

Appendix A3: Surfclams in New York and New Jersey state waters

The states of New York and New Jersey support surfclam fisheries in their territorial waters (≤ 3 nmi from shore), and have had surfclam surveys since 1992 and 1988, respectively, that are carried out using commercial clam gear (Appendix Figures A3-1 to A3-3). These state surveys provide are important because the NEFSC clam survey does not cover state waters. New York and New Jersey state waters contain excellent habitat for surfclams and have provided as much as 35% of total surfclam landings in some years. However, stock biomass and recruitment have declined along the coasts of both states to low levels. The percentage of landings harvested from state waters has been falling since 2001 (Appendix Figure A3-4).

The New York and New Jersey state surveys

The New Jersey State survey is conducted annually by the New Jersey Department of Environmental Protection from a commercial clam vessel with a hydraulic dredge, most recently the F/V Ocean Girl (Appendix Figure A3-3). The survey has been conducted since 1988, and has followed a stratified random sampling protocol since 1994. The survey area is divided into regions covering the whole New Jersey coast, and each region has 3 strata one mile wide and parallel to the coast covering surfclam habitat out to the 3-mile limit (Appendix Figure A3-1). Each survey does between 250 and 330 5-minute tows, measuring the catch volume in bushels, then counting and measuring a known volume of surfclams for population estimates and length frequencies. Grab samples of the sediment are also taken.

Data available for this appendix from the State of New Jersey surfclam surveys includes catch data since 1994, length frequencies, surfclam densities, commercial landings and grab sample data.

The New York surfclam survey is conducted by the New York Department of Environmental Conservation more or less every three years. They use a commercial clam vessel, most recently the F/V Ocean Girl, with a hydraulic dredge. The survey area is divided into four regions which span the southern shore of Long Island. The three westernmost regions have three strata each within them, each a mile wide moving offshore to the three-mile limit (Appendix Figure A3-2). The last four surveys have occurred in the summer or fall, had an average of 236 stations, and used a random stratified sampling technique. Tows are three minutes long, the total volume of each tow is measured in bushels, and half a bushel of surfclams from each tow is measured and counted for population estimates and length frequencies. A picture of the dredge used is shown in Appendix Figure A3-3.

Data from New York State available for this appendix is from the 2002, 2005 and 2006 surfclam surveys, with some preliminary data from the 2008 survey. The available information includes catch data, average length frequencies, and lengths and ages of all the surfclams that were aged. Commercial landings data for state waters through 2006 were also available.

Results

Both states have seen a substantial decrease in the population of surfclams (Appendix Figure A3-5). The peak population of surfclams in New Jersey in recent years occurred in 1996, a few years before the peak in biomass of surfclams in the EEZ in 1998-1999. The data available to us from New York do not go back far enough to reflect peak abundance levels.

Despite the decline in numbers of clams since 2002, landings in New York stayed fairly high through 2006 (Appendix Figure A3-6). There was a very large harvest limit set in 2004

(930,000 bushels) and it was almost reached, making the landings from New York from that year almost double what they had been in years before. The high harvest in 2002 was followed by a substantial reduction in stock biomass.

The length composition of surfclams in New Jersey became more narrow and composed of larger surfclams each year from 2000 to 2006 (Appendix Figure A3-7), as clams were growing larger and not being replaced by new recruits. However, the years 2007-2009 show a small number of recruits entering the survey. Surfclams from the New York surveys conducted in 2005 and 2006 were larger on average than those collected in 2002 (Appendix Figure A3-8). The effect of the lack of recruitment of smaller clams into the population is shown dramatically in Appendix Figure A3-9, which shows the mean shell length of surfclams collected during the New Jersey survey from 1991 through 2009.

Appendix Figure A3-10 shows surfclam density for New Jersey State waters compared to the densities calculated for the fished areas of the EEZ (all regions except Georges Bank) in recent years from the NEFSC clam survey data. Densities have always been higher in the inshore New Jersey State strata (Appendix Figure A3-11), but recently they appear to be falling to or towards levels typical of more unproductive offshore areas.

For some reason, surfclams in New York and New Jersey have been unable to resupply their aging, and constantly harvested, populations with new recruits. This could be happening because there is not enough successful spawning occurring and the supply of larvae is not there, or because smaller surfclams are dying before they are available to a survey or commercial dredge.

In New Jersey, annual grab sample data collected since 1994 from the area of the survey show that juvenile surfclams are settling successfully out of the plankton (Appendix Figure A3-12). Some years have been better than others with occasional larger sets such as the ones seen in 2005 and 2009. This data do not show a downward trend in juvenile surfclams that might explain the decline in older surfclams of fishable size.

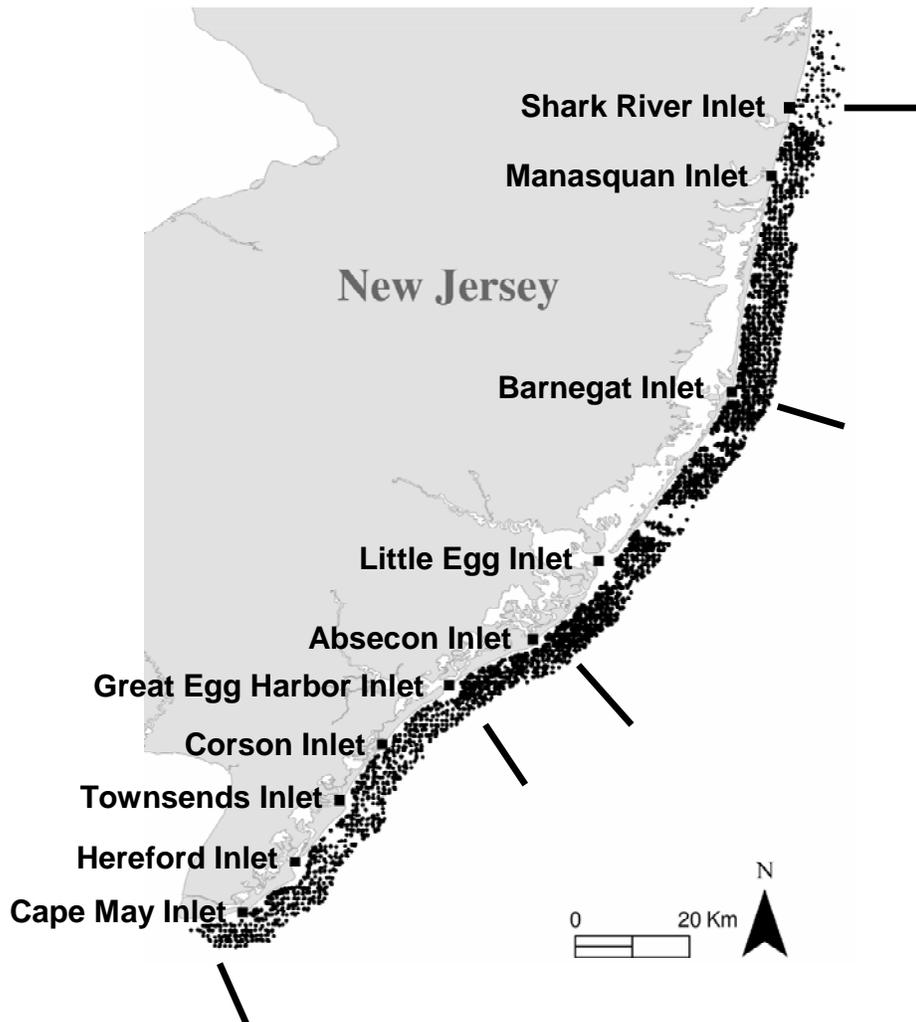
Age frequencies from the New York surveys in 2002, 2005 and 2006 (Appendix Figure A3-13) show that surfclams of all ages, although there were very few older than 20 y. There seem to be recognizable ~1996, ~1991 and ~1988 year classes which can be followed over the three NY surveys. Age data from the Long Island region of the NEFSC survey are not available, but recognizable year classes in NEFSC survey data for the New Jersey region included one in 1992.

Length-at-age data from the New York surveys (Appendix Figure A3-14) indicate there was no significant change in growth rate from 2002 through 2006, but all regions and strata were lumped together so spatial changes may be masked.

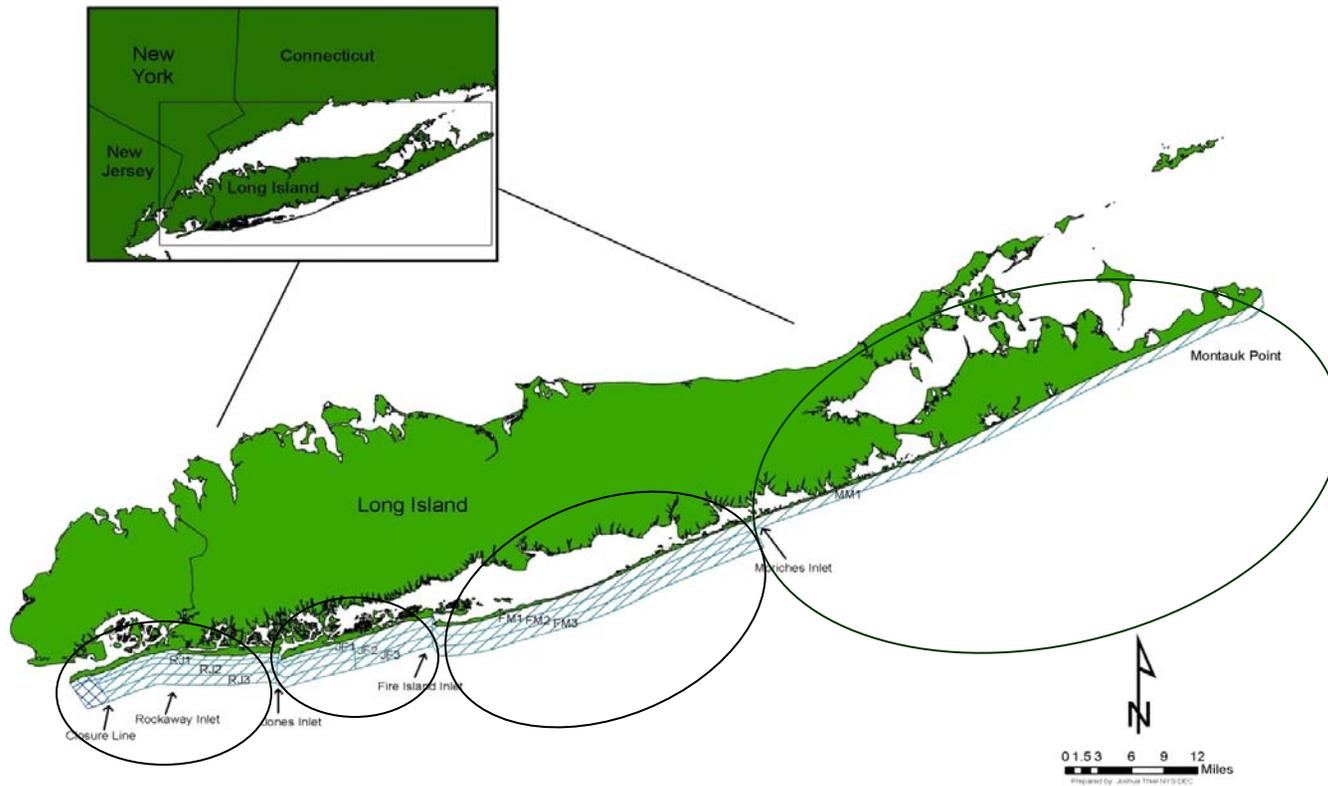
Exploitation rates (landings for human consumption / survey abundance data) were calculated for surfclams in both NJ and NY state waters (Appendix Figure A3-15). The data suggest that exploitation rates in NJ waters decreased from about 4% in 1996 to 2% in 1997-1998 then increased to about 6% in 2002 before falling to zero by 2005 as the fishery for human consumption was closed. The limited data for NY indicate that exploitation rates increased from 2.5% in 2002 to about 4.25% in 2006 (landings data were not available for NY in 2008)

The simple exploitation rates in Appendix Figure A3-15 provide useful information about trends in fishing mortality. However, these calculations assume that 100% of the surfclams in the path of the survey dredge are captured. For example, the median capture efficiency of commercial dredges in surfclam depletion experiments conducted offshore is 0.79 (Table Efficiency-1). If the capture efficiency of the survey dredge is 0.79 then the exploitation rates

calculated here for surfclams in state waters are too high and should be multiplied by 0.79. In addition, NJ landings for use as bait were excluded because surfclams for bait are harvested in contaminated areas outside of the survey region.



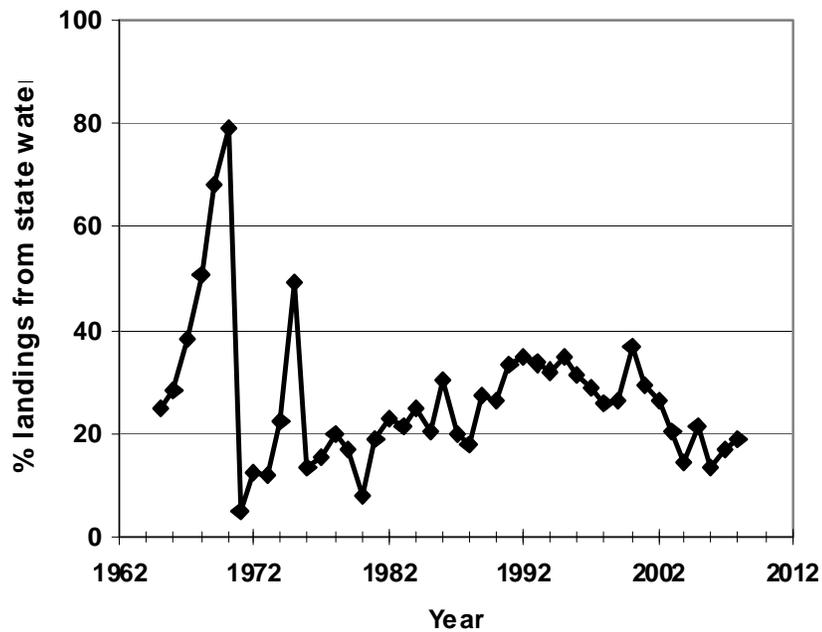
Appendix Figure A3-1. Map showing the sampling regions for the NJ state survey, and all station locations since 1988. Within each region there are three depth strata one mile wide. Map courtesy of Jeff Normant, NJDEP.



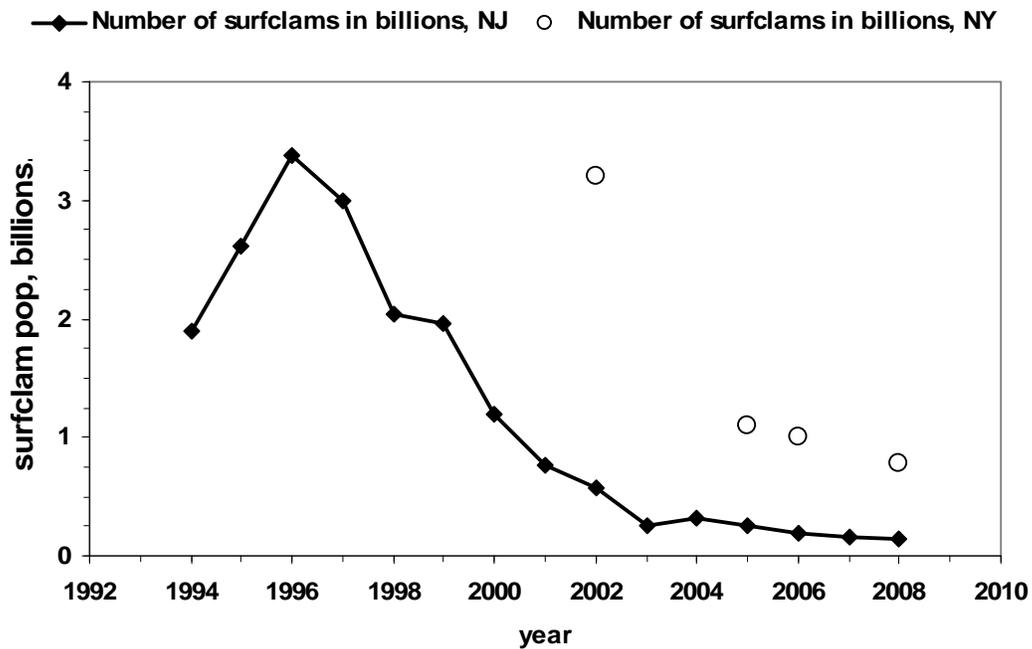
Appendix Figure A3-2. Map showing NY clam survey sampling regions from west to east. Regions RJ, JF and FM each have 3 depth strata, while region MM which has one depth stratum. Map courtesy of Wade Carden, NYSDEC.



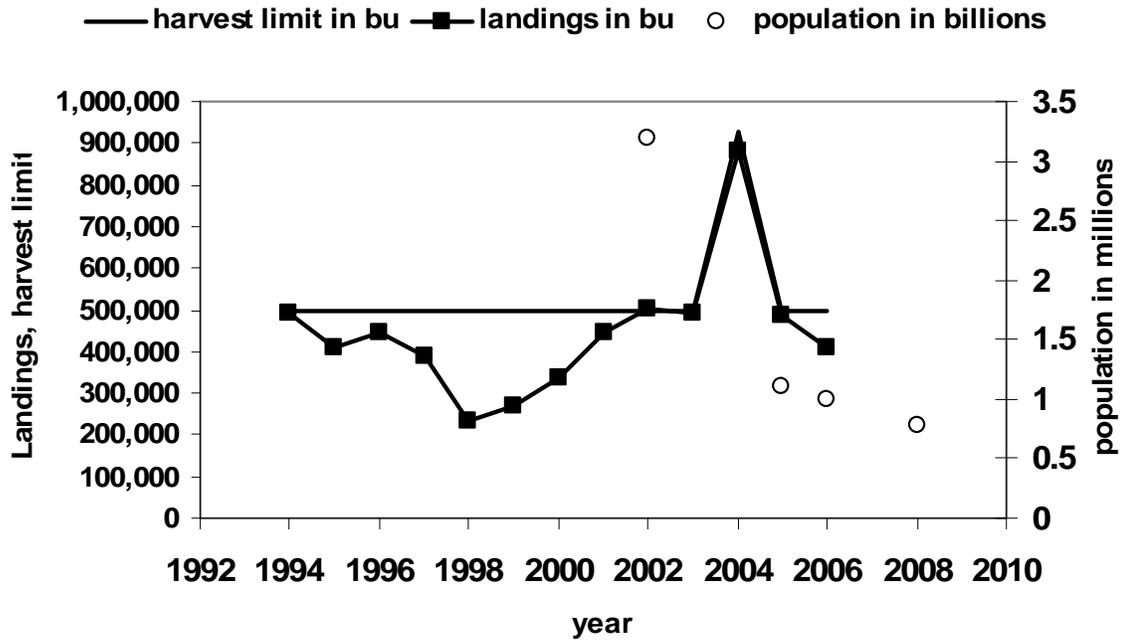
Appendix Figure A3-3. The inshore commercial clam dredge used for recent state surfclam surveys. Photo courtesy of Jeff Normant, NJDEP; William Burton, Versar, Inc.; and Beth Brandreth, USACE.



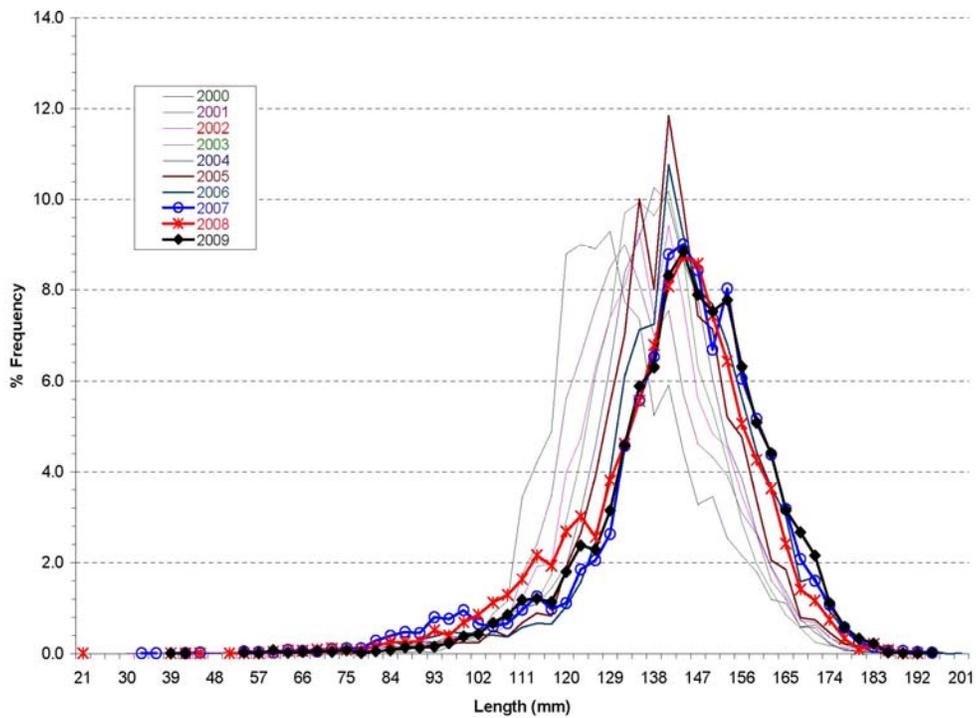
Appendix Figure A3-4. Percentage of total surfclam landings from state waters. State landings are mostly from New Jersey and New York with small amounts from Southern New England.



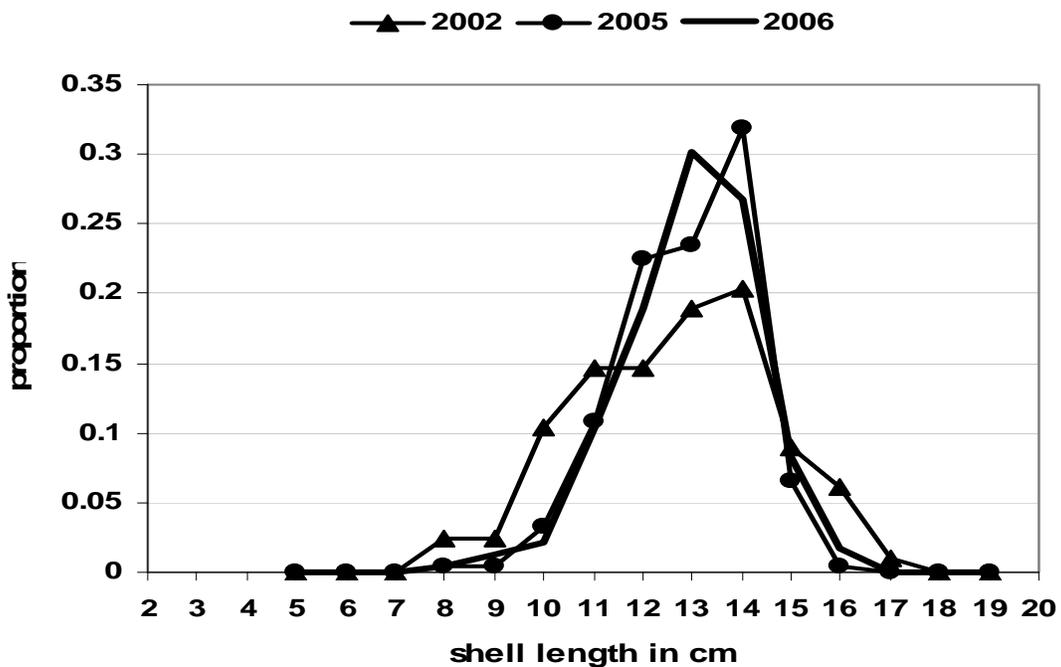
Appendix Figure A3-5. Survey-based population estimates for surfclams in New Jersey and New York for years with random stratified survey design.



Appendix Figure A3-6. Landings, harvest limit and population abundance for surfclams in New York state waters. Landings and harvest limit are scaled to the left axis and population is scaled to the right axis. The harvest limit was raised to 890,000 bushels in 2004.

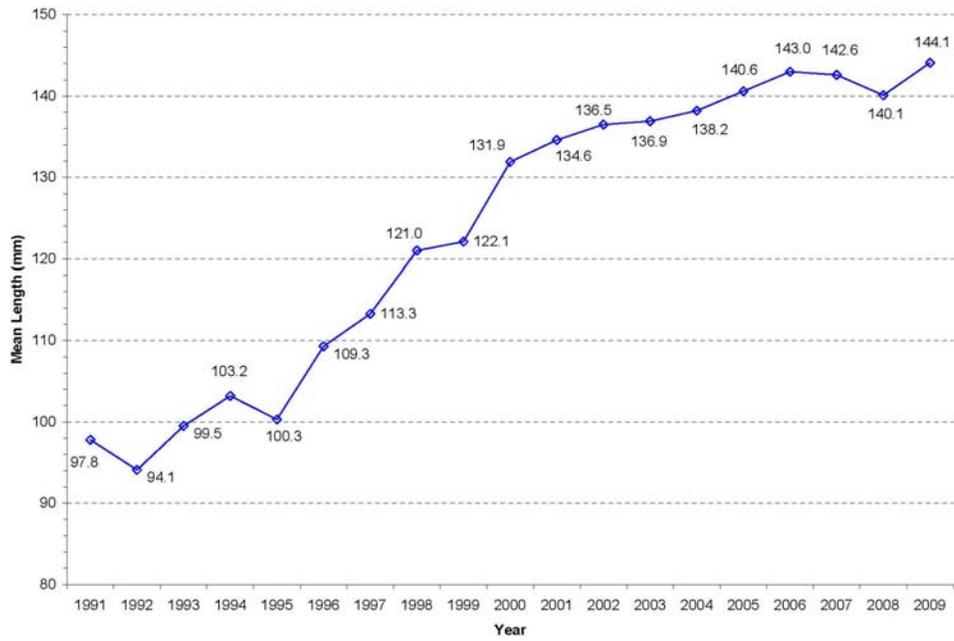


Appendix Figure A3-7. New Jersey state surfclam survey shell length composition data by year during 2000-2008. Figure courtesy of Jeff Normant, NJDEP.

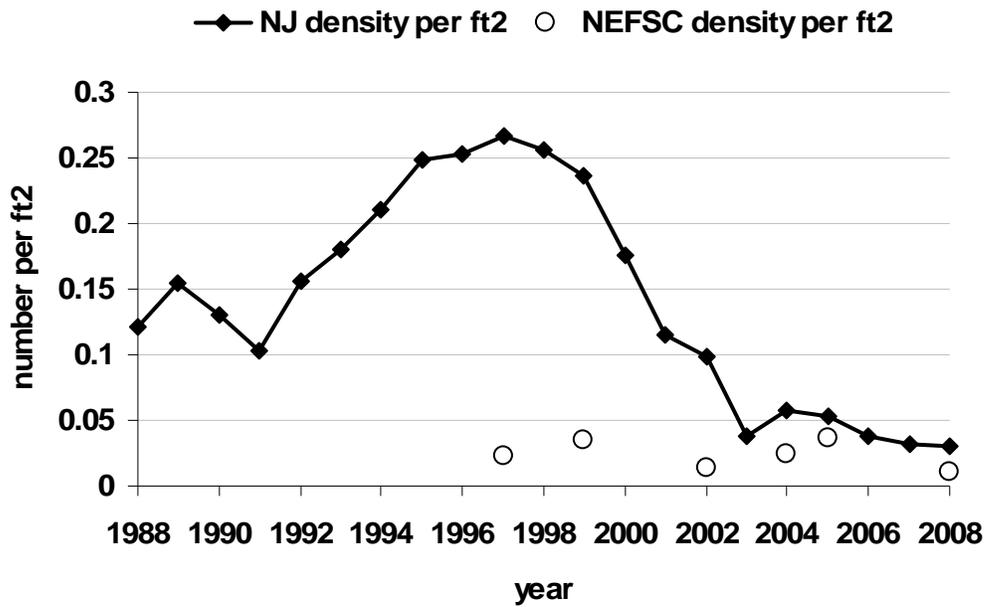


Appendix Figure A3-8. New York state surfclam survey shell length composition data during 2002, 2005 and 2006.

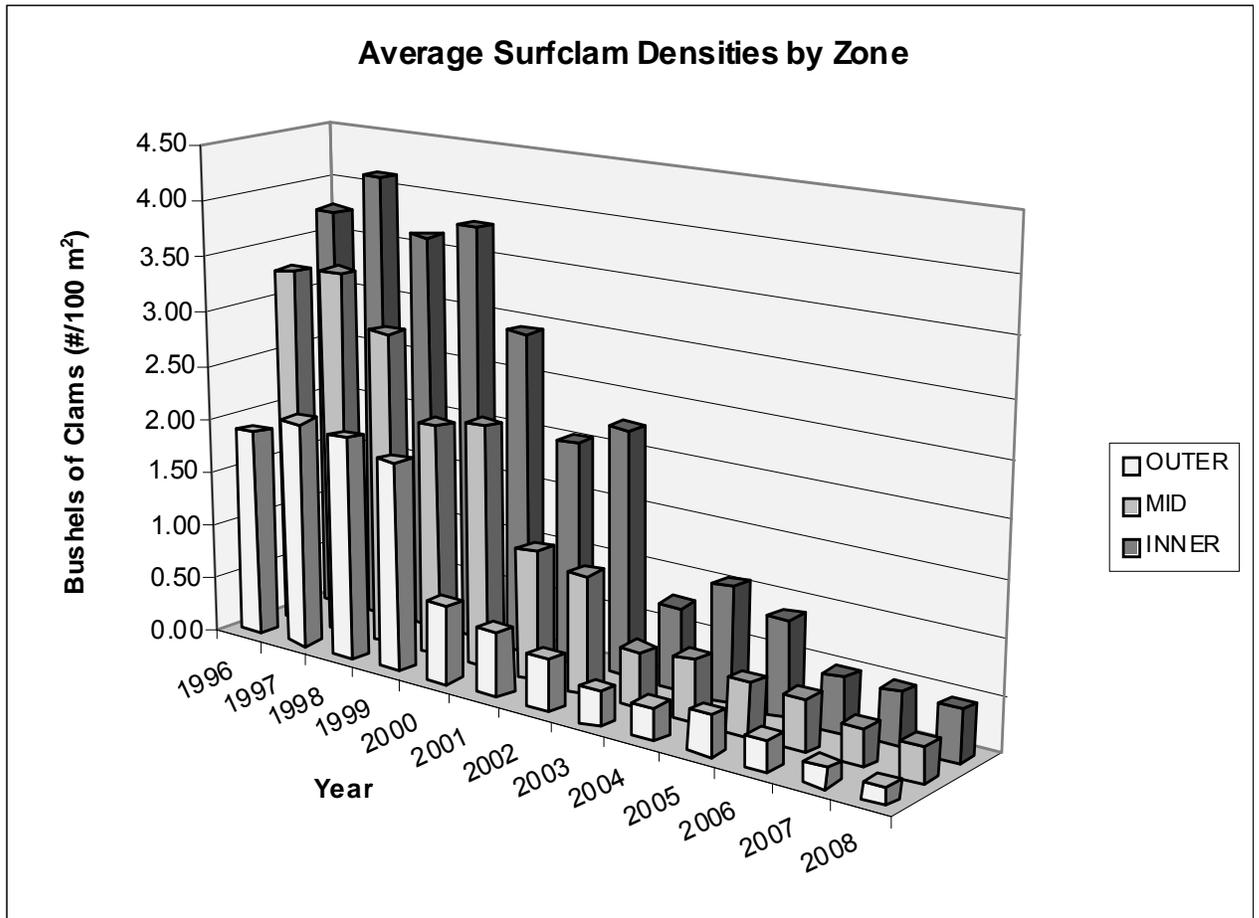
Figure 3. Mean Lengths of Surf Clams Collected by the Dredge from 1991 to 2009, New Jersey Surf Clam Inventory



Appendix Figure A3-9. Mean shell length of surfclams caught during the New Jersey state survey by year. Figure courtesy of Jeff Normant, NJDEP.

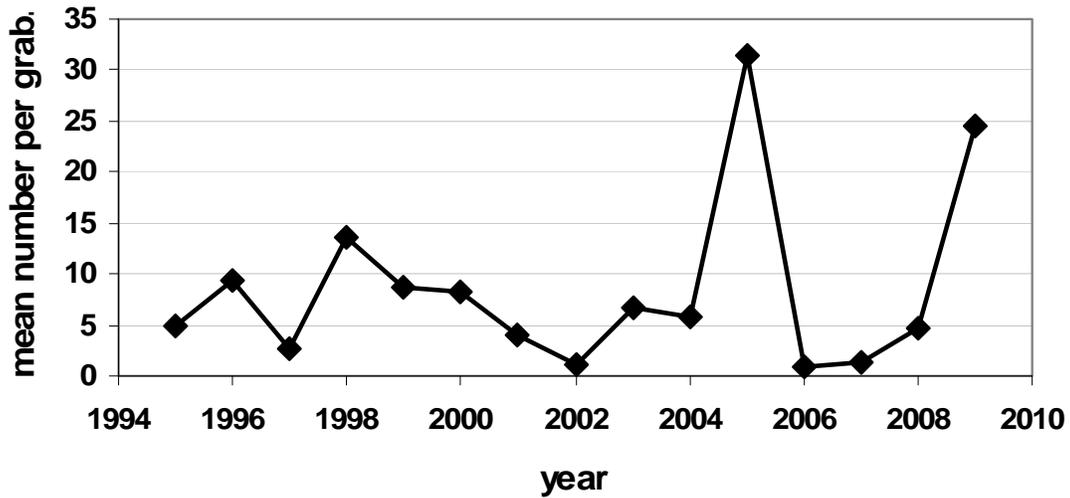


Appendix Figure A3-10. A rough comparison of density estimates from the NJ State and NEFSC surveys. However, the density estimates from the NEFSC surveys are for clams larger than 150mm, whereas the estimates for NJ are for all clams.

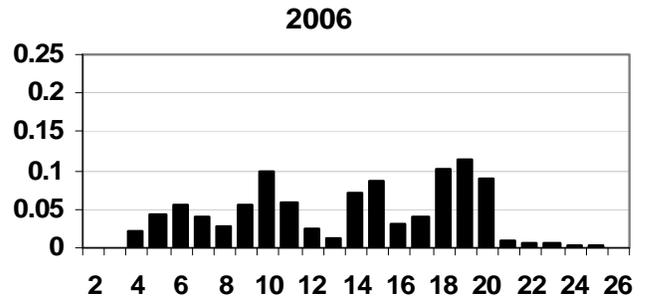
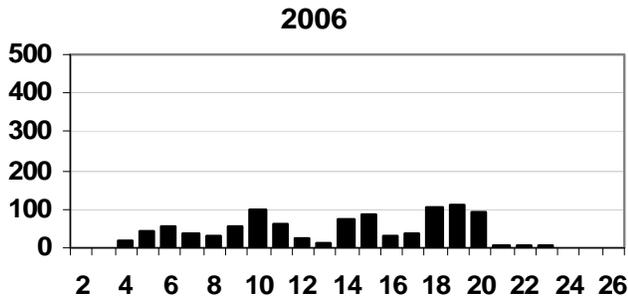
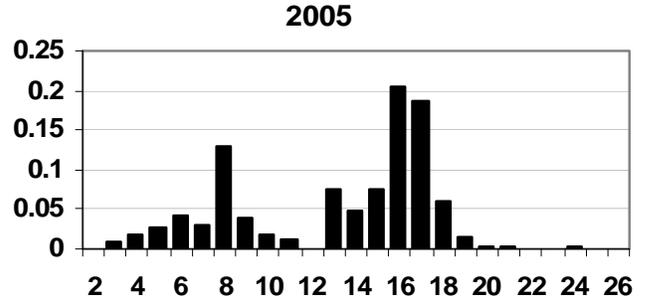
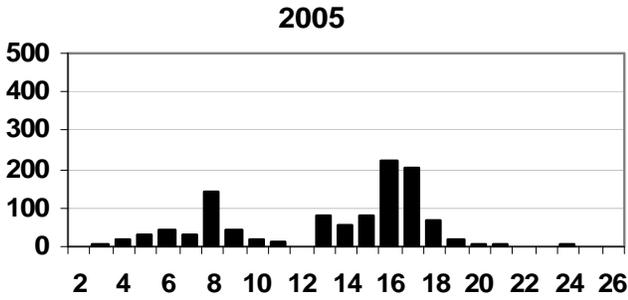
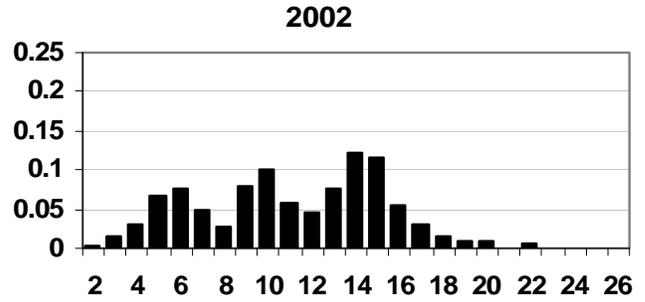
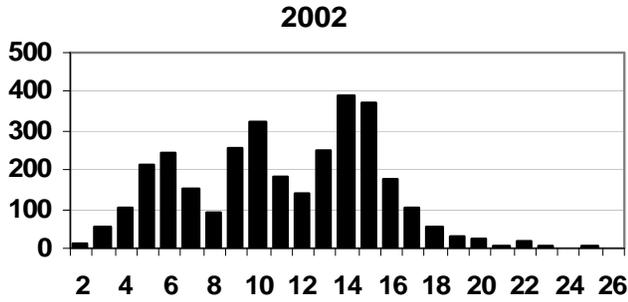


Appendix Figure A3-11. Summary of yearly surfclam densities (bushels per 100 m²) estimated for New Jersey coastal waters from 1996 through 2008 by inshore to offshore zones. Figure courtesy of Jeff Normant.

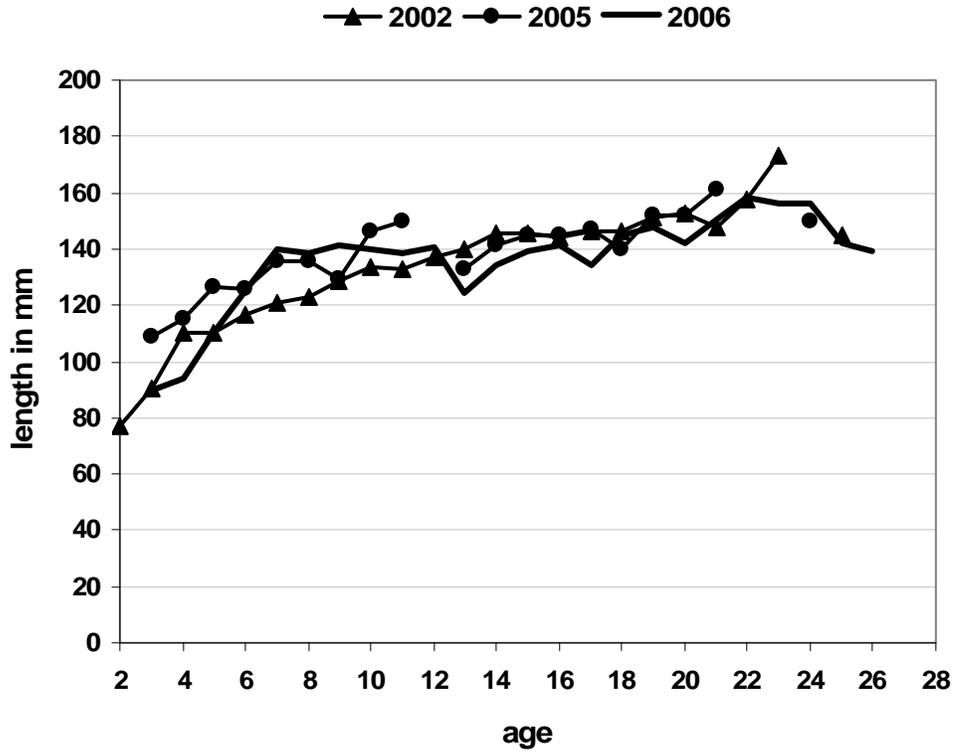
Juvenile surfclams per grab sample



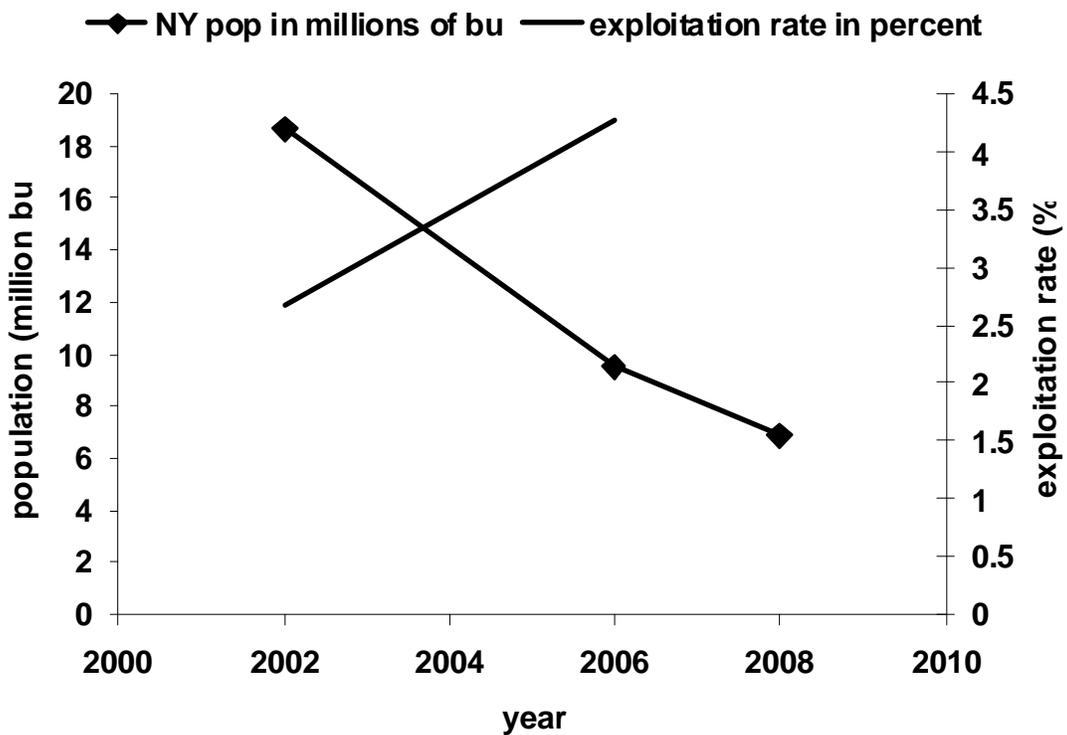
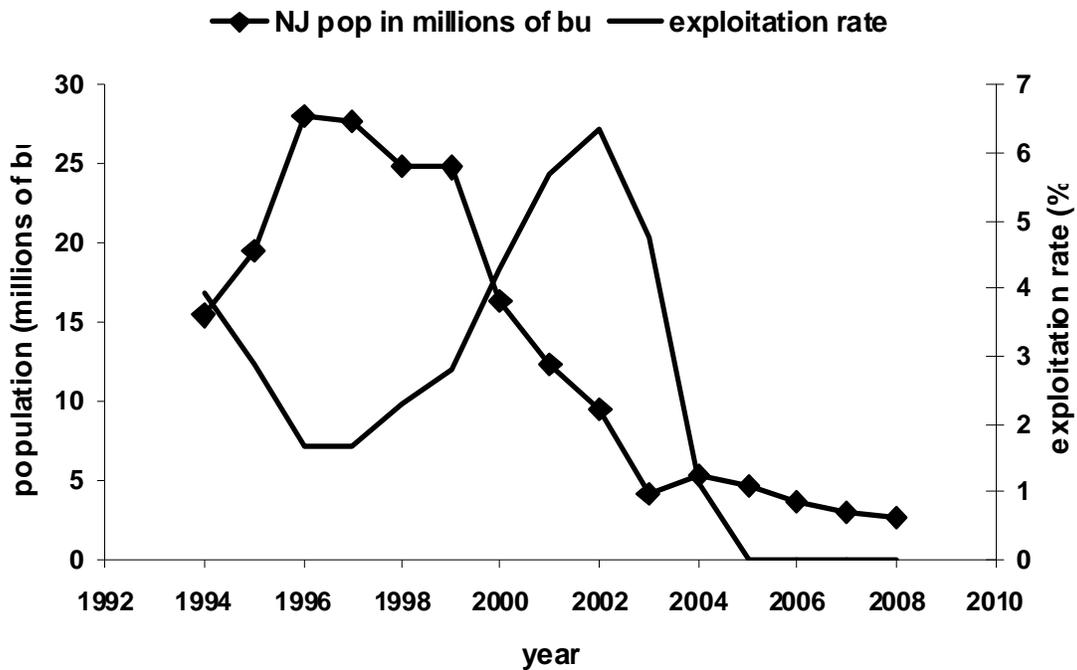
Appendix Figure A3-12. As part of the annual survey, the state of New Jersey takes sediment grab samples, which contain recently settled juvenile surfclams. The clams are generally under 10 mm SL. An average of 311 grabs are taken every survey.



Appendix Figure A3-13. Age composition data for surfclams during 2002, 2005 and 2006 from York state surfclam surveys. The graphs on the left are numbers at age in millions, and the graphs on the right are proportions at age.



Appendix Figure A3-14. Length at age for surfclams from the 2002, 2005 and 2006 New York state surveys.



Appendix Figure A3-15. Swept-area abundance and exploitation rate (landings divided by estimated abundance) for state surveys. For NJ, exploitation rates were calculated using landings from the fishing season after the survey was conducted. For NY, the landings during the same year as the survey were used.