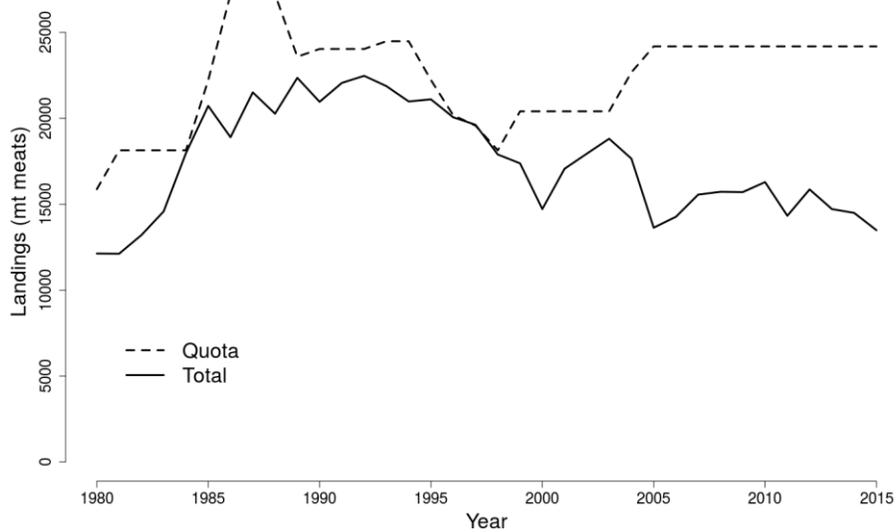


Figure 3. Ocean quahog landings during 1981-2014, and preliminary 2015. Source: Dan Hennen Pers. Comm., NEFSC 2016.

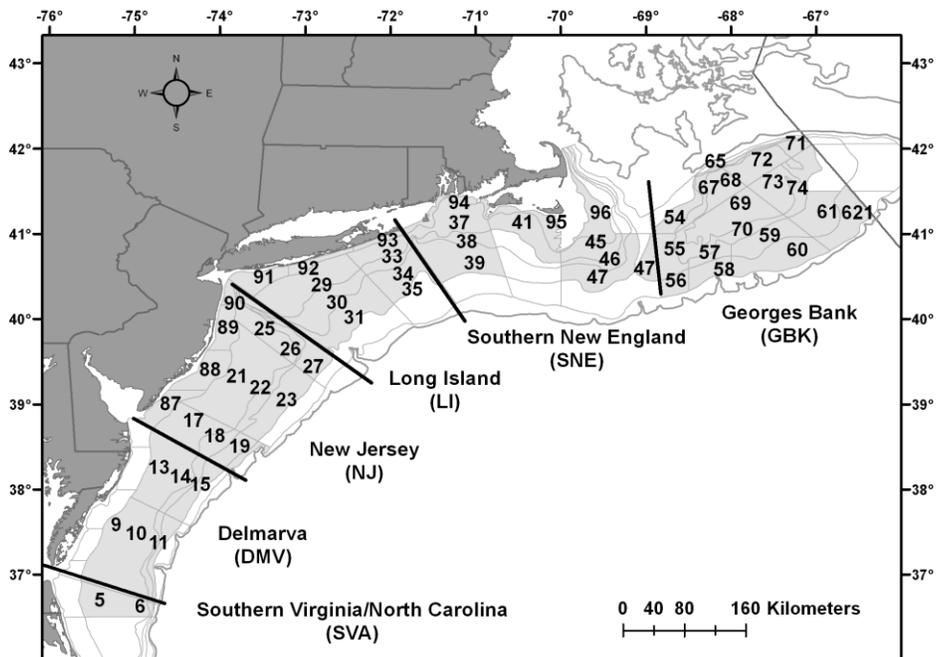


Figure 4. Ocean Quahog stock assessment regions and NEFSC shellfish survey strata. The shaded strata are where ocean quahogs are found. Dan Hennen Pers. Comm., NEFSC 2016.

The distribution of the fishery has changed over time, with the bulk of the fishery from 1980-1990 being prosecuted off the Delmarva, to now being prosecuted in more Northern areas (Figures 4-11). Surfclams on Georges Bank were not fished from 1990 to 2008 due to the risk of paralytic shellfish poisoning (PSP).¹

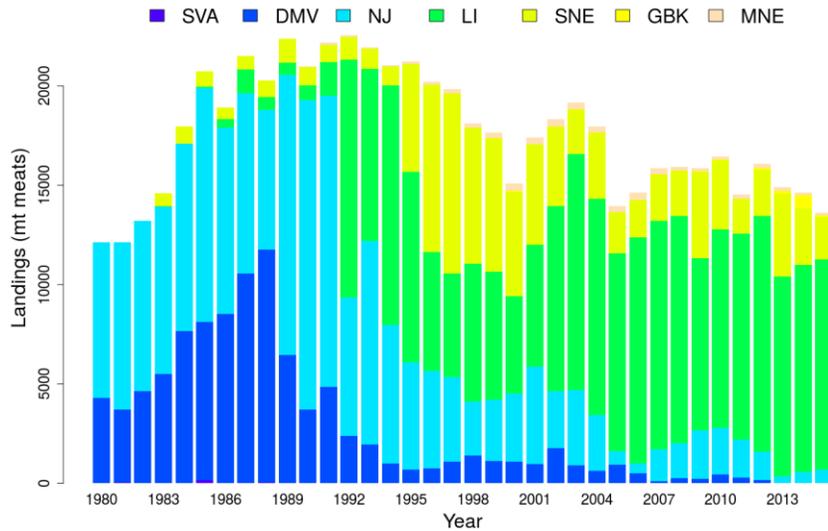


Figure 5. Ocean quahog landings from the US EEZ during 1979-2014, and preliminary 2015, by stock assessment region. Source: Dan Hennen Pers. Comm., NEFSC 2015.

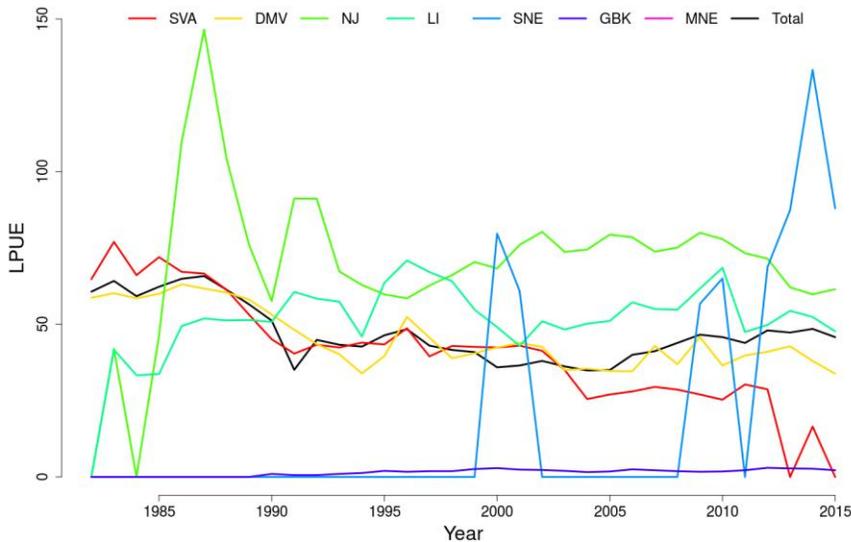


Figure 6. Nominal landings per unit effort (LPUE in bushels landed per hour fished) for ocean quahog, by region, during 1981-2014, and preliminary 2015. LPUE is total landings in bushels divided by total fishing effort. Source: Dan Hennen Pers. Comm., NEFSC 2016.

¹ See Area Closure section on page 17 for additional information.

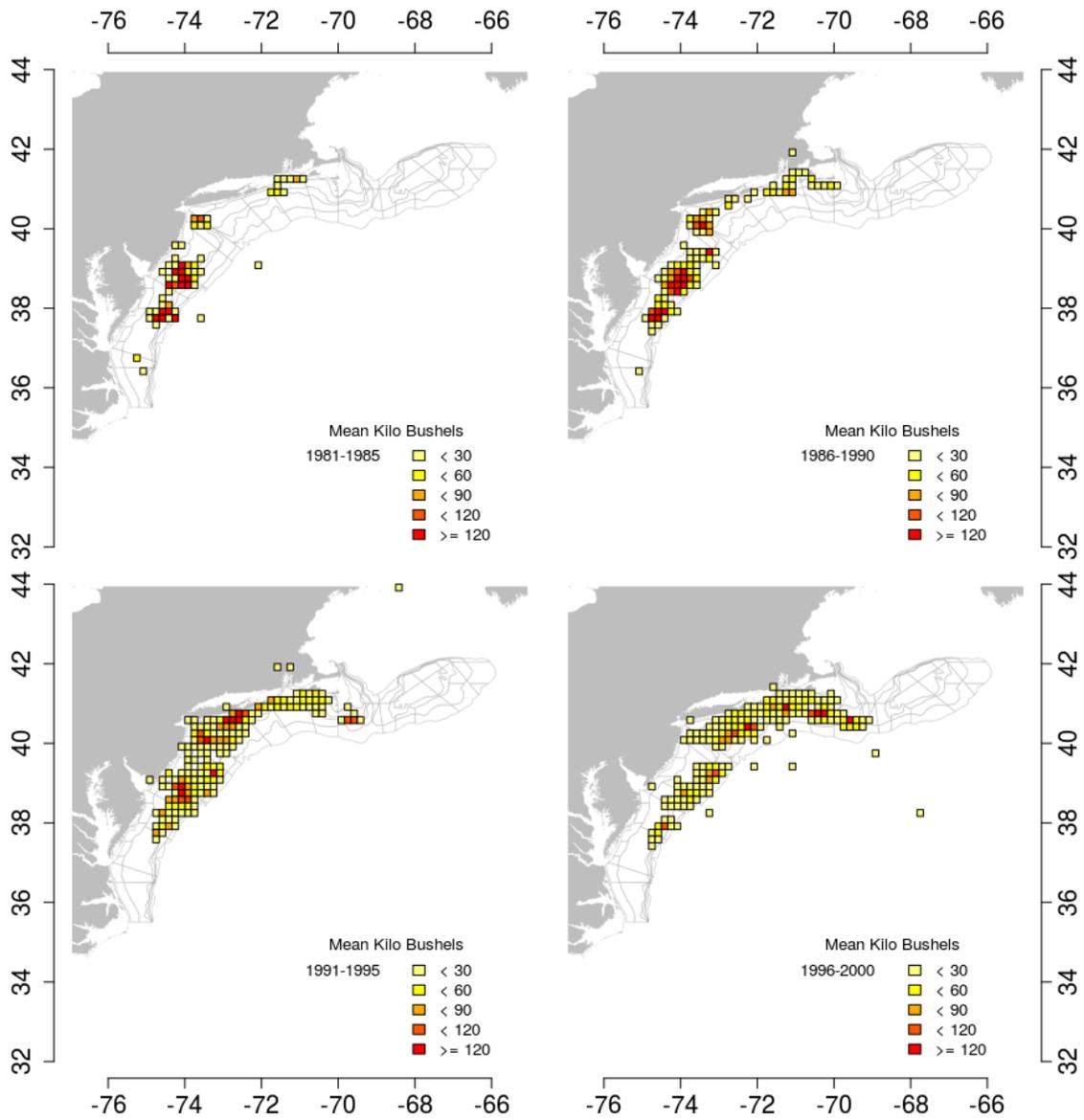


Figure 7. Average ocean quahog landings by ten-minute square (TMSQ), the finest scale location for landings reported in logbooks, for 1981-2000 (1 kilobushel = 1000 bu y⁻¹). Only squares where more than 5 kilo bushels were caught are shown. Source: Dan Hennen Pers. Comm., NEFSC 2016.

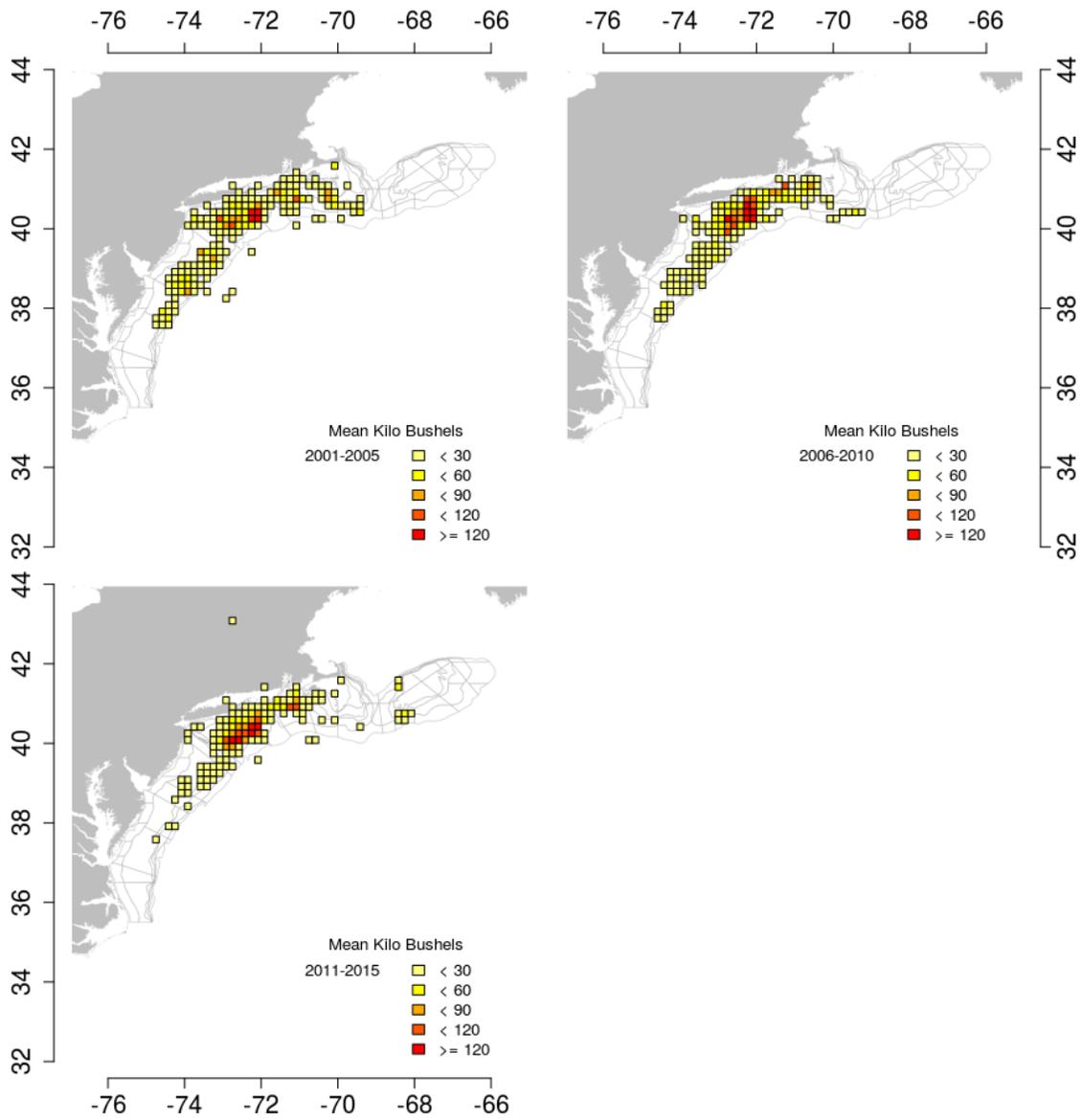


Figure 8. Average ocean quahog landings by ten-minute square (TMSQ), the finest scale location for landings reported in logbooks, for 2001-2014, and preliminary 2015 (1 kilobushel = 1000 bu y⁻¹). Only squares where more than 5 kilo bushels were caught are shown. Source: Dan Hennen Pers. Comm., NEFSC 2016.

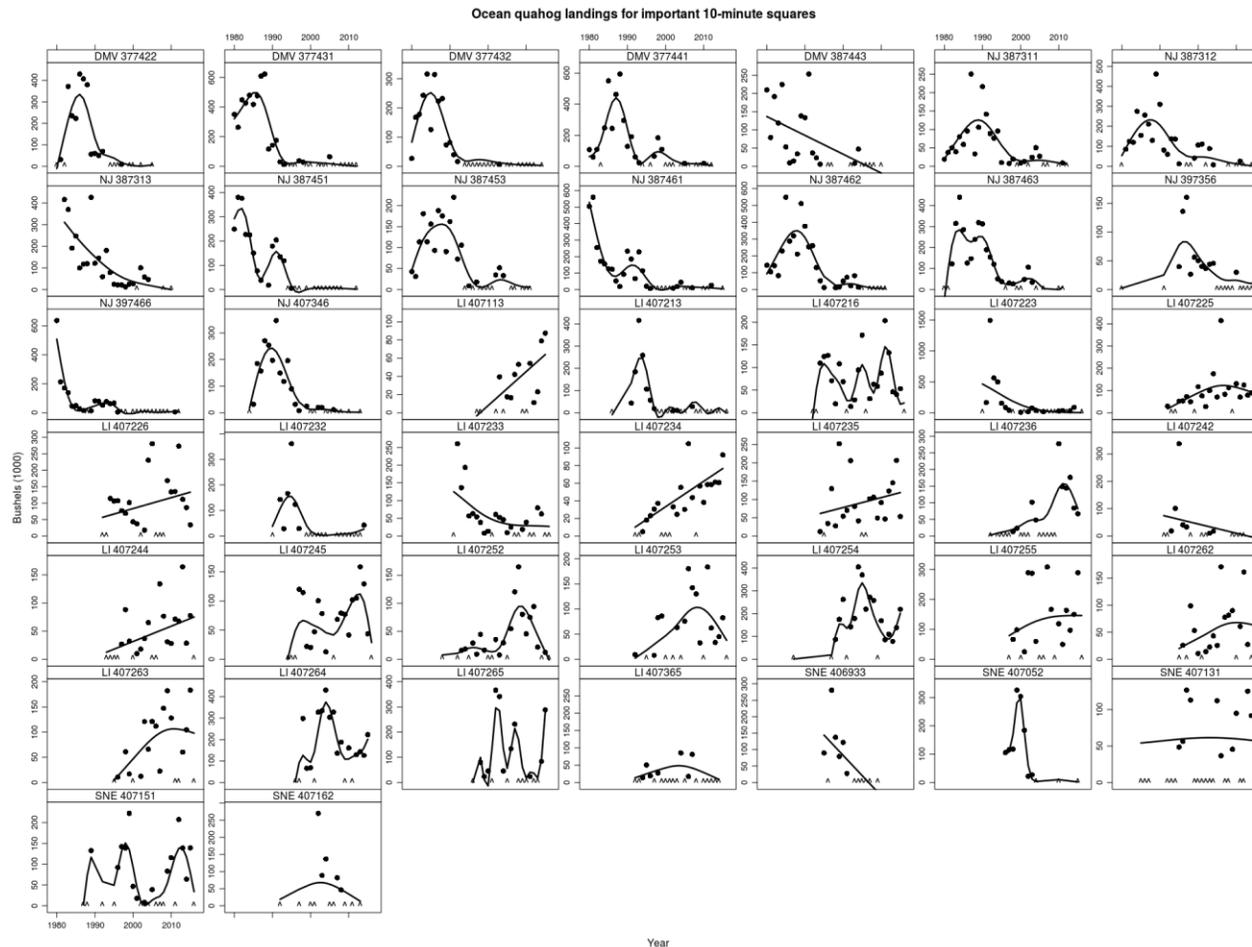


Figure 9. Annual ocean quahog landings in "important" ten minute squares (TMSQ) during 1980-2015 based on logbook data. Important means that a square ranked in the top 10 TMSQ for total landings during any five-year period (1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2010-2015). Data for 2015 are incomplete and preliminary. To protect the privacy of individual firms, data are not plotted if the number of vessels is less than 2. Instead, a "A" is shown on the x-axis to indicate where data are missing. The solid dark line is a spline intended to show trends. The spline was fit to all available data, including data not plotted. Source: Dan Hennen Pers. Comm., NEFSC 2016.

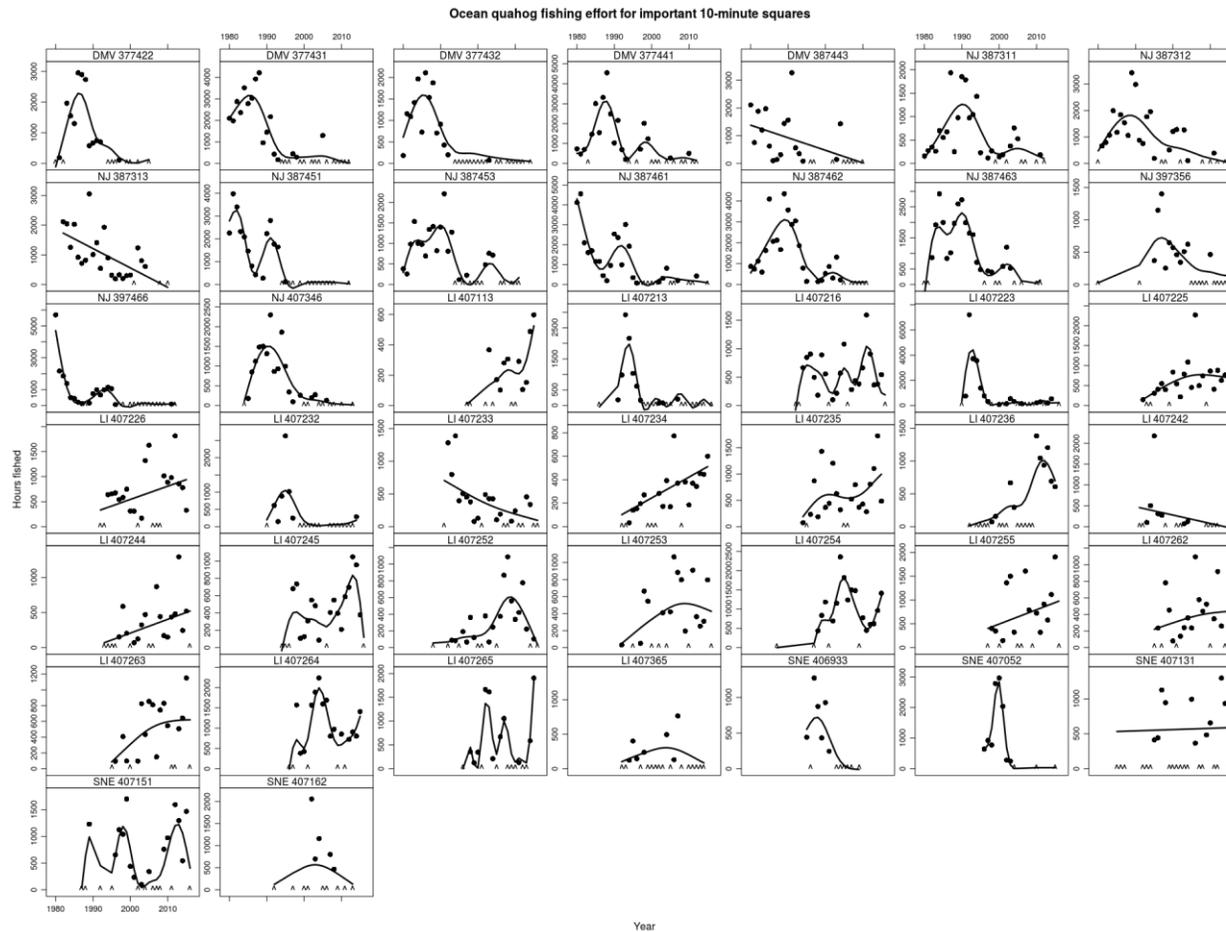


Figure 10. Annual ocean quahog fishing effort (h y^{-1}) in "important" ten minute squares (TMSQ) during 1980-2015 based on logbook data. Important means that a square ranked in the top 10 TMSQ for total landings during any five-year period (1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2010-2015). Data for 2015 are incomplete and preliminary. To protect the privacy of individual firms, data are not plotted if the number of vessels is less than 2. Instead, a '^' is shown on the x-axis to indicate where data are missing. The solid dark line is a spline intended to show trends. The spline was fit to all available data, including data not plotted. Source: Dan Hennen Pers. Comm., NEFSC 2016.

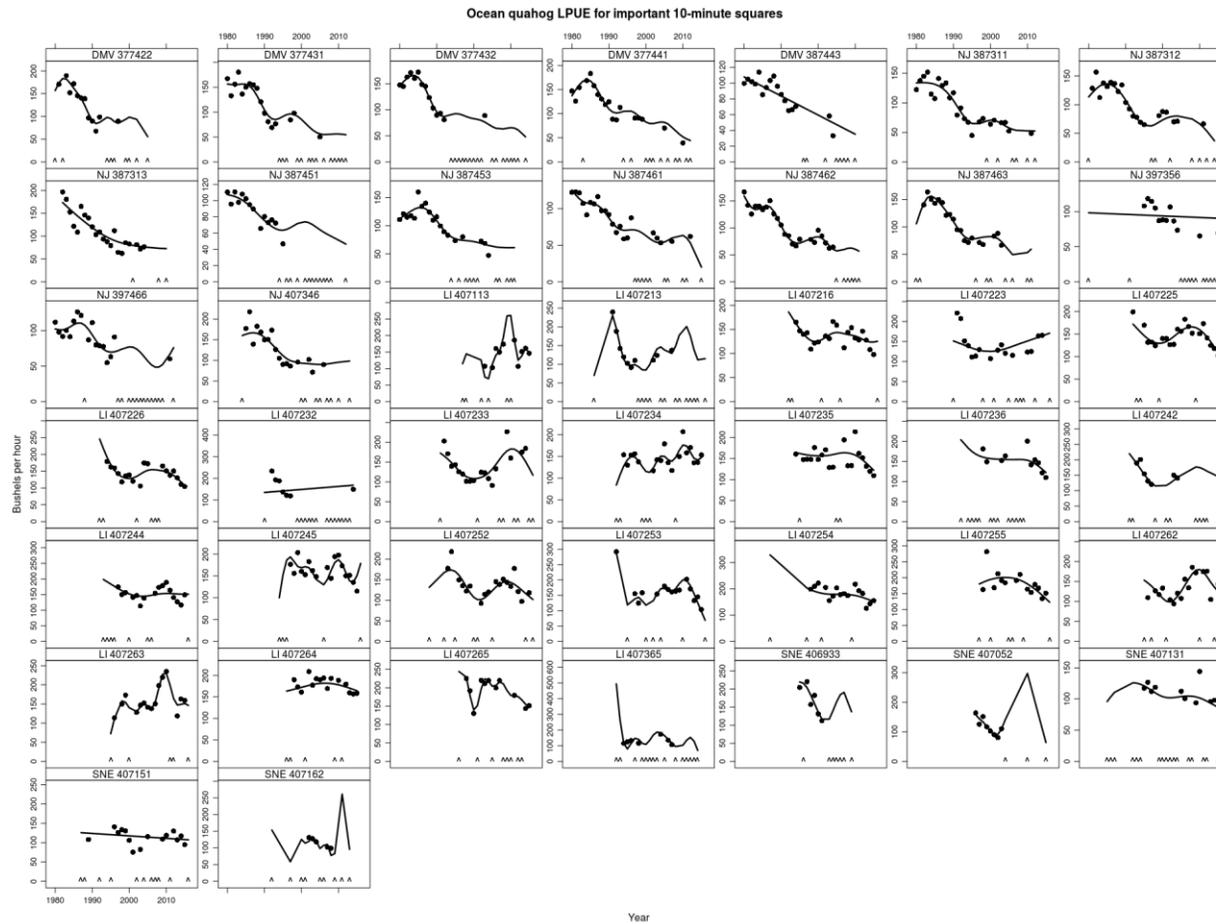


Figure 11. Annual ocean quahog LPUE (bushels h⁻¹) in "important" ten minute squares (TMSQ) during 1980-2015 based on logbook data. Important means that a square ranked in the top 10 TMSQ for total landings during any five-year period (1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2010-2015). Data for 2015 are incomplete and preliminary. To protect the privacy of individual firms, data are not plotted if the number of vessels is less than 2. Instead, a '^' is shown on the x-axis to indicate where data are missing. The solid dark line is a spline intended to show trends. The spline was fit to all available data, including data not plotted. Source: Dan Hennen Pers. Comm., NEFSC 2016.

Additional information of the length composition of port sampled ocean quahogs, and their associated sample sizes by area, are available in the data updates (Dan Hennen Pers. Comm., NEFSC 2016) at: http://www.mafmc.org/s/DataUpdatefromNEFSC_OceanQuahog.pdf.

Port and Community Description

When Amendment 13 to the FMP was developed, the Council hired Dr. Bonnie McCay and her associates at Rutgers University to describe the ports and communities that are associated with the surfclam and ocean quahog fisheries. The researchers did an extensive job characterizing the three main fisheries (non-Maine ocean quahog, Maine ocean quahog, and surfclam). The McCay team characterizations of the ports and communities are based on government census and labor statistics and on observations and interviews carried out during the late 1990s and in the fall of 2001. The description of the fishing gear, areas fished, etc. are fully described in Amendment 13. 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 and Point Pleasant, New Jersey, and New Bedford, Massachusetts. There are also landings in Ocean City, Maryland, and the Jonesport and Beals Island areas of Maine. The small scale Maine fishery is entirely for ocean quahogs, which are sold as shellstock for the half-shell market. The other fisheries are industrialized ones for surfclams and ocean quahogs, which are hand shucked or steam-shucked and processed into fried, canned, and frozen products.

Additional information on "Community Profiles for the Northeast US Fisheries" can be found at: <http://www.nefsc.noaa.gov/read/socialsci/communityProfiles.html>

Federal Fleet Profile

The total number of vessels participating in the ocean quahog fisheries outside the state of Maine has experienced a downward trend as the fisheries moved beyond a market crisis in 2005 where major users of clam meats reduced their purchases from industry and stopped advertising products like clam chowder in the media. Industry members reported that imported meat from Canada and Vietnam contributed to an oversupply of clam meats in the marketplace. The costs to vessels harvesting clams have increased significantly, with the greatest component being the cost of diesel fuel. Trips harvesting quahogs have also increased in length as catch rates have declined steadily. The 30 or so vessels that reported landings during 2004 and 2005 has consolidated over time into fewer vessels. The Maine ocean quahog fleet numbers started to decline with fuel prices soaring in mid-2008, and a decline in the availability of smaller clams consistent with the market demand (i.e., half-shell market), and totaled 8 vessels in 2015 (Table 2).

Table 2. Federal Fleet Profile, 2006 through 2015.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Non-Maine Vessels Harvesting BOTH surfclams & ocean quahogs	9	9	8	8	12	12	13	7	7	6
Non-Maine Vessels Harvesting only ocean quahogs	9	8	10	7	9	7	6	9	9	10
Total Non-Maine Vessels	18	17	18	15	21	19	19	16	16	16
Maine Ocean Quahog Vessels	25	24	22	19	15	13	12	11	9	8

Source: NMFS clam vessel logbooks.

The average ex-vessel price of non-Maine ocean quahogs reported by processors in 2015 was \$7.10 per bushel, a few cents higher than the 2014 price (\$7.02 per bushel). In 2015, about 3.0 million bushels of non-Maine ocean quahog were landed compared to 3.2 million bushels landed in 2014. The total ex-vessel value of the 2015 federal harvest outside of Maine was approximately \$21 million, slightly lower than the \$22 million in 2014.

In 2015, the Maine ocean quahog fleet harvested a total of 41,611 Maine bushels, a 66% decrease from the 121,373 bushels harvested in 2006, and an 11% decrease from the prior year (2014; 46,109 bushels). Average prices for Maine ocean quahogs have declined substantially over the past 10 years. In 2003, there were very few trips that sold for less than \$37.00 per Maine bushel, and the mean price was \$40.66. Prices have since been lower; apparently the result of aggressive price cutting as noted by industry. In 2015, the mean price was \$28.27 per Maine bushel. The value of the 2015 harvest reported by the purchasing dealers totaled \$1.22 million, a decrease of 10% from the prior year.

The distribution of LPUE in bushels per hour over time is shown below in Figures 6, 12 and 13.

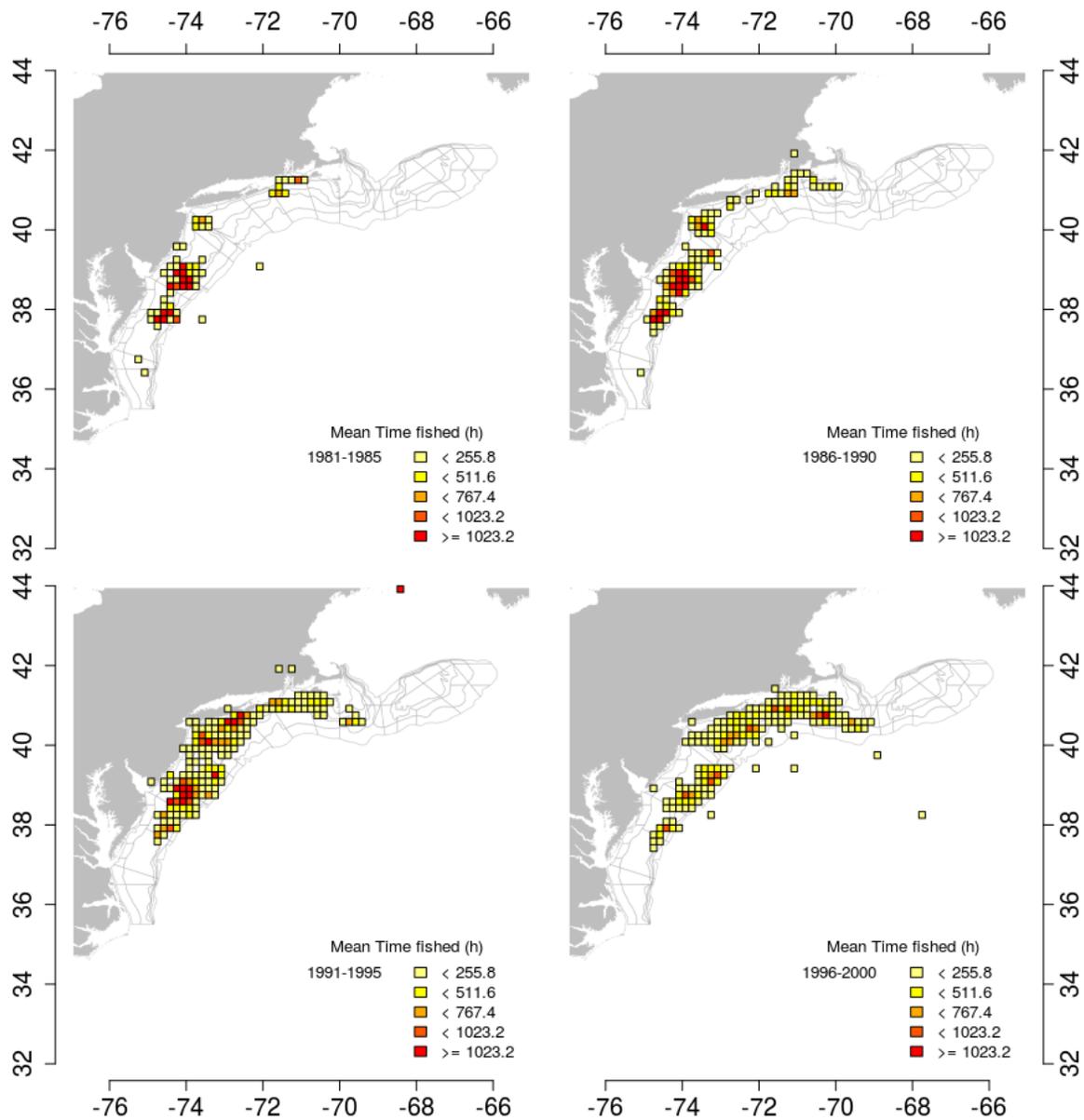


Figure 12. Ocean quahog landings per unit effort (bushels per hour) by ten-minute square (TMSQ), the finest scale location for landings reported in logbooks, for 1981-2000. Only squares where more than 5 kilo bushels were caught are shown. Source: Dan Hennen Pers. Comm., NEFSC 2016.

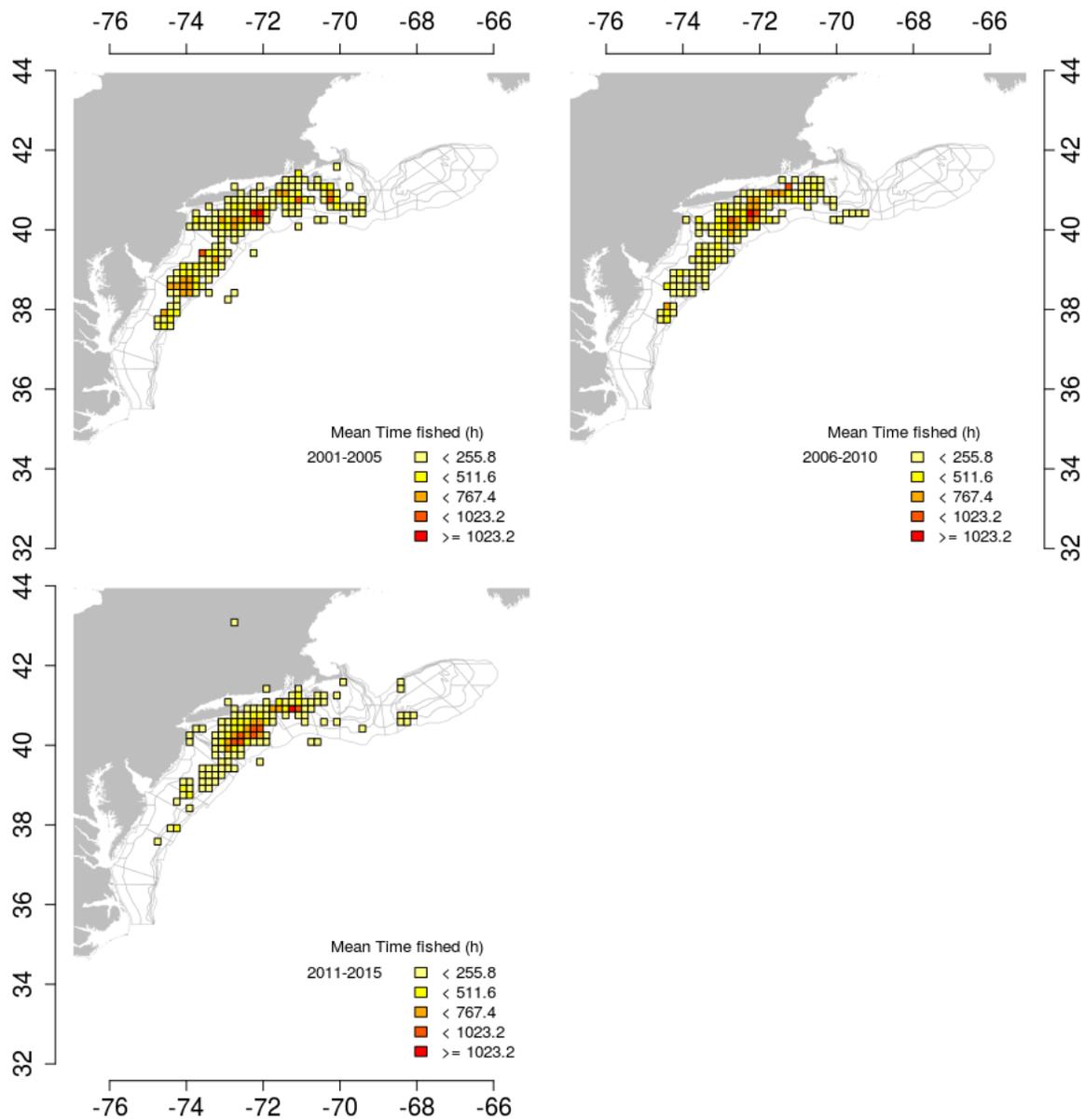


Figure 13. Ocean quahog landings per unit effort (bushels per hour) by ten-minute square (TMSQ), the finest scale location for landings reported in logbooks, for 2001-2014, and preliminary 2015. Only squares where more than 5 kilo bushels were caught are shown. Source: Dan Hennen Pers. Comm., NEFSC 2016.

Processing Sector

Even though this document describes the ocean quahog fisheries, the information presented in this section regarding the processing sector is for both surfclams and ocean quahogs as some of these facilities purchase/process both species. In 2014, there were 9 companies reporting purchases of surfclams and/or ocean quahogs from the industrial fisheries outside of Maine. They were distributed by state as indicated in Table 3. Employment data for these specific firms are not available. In 2015, these companies bought approximately \$21 million worth of ocean quahogs and \$30 million worth of surfclams.

Area Closures

Fishing areas can also be closed for public health related issues due to environmental degradation or the toxins that cause PSP. PSP is a public health concern for surfclams. PSP is caused by saxitoxins, produced by the alga *Alexandrium fundyense* (red tide). Surfclams on Georges Bank were not fished from 1990 to 2008 due to the risk of PSP. There was light fishing on Georges Bank in years 2009-2011 under an exempted fishing permit. The Greater Atlantic Regional Fisheries Office reopened a portion of Georges Bank to the harvest of surfclams and ocean quahogs beginning January 1, 2013 (77 FR 75057, December 19, 2012) under its authority in 50 CFR 648.76. Harvesting vessels have to adhere to the adopted testing protocol from the National Shellfish Sanitation Program.

Table 3. Companies that reported buying ocean quahogs and surfclams by state (from NMFS dealer/processor surfclam/ocean quahog dealer/processor report database) in 2015.

Number of Companies	MA	NJ
	7	2

References

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

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

Hennen, Dan. Personal Communication. February 25, 2016. NOAA Fisheries, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543.