

Mid-Atlantic Fishery Management Council
Atlantic Surfclam Information Document - May 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_Surfclam.pdf.

Management System

The Fishery Management Plan (FMP) for Atlantic surfclam (*Spisula solidissima*) became effective in 1977. The FMP established the management unit as all Atlantic surfclams in the Atlantic Exclusive Economic Zone (EEZ). The FMP is managed by the Mid-Atlantic Fishery Management Council (Council), in conjunction with 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 New York, New Jersey, and Massachusetts. The FMP, including subsequent Amendments and Frameworks, is available on the Council website at: <http://www.mafmc.org>.

Basic Biology

Information on Atlantic surfclam biology can be found in the document titled, “Essential Fish Habitat Source Document: Surfclam, *Spisula solidissima*, Life History and Habitat Requirements” (Cargnelli et al. 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.

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

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

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

Status of the Stock

The Atlantic surfclam stock assessment was peer reviewed and approved for use by management at Stock Assessment Workshop 56 (SAW 56). A statistical catch at age and length model called SS3 was used and incorporates age and length structure. Reports on “Stock Status,” including assessment and reference point updates, SAW reports, and Stock Assessment Review Committee (SARC) panelist reports are available online at the NEFSC website:

<http://www.nefsc.noaa.gov/saw>.

The Atlantic surfclam resource in the US EEZ is not overfished and overfishing is not occurring in 2011 (NEFSC 2013). Estimated biomass of the entire resource during 2011 (approximately 120+ mm shell length, SL) was 1,060 thousand mt (2,337 million lbs), with a 95% confidence interval of 802 - 1,401 thousand mt meats (NEFSC 2013). The 95% confidence interval overlaps the $B_{\text{Target}} = \frac{1}{2} B_{1999} = 972$ thousand mt meats (2,142 million lbs) but is entirely above $B_{\text{Threshold}} = \frac{1}{2} B_{\text{Target}} = 486$ thousand mt meats (1,071 million lbs; Figure 1). Estimated annual fishing mortality during 2011 for the entire resource was $F = 0.027$ (95% confidence interval 0.016 - 0.045), which is entirely below the overfishing threshold $F_{\text{MSY proxy}} = M = 0.15$ (Figure 2).

Estimated biomass on Georges Bank during 2011 (ages 7+, approximately 120+ mm shell length, SL) was 357 thousand mt of meats (787 million lbs) with a 95% confidence interval 252 - 506 mt. Surfclams on Georges Bank were not fished from 1990 to 2008 due to the risk of paralytic shellfish poisoning (PSP).¹ There was light fishing in years 2009-2011 under an exempted fishing permit. Fishing mortality on Georges Bank was close to zero ($F_{2011} = 0.009$; 95% confidence interval 0.006 - 0.013) during 2011. Estimated biomass of the southern area during 2011 (ages 6+, approximately 120+ mm shell length, SL) was 703 thousand mt (1,549 million lbs), with a 95% confidence interval of 481 - 1,028 thousand mt meats (Figure 3). Estimated fishing mortality during 2011 for the southern area was $F = 0.037$ (95% confidence interval 0.025 - 0.056) (Figure 4). Recruitment (age 0) has been below average for the whole stock since 1999 (Figure 5).

¹ See Area Closure section on page 15 for additional information.

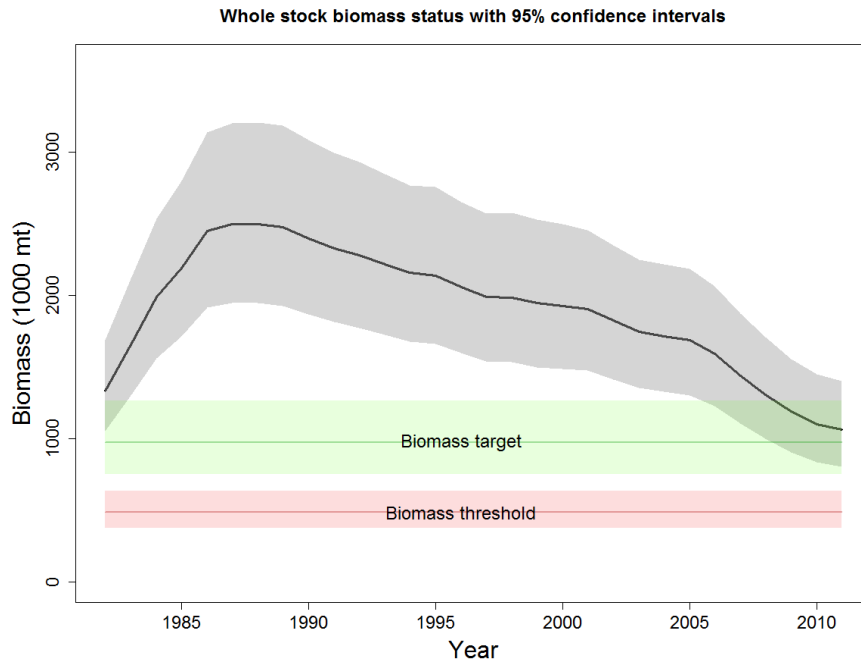


Figure 1. Whole stock biomass status estimates with approximate 95% confidence intervals on the estimates and reference points. Source: Stock Assessment Summary (NEFSC 2013).

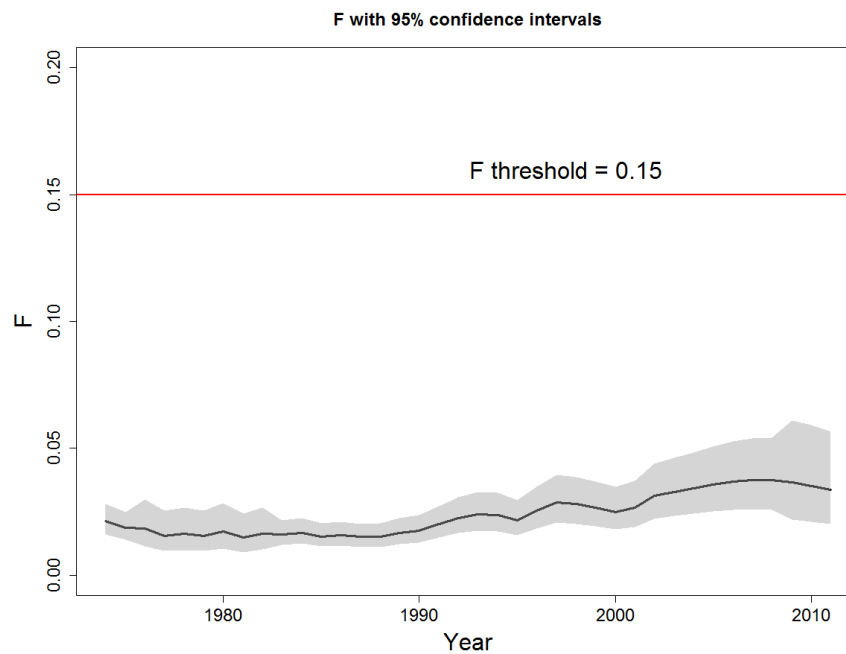


Figure 2. Whole stock fishing mortality estimates with approximate 95% confidence intervals, and the overfishing threshold. Source: Stock Assessment Summary (NEFSC 2013).

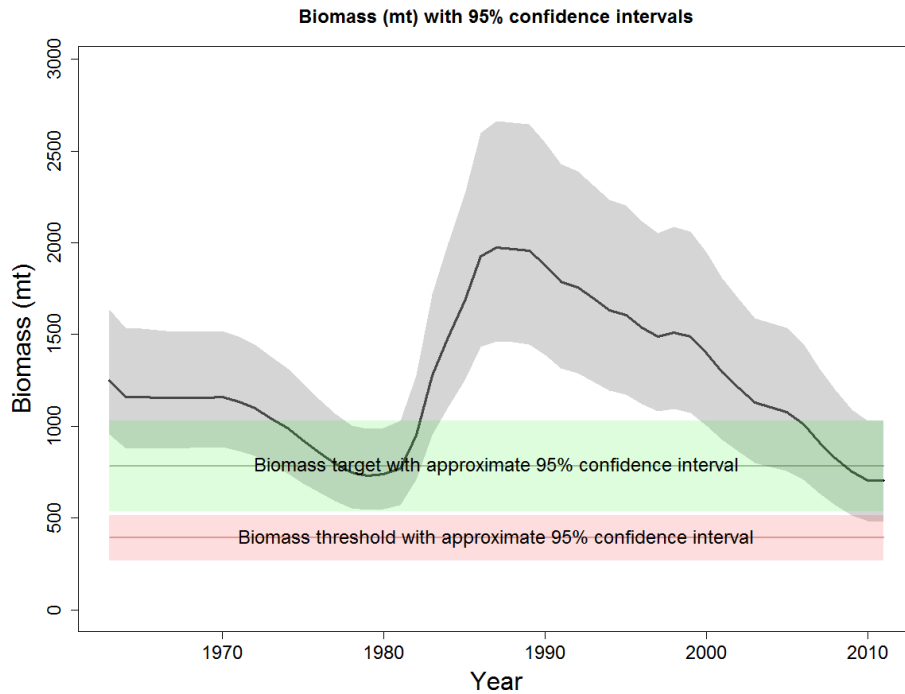


Figure 3. Southern area biomass estimates, and biomass reference points with approximate 95% confidence intervals. Source: Stock Assessment Summary (NEFSC 2013).

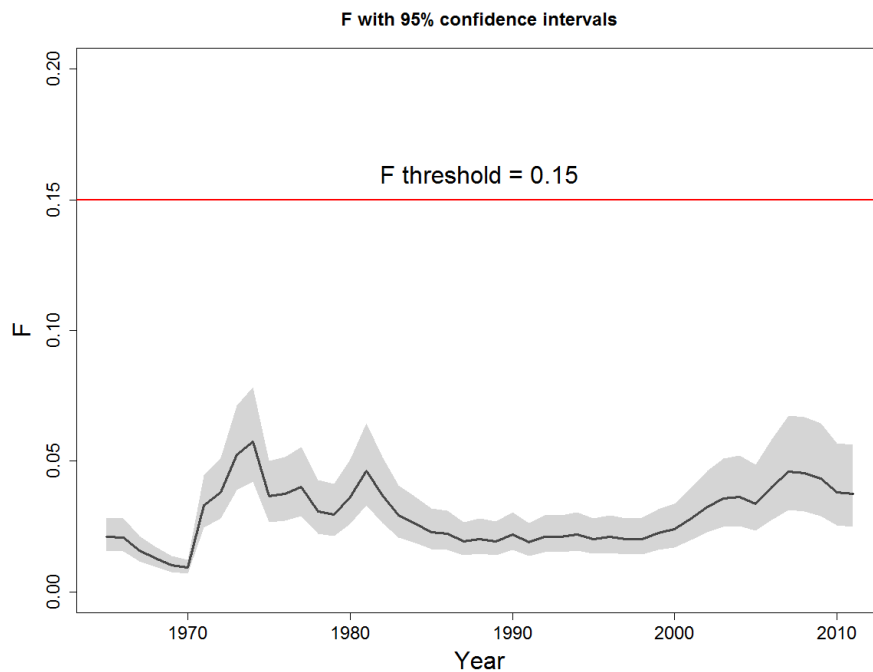


Figure 4. Southern area fishing mortality estimates and with approximate 95% confidence intervals, and the overfishing threshold. Source: Stock Assessment Summary (NEFSC 2013).

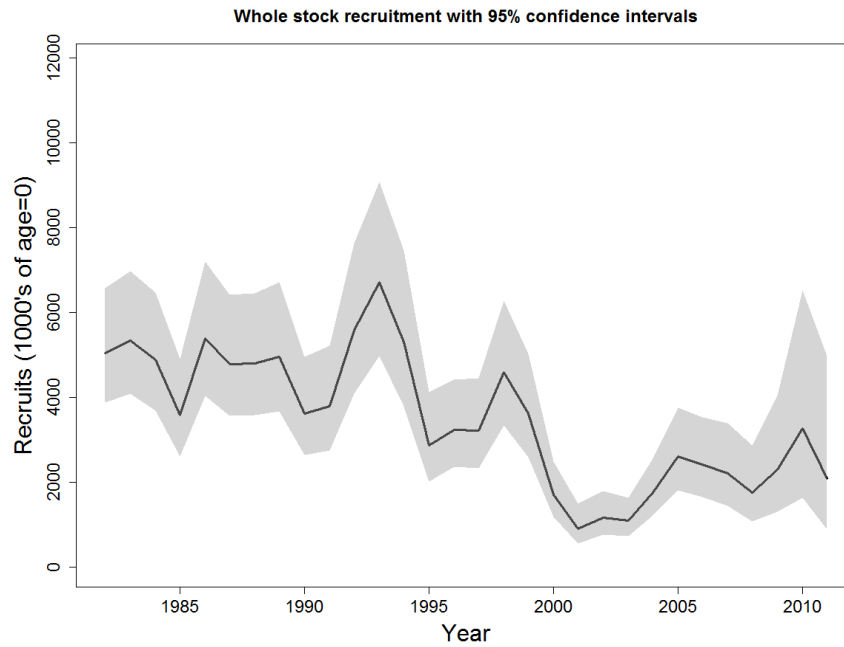


Figure 5. Whole stock recruitment estimates with approximate 95% confidence intervals.
Source: Stock Assessment Summary (NEFSC 2013).

Description of the Fishery and Market

The commercial fishery for surfclam in Federal waters is prosecuted with large vessels and hydraulic dredges. Surfclam landings and commercial quotas are given in Table 1 and Figure 6. The distribution of the fishery has changed over time, as shown in Figures 7-11, with a shift to increased landings in Southern New England and Georges Bank areas.

Figures 12-14 provide the distribution of surfclam landings, fishing effort, and landings per unit effort (LPUE) in “important” ten minute squares (TMSQ). 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.

Additional information of the length composition of port sampled surfclams, 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_Surfclam.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.

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

Table 1. Federal surfclam quotas and landings: 1998 - 2016.

Year	Total Landings (includes state waters)	EEZ Landings (mt meats)	EEZ Landings^a ('000 bu)	EEZ Quota ('000 bu)	% Harvested
1998	24,506	18,234	2,365	2,565	92%
1999	26,677	19,577	2,539	2,565	99%
2000	31,093	19,788	2,566	2,565	100%
2001	31,237	22,017	2,855	2,850	100%
2002	32,645	24,006	3,113	3,135	99%
2003	31,526	24,994	3,241	3,250	100%
2004	26,463	24,197	3,138	3,400	92%
2005	22,734	21,163	2,744	3,400	81%
2006	25,779	23,573	3,057	3,400	90%
2007	27,091	24,915	3,231	3,400	95%
2008	25,038	22,510	2,919	3,400	86%
2009	22,283	20,065	2,602	3,400	77%
2010	19,941	17,984	2,332	3,400	69%
2011^b	19,776	18,839	2,443	3,400	72%
2012^b	18,378	18,054	2,341	3,400	69%
2013^b	18,459	18,551	2,406	3,400	71%
2014^c	18,707	18,227	2,364	3,400	70%
2015^c	9,117 ^d	17,362 ^d	2,252 ^d	3,400	66% ^d
2016^c	NA	NA	NA	3,400	NA

^a 1 surfclam bushel is approximately 17 lb. ^b The Scientific and Statistical Committee (SSC) recommended an overfishing limit (OFL) for 2010, 2011, 2012, and 2013 of 129,300 mt, 114,00 mt, 102,300 mt, and 93,400 mt, respectively, and an acceptable biological catch (ABC) of 96,600 mt (2011-2013). ^c For 2014-2016, the SSC recommended an OFL of 81,150 mt, 75,178 mt, 71,512 mt, respectively, and an acceptable biological catch (ABC) of 60,313 mt, 51,804 mt, and 48,197 mt, respectively. ^d Preliminary, incomplete 2015 data. Source: NMFS clam vessel logbook reports. Dan Hennen Pers. Comm., NEFSC 2016.

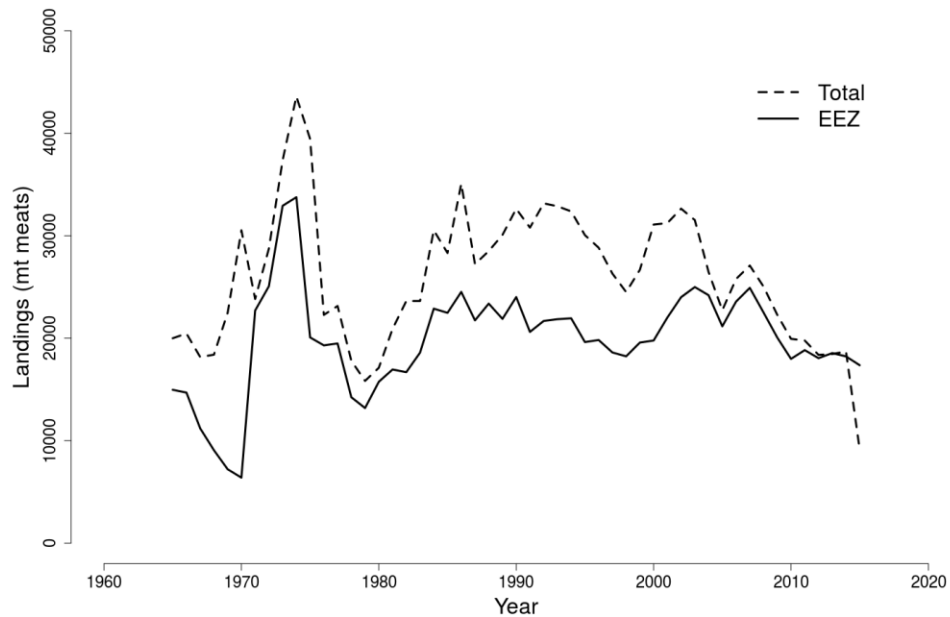


Figure 6. Surfclam landings (total and EEZ) during 1965-2014, and preliminary 2015. Source: Dan Hennen Pers. Comm., NEFSC 2016.

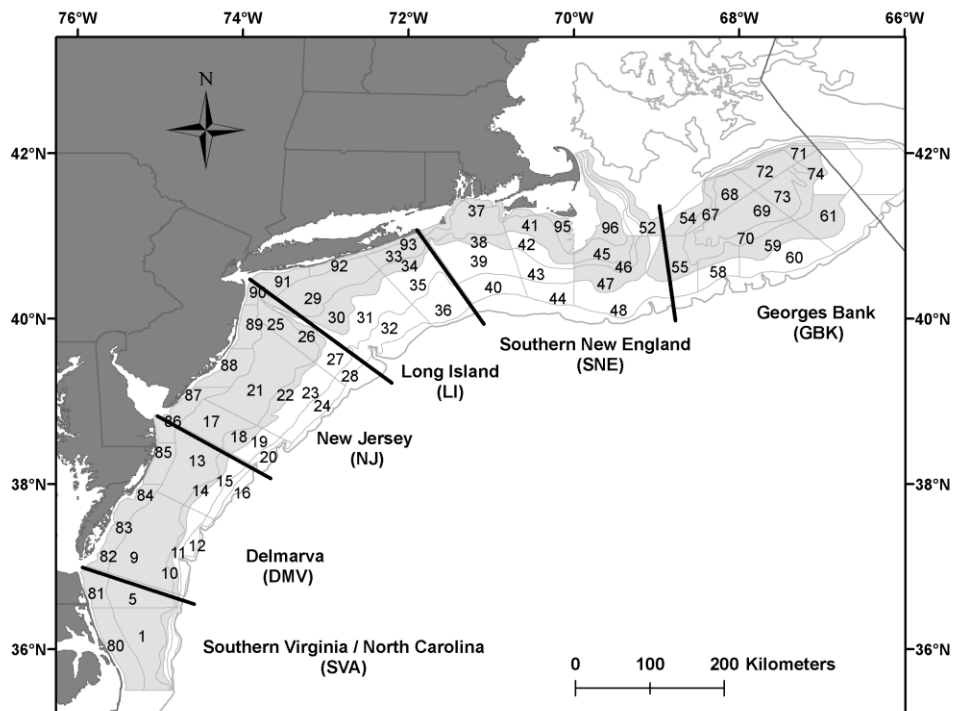


Figure 7. Surfclam stock assessment regions and NEFSC shellfish survey strata. The shaded strata are where surfclams are found. Source: Dan Hennen Pers. Comm., NEFSC 2016.

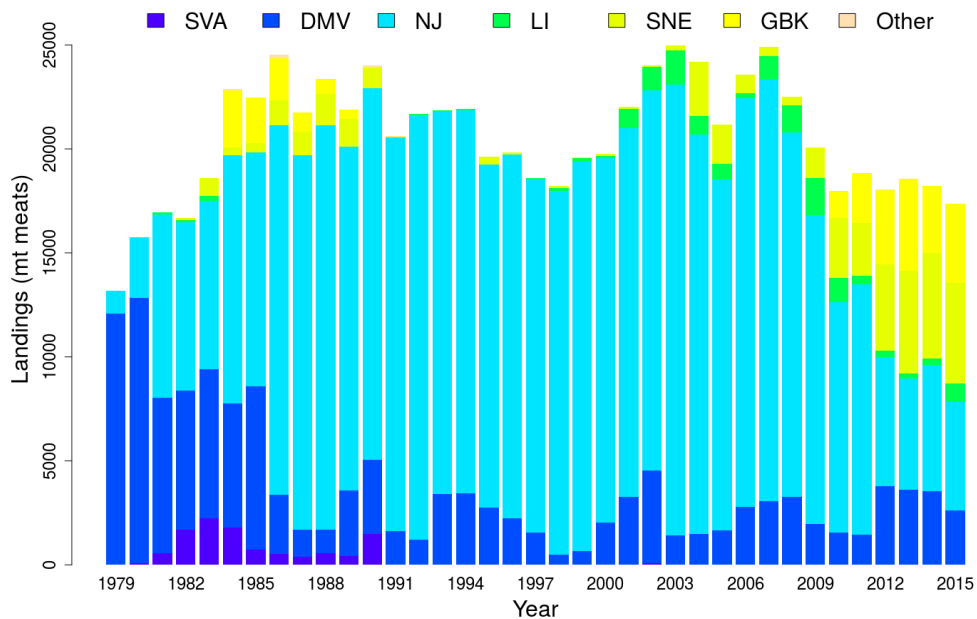


Figure 8. Surfclam landings from the US EEZ during 1979-2014, and preliminary 2015, by stock assessment region. Source: Dan Hennen Pers. Comm., NEFSC 2016.

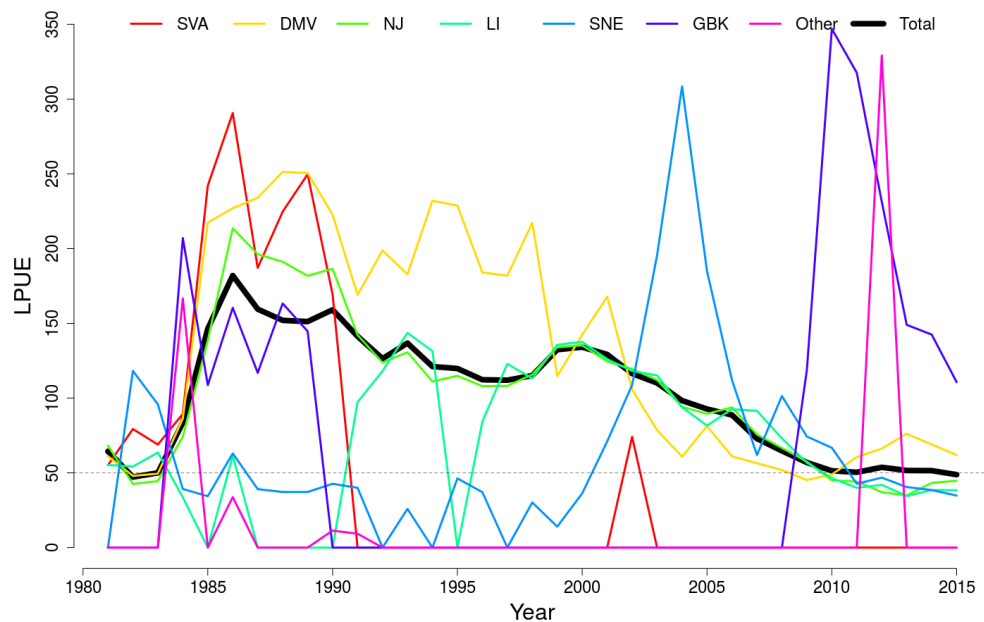


Figure 9. Nominal landings per unit effort (LPUE in bushels landed per hour fished) for surfclam, by region, during 1981-2014, and preliminary 2015. LPUE is total landings in bushels divided by total fishing effort. Source: Dan Hennen Pers. Comm., NEFSC 2016.

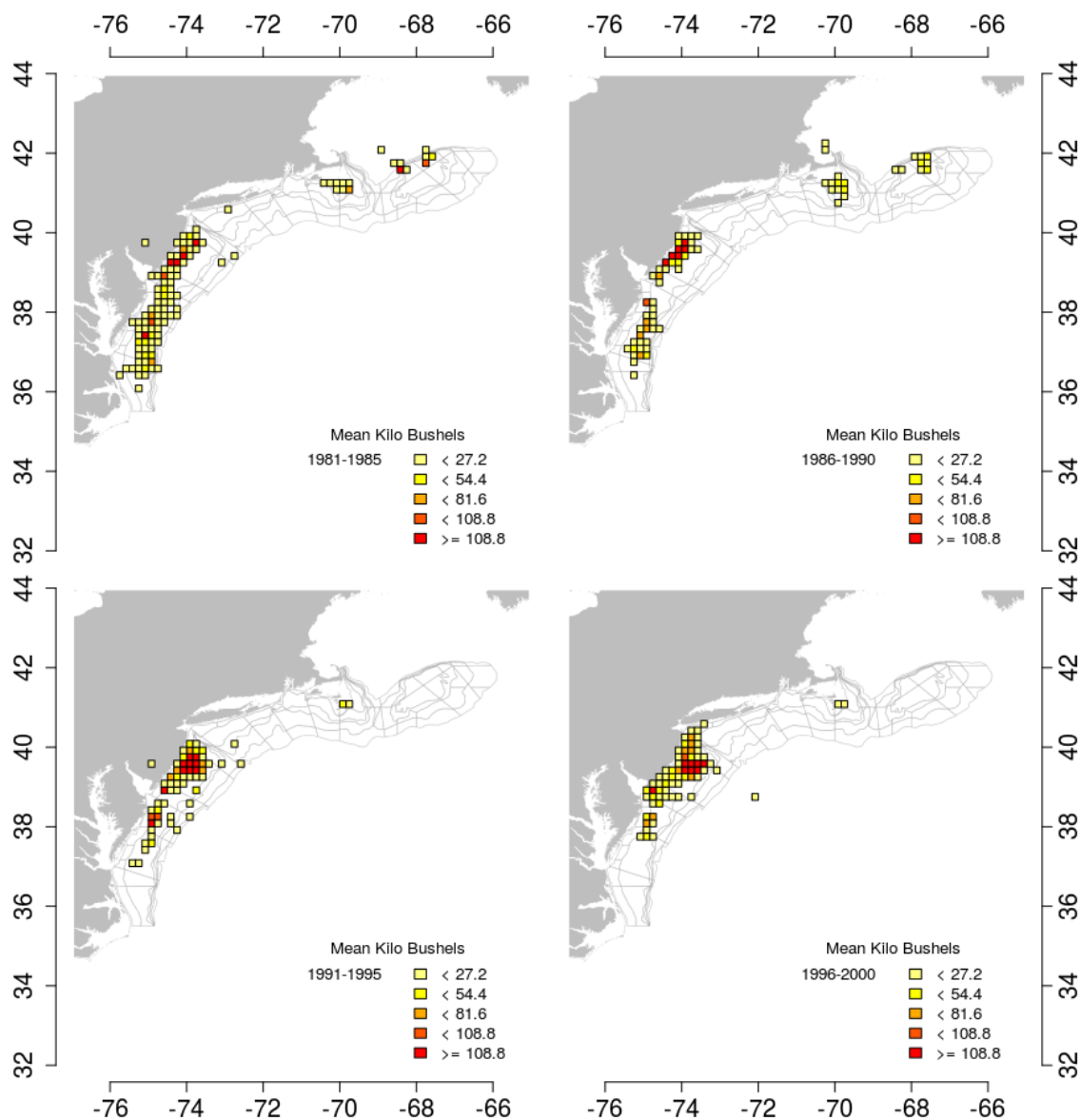


Figure 10. Average surfclam landings by ten-minute square (TMSQ), the finest scale location for landings reported in logbooks, for 1981-2000 (1 kilobushel = 1000 bu y⁻¹). Source: Dan Hennen Pers. Comm., NEFSC 2016.

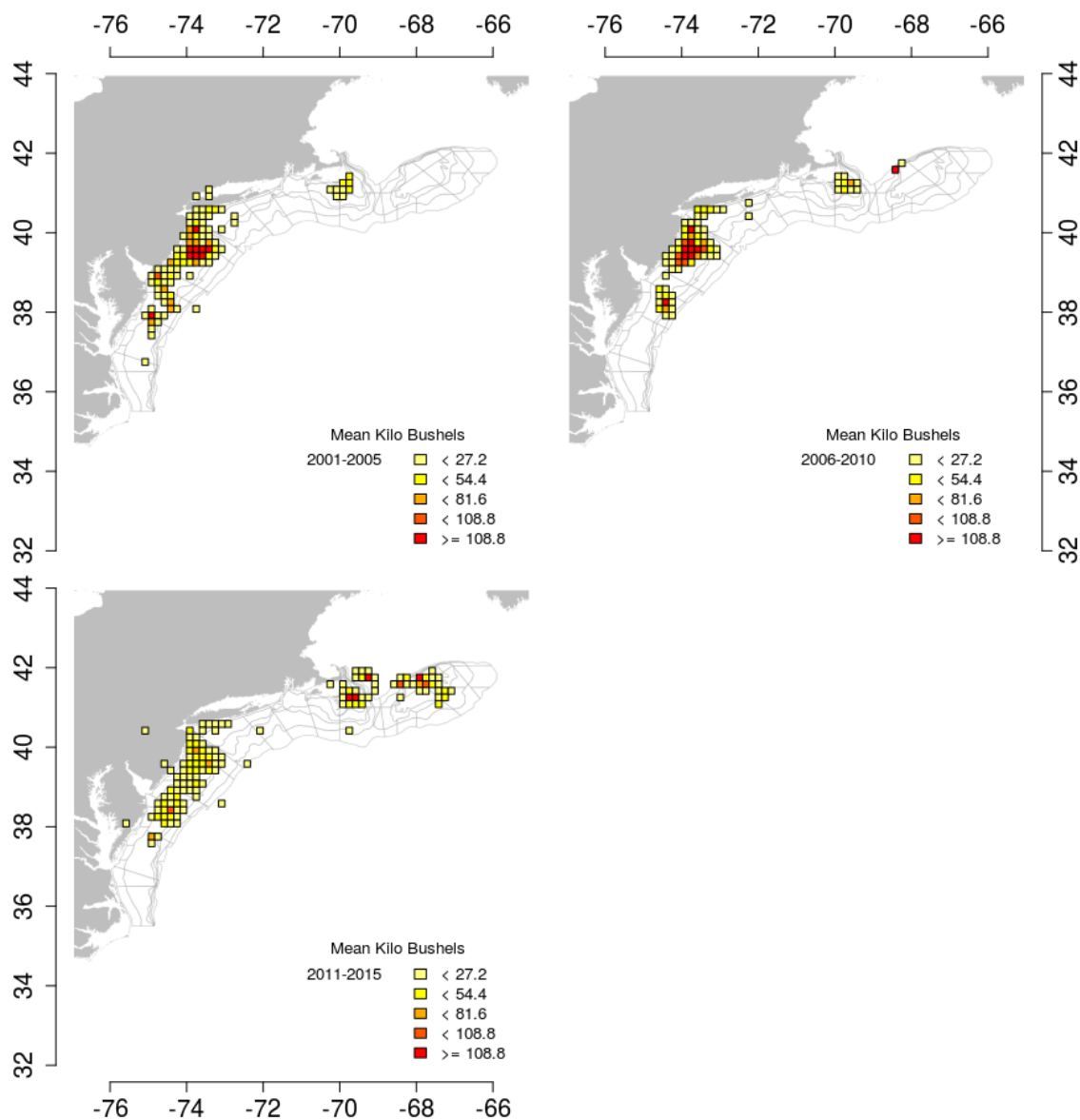


Figure 11. Average surfclam landings by ten-minute square (TMSQ), the finest scale location for landings reported in logbooks, for 2001-2014, and preliminary 2015 (1 kilobushel = 1000 bu y⁻¹). Source: Dan Hennen Pers. Comm., NEFSC 2016.

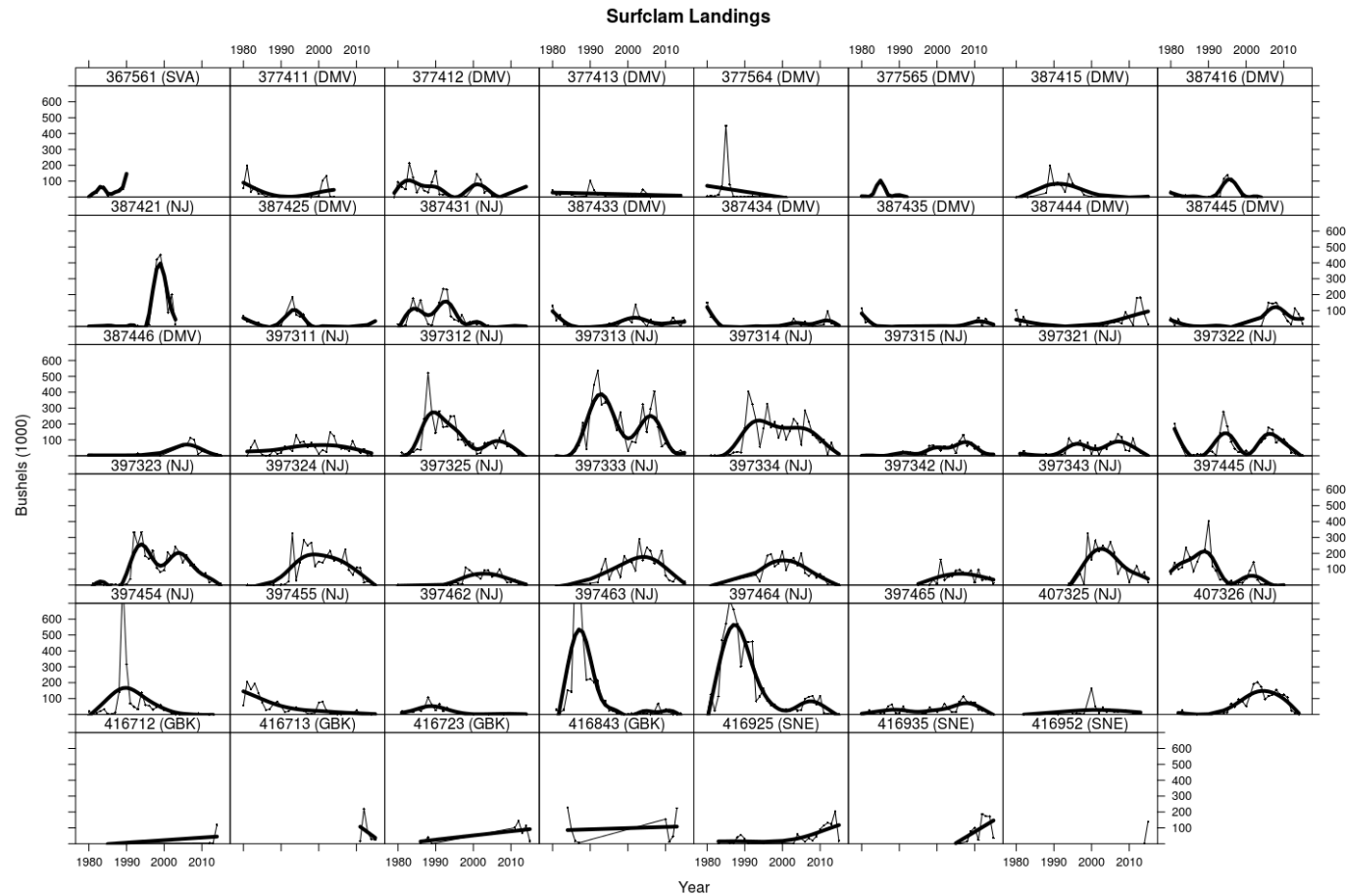


Figure 12. Annual surfclam landings in "important" ten minute squares (TMSQ) during 1980-2015 based on logbook data. Important means that a square ranked in the top 10 TMSQ for total landings during any five-year period (1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2010-2015). Data 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 "^" 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.

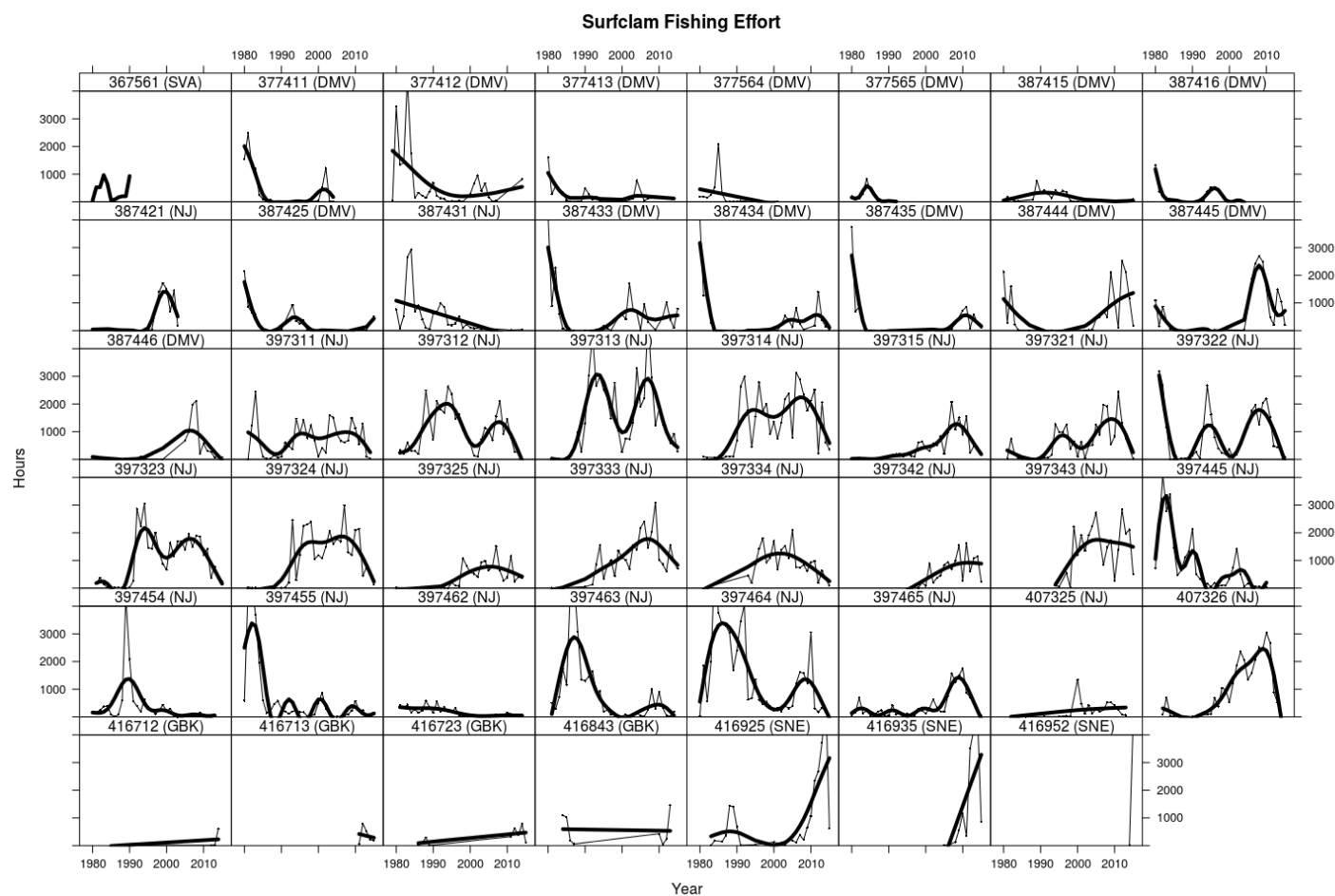


Figure 13. Annual surfclam fishing effort (h y^{-1}) in "important" ten minute squares (TMSQ) during 1980-2015 based on logbook data. Important means that a square ranked in the top 10 TMSQ for total landings during any five-year period (1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009, 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.

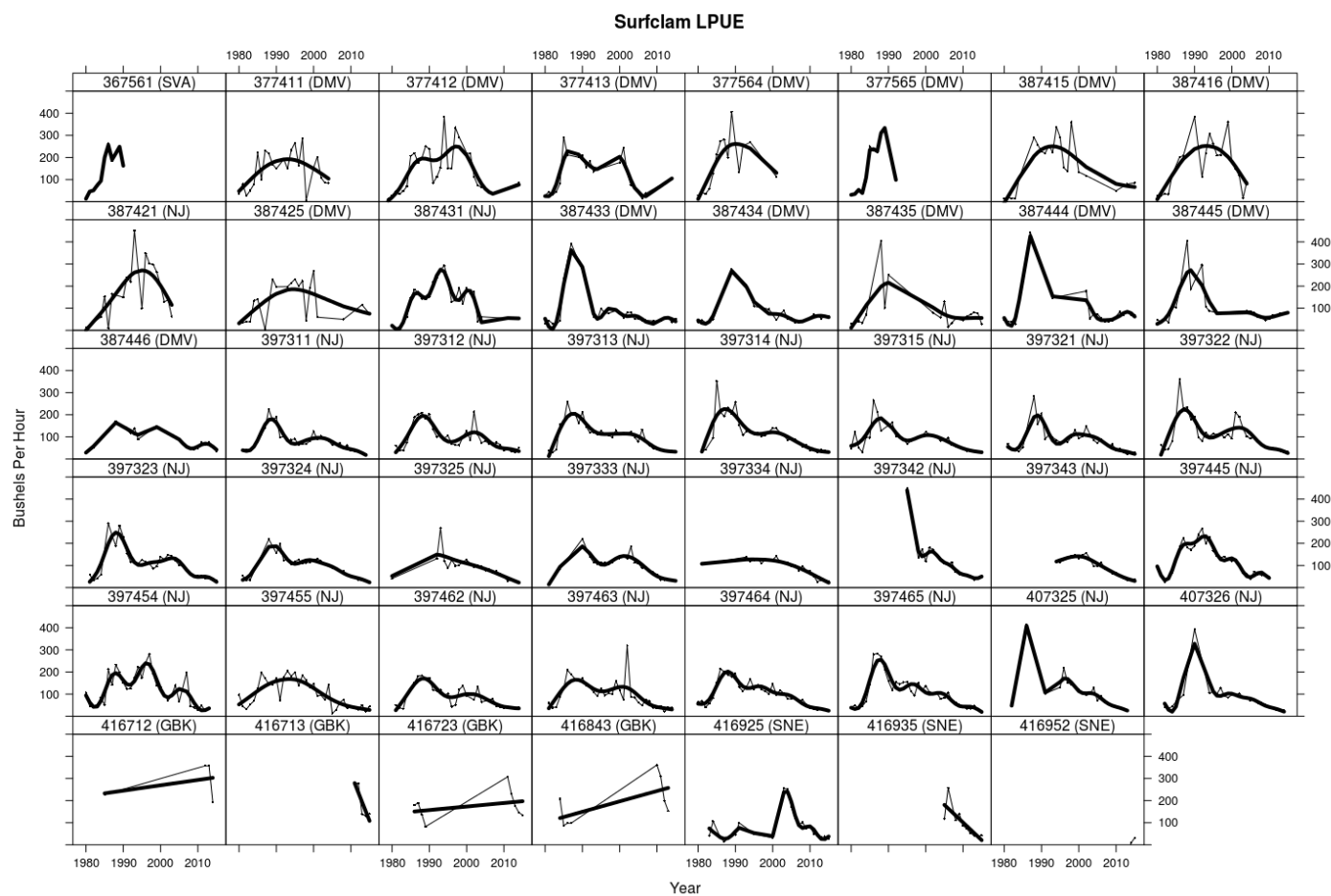


Figure 14. Annual surfclam LPUE (bushels h⁻¹) in "important" ten minute squares (TMSQ) during 1980-2015 based on logbook data. Important means that a square ranked in the top 10 TMSQ for total landings during any five-year period (1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009, 2010-2015). 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.

Federal Fleet Profile

The total number of vessels participating in the surfclam fishery has remained relatively stable from 2005 through 2015, and has ranged from 29 vessels in 2006 to 42 vessels in 2012 (Table 2). The average ex-vessel price of surfclams reported by processors was \$12.61 in 2015, nearly identical to the \$12.66 per bushel seen in 2014. The total ex-vessel value of the 2015 federal harvest was approximately \$30 million, also nearly identical to 2014. A myriad of factors have contributed to the difficulties in the clam industry. Major users of clam meats have 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 has increased due to the rising costs of insurance; industry has also indicated price of diesel fuel in conjunction with distance traveled to fish is a big factor determining trip cost. Trips harvesting surfclams have increased in length as catch rates have declined. The distribution of LPUE in bushels per hour over time is shown below in Figures 9, 15 and 16.

Processing Sector

Even though this document describes the surfclam fishery, 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 2015, 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 \$30 million worth of surfclams and \$21 million worth of ocean quahogs.

Area Closures

Areas can be closed to surfclam fishing if the abundance of small clams in an area meets certain threshold criteria. This small surfclam closure provision was applied during the 1980's with three area closures (off Atlantic City, NJ, Ocean City, MD, and Chincoteague, VA), with the last of the three areas reopening in 1991.

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 and LPUE in that area was substantially higher (5-7 times higher) than in other traditional fishing grounds. 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.

Industry has indicated that they have recently implemented a large, voluntary closure off Atlantic City, New Jersey because of concerns for the fishery in the area and the prevalence of large numbers of small clams.

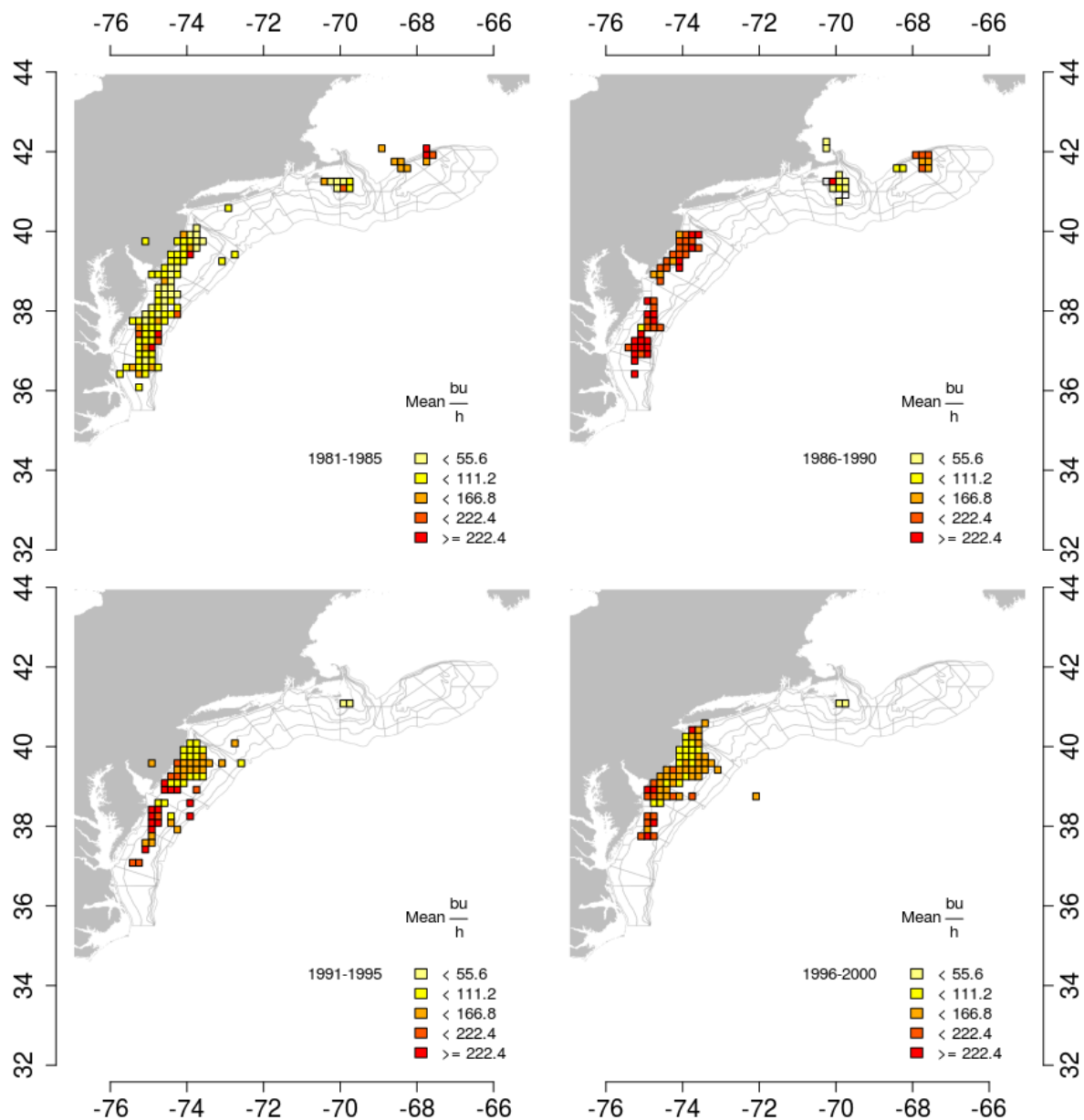


Figure 15. Surfclam landings per unit effort (LPUE in bushels per hour fished) by ten-minute square (TMSQ), the finest scale location for landings reported in logbooks, for 1981-2000. Source: Dan Hennen Pers. Comm., NEFSC 2016.

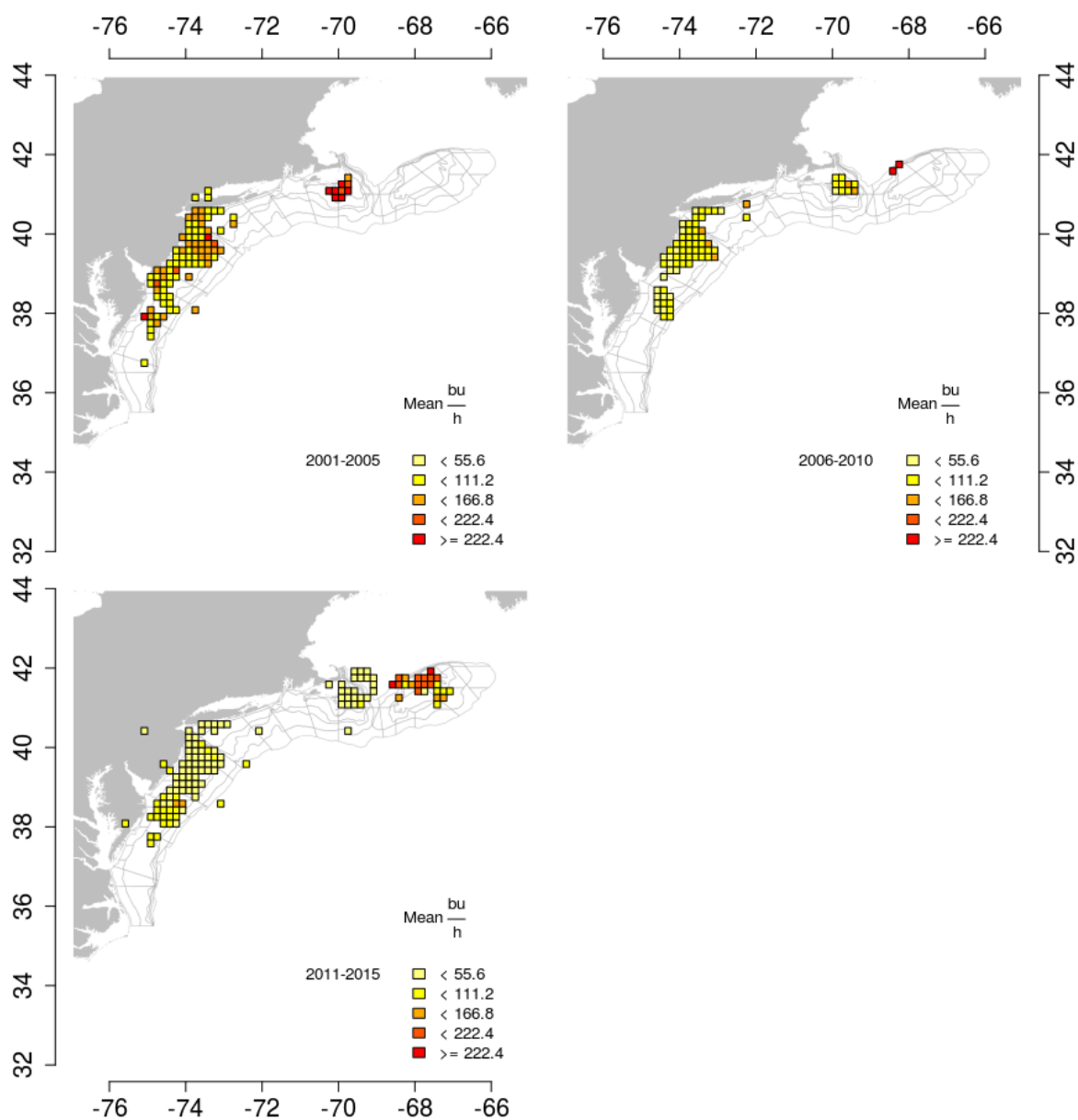


Figure 16. Surfclam landings per unit effort (LPUE in bushels per hour fished) by ten-minute square (TMSQ), the finest scale location for landings reported in logbooks, for 2001-2014, and preliminary 2015. Source: Dan Hennen Pers. Comm., NEFSC 2016.

Table 2. Federal fleet profile, 2006 through 2015.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Harvesting BOTH surfclams & ocean quahogs	9	9	8	8	12	12	13	7	7	6
Harvesting only surfclams	20	24	24	28	22	24	29	33	31	31
Total Vessels	29	33	32	36	34	36	42	40	38	37

Source: NMFS clam vessel logbooks

Table 3. Companies that reported buying surfclams ocean quahogs and 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: Atlantic Surfclam, *Spisula solidissima*, Life History and Habitat Characteristics. NOAA Tech. Memo. NMFS-NE-142.

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